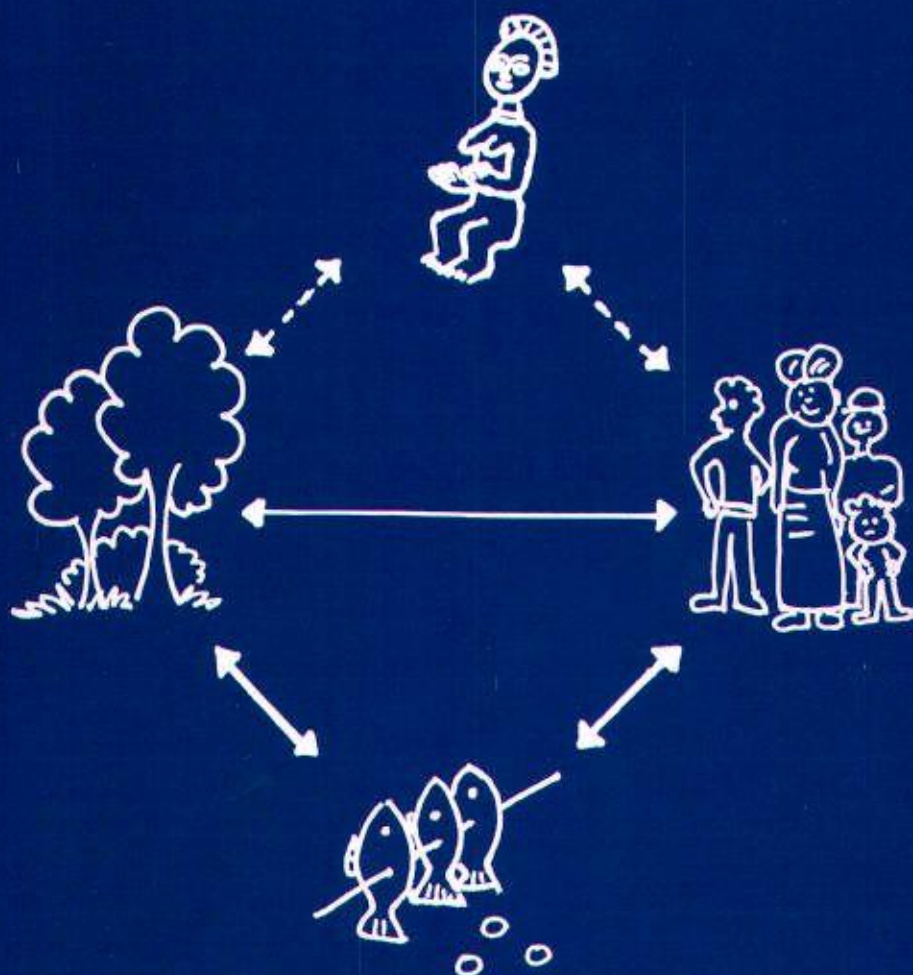# Platforms for Resource Management

Case studies of success or failure in Benin and Burkina Faso

Constant Dangbégnon

Platforms for Resource Management

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Platform for Resource Management

Case studies of success or failure in Benin and Burkina Faso

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Acronyms

AD:	Association de Développement
AKIS:	Agricultural Knowledge and Information Systems
APRETECTRA:	Association des Personnes Rénovatrices des Technologies Traditionelles
CARDER:	Centre d'Action Regionale pour le Développement Rural
CCP:	Comité Communal de Pêche
CCV:	Comité Coutumier des Vieux
CDP:	Comité Départemental de Pêche
CEBEDES:	Centre Béninois pour Développement Economique et Social
CGT:	Comité de Gestion de Terroir
CI:	Commission Interterroir
CIRAPIP:	Centre d'Information et de Recherches pour l'Auto-Promotion à l'Initiative Paysanne
CND:	Commission Nationale de la Décentralisation
CRPA:	Centre Régional de Promotion Agro-pastorale
CTOM:	Centre de Traitement des Ordure Ménagères
CVGT:	Comité Villageois de Gestion de Terroir
DCVP:	Direction du Control Vétérinaire et Phytosanitaire
DFN:	Domaine Foncier National
DP:	Direction des Pêches
DRARA:	Direction Régional de l'Agriculture et des Ressources Animales
DREEF:	Direction Régionale de l'Environnement et des Eaux et Forêts
EMP:	Equipe Mobile Pluridisciplinaire
ETF:	Equipe Technique Forestière
FCM:	Forêt Classée de Maro
GEBC:	Groupement des Exploitants de Bois et Charbon de Bois
GERN:	Projet Gestion des Ressources Naturelles
GGF:	Groupement de Gestion Forestière
GTEBC:	Groupement des Transporteurs Exploitants de Bois de chauffe et de Charbon
GVA:	Groupement Villageois des Agriculteurs
GVE:	Groupement Villageois d'Eleveurs
GVF:	Groupement Villageois Féminin
ICCO:	Dutch Church Organization
IDA:	International Development Agency
IDR:	Institut de Développement Rural
INSAE:	Institut National de Statistique et d'Analyse Economique
MARA:	Ministère de l'Agriculture et des Ressources Animales
MARP:	Méthode Active (Accélérée) de Recherche Participative
MDR:	Ministère du Développement Rural
MEE:	Ministère de l'Environnement et de l'Eau
MET:	Ministère de l'Environnement et du Tourisme
NGO:	Non-Governmental Organization

NIRP: Netherlands Israelian Research Programme
PCN: Programme Communautaire de Nutrition
PGRN: Projet de Gestion des Ressources Naturelles
PNGT: Programme National de Gestion des Terroirs
RAF: Réorganisation Agraire et Foncière
REDAD: Reseau de Développement d'Agriculture Durable
SEF: Service des Eaux et Forêts
SPEEF: Service Provincial de l'Environnement et des Eaux et Forêts
SRC: Station de Recherche sur le Cocotier
SSM: Soft System Methodology
UA: Unité d'Aménagement
UFGE: Union des Femmes de Guézin et Environs
UGF: Unité de Gestion Forestière
UGO: Unité de Gestion Opérationnelle
UNEBOC: Union des Exploitants de Bois et Charbon de bois
UPGO: Unité Provinciale de Gestion Opérationnelle
WCED: World Commission Environment Developement
ZSP: Zone Sylvo-Pastorale

1 Introduction and an Overview

1.1 Background and motivations for this study

Being employed as a research-assistant in the joint research project between the *Université Nationale du Bénin* (UNB) and the Wageningen Agricultural University (WAU) in the Netherlands (see Daane *et al*, 1997), the opportunity was offered for gaining some practical experience in anthropological research with the Adja ethnic group in the South-West of Benin. The network of the researchers[1] I belonged to, and the ideas and findings shared during this period had contributed to my motivation for pursuing research activities. Two important learning points were gained, according to me, during my participation in the research about 'indigenous knowledge systems' of the Adja people. First, the 'sophisticated' and dynamic knowledge networks among the Adja farmers were identified but we realized that they were poorly inter-linked (cf. Dangbégnon, 1990; Breusers, 1990; Dangbégnon & Brouwers, 1990; Hiddink, 1991; Dangbégnon & Brouwers, 1991bc; Brouwers, 1991,1993; Maas, 1991; Gnanglè, 1992; Brouwers *et al*, 1997). Second, there were no political and institutional frameworks for legitimizing, mobilizing and supporting these 'indigenous knowledge systems'. The efforts of the researchers were limited to the discussion with individual Adja farmers for the identification of their knowledge. These anthropological studies on the 'indigenous knowledge systems' of the Adja ethnic group were inspired by the existing literatures on this subject (e.g., Brokensha *et al*, 1980; Chambers, 1983; Richards, 1985; Darré, 1985; Beal *et al*, 1986; Röling, 1988, Röling & Engel, 1988; Chambers *et al* 1985; Warren *et al*, 1990, new edition 1995), which had served as the basis for the conceptual and theoretical orientations.

The fact that the Adja farmers' knowledge was not exchanged struck us, and the idea of doing a study to explore the role of information network (in the research area) emerged as a solution (cf. Dangbégnon & Brouwers, 1991a). Later, this initiative was encapsulated in a networking activity with a few farmers' organization, Non-Governmental Organizations (NGOs) and professionals in the research and development organizations in Benin for the promotion of 'sustainable agriculture'. This process led to the creation of the *Réseau de Développement d'Agriculture Durable*[2] (REDAD) at the beginning of 1992. The support of ILEIA (Information Centre for Low-External-Input and Sustainable Agriculture), which was already engaged in a networking for Low-External-Input and Sustainable Agriculture (LEISA), had strengthened the process. As a main activist in the REDAD movement at that moment, I faced some crucial problems. The first was the lack of a clear perspective for the facilitation of this movement. Everybody was talking about *Agriculture durable* ('sustainable agriculture') but nobody had a clear answer about the problem, defined as how to go about by mobilizing 'indigenous knowledge systems' (cf. Dangbégnon, 1994). In the ambience of the democratization process in Benin[3], there were new social dynamics and a rapid increase of the REDAD movement. The second problem was the difficult coordination of the activities in the REDAD, which involved different interest groups[4]. This period coincided with a fascinating

context in West Francophone Africa, the political shift to 'democratization' and the idea of 'decentralization' of certain powers to the local communities. All these problems were also stimulating and motivating for undertaking a research at regional/national levels to incorporate the emergence of new 'policies' and 'institutions' for socioeconomic change and rural development. Before my enrolment in research which eventually led to the present book, I was motivated and convinced that, doing a research and focusing on local groups or coalitions around specific interests would be very useful. The issue was not to focus only on individual farmers' knowledge and their farming strategies, but to create networks, and exchange information with various actors to improve the local people's natural resource base for agriculture: the importance of natural resource management.

These previous studies and activities are a source of experience before my enrolment to the research project[5] which led to the present book. My training at the WAU[6] has influenced greatly this study about the richness and the diversity of the concepts and perspectives studied: 'soft- system thinking', 'Agricultural Knowledge and Information Systems', 'actor-oriented perspective', agricultural education, gender studies, etc. Discussions within the Netherland-Israel Development Research Programme (NIRP) project and my access to literature on comparative studies from the Hebrew University of Jerusalem (HUJ) in Israel (Blum, 1991ab, 1994; Blum & Isaak, 1990) stimulated reflection and ideas in the process of the research design for the present study. A comparative analysis of case studies was adopted (see chapter 3).
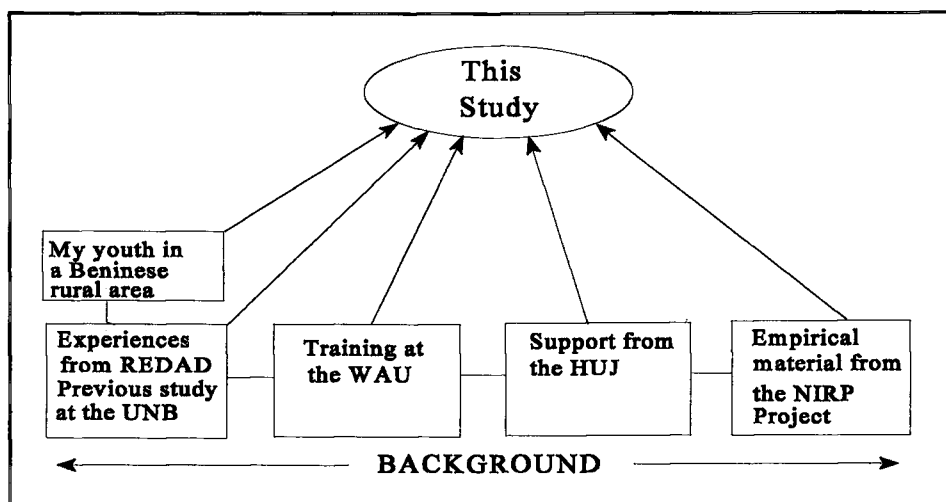
Figure 1.1:   The different background for this study

1.2   The problematic context for this study

At an early stage of the present study, the African context, especially West Francophone Africa, was targeted[7]. Many studies (e.g., Harrison, 1991) show that environmental degradation has increased seriously during the last three decades in Francophone West Africa. Problems are aggravated by natural calamities (e.g., droughts, inundation, war, etc.), capricious climatic conditions, unappropriated policies (Horowitz and Painter, 1986); poverty, and uncertainty about the world economic environment (Oasa *et al*, 1986). The awareness of such 'pathologies', has increased after the droughts of the 1970s and the 1980s, which made visible the relation between resource depletion and human hardships and suffering. The magnitude of the problem is so great that conventional public means and services are not sufficient to prevent further degradations (Breemer *et al*, 1995).

Environmental degradation is largely man-made because people have no other choice than to use methods that degrade the environment. Factors that govern changing conditions are identified as the following: mounting demographic pressure, regression of annual rains possibly as a result of deforestation, uncontrolled transhumance with anarchical exploitation of space, unadapted *systèmes d'exploitation et de gestion des ressources naturelles*[8] and endemic drought of Sahelian countries (PNGT, 1995; PAE, 1993). Successful responses to such problems can be expected under experiential, flexible and adaptive processes. In Mali for example, the degradation of common pastures, severe erosion and soil mining, are ongoing features which have led to a shift of the official mandate from Farming System Research to natural resource management (Defoer & Hilhorst, 1995:3).

Beyond the specific experience with REDAD, the problematic context in West Francophone Africa was realized through a *prise de conscience* with respect to the emerging severe ecological crises. This issue had emerged and had become an important problem which mobilized donors, governments, policy makers, researchers and development professionals. The use of the *Gestion des Terroirs* (a French approach to natural resource management) in the wider context of Francophone West Africa, i.e., Mali (see Souleymane *et al*, 1994); Burkina Faso (see Van der Hoek *et al*, 1993; Boer & Kessler, 1994); in Niger (see Briel *et al*, 1994), and in Benin the *Projet de Gestion des Ressources Naturelles* (PGRN) was perceived as a challenge for natural resource management to resolving problems related to environmental degradation. However, much work has to be done in this domain (Toulmin, 1993).

The NIRP project provided the room to focus on 'natural resource management' (for the moment, but later 'resource management' and 'adaptive resource management' will be used). The assumption was that by improved collective management of natural resources and by using indigenous knowledge in a participatory decision making, an improvement in rural development intervention can be achieved (pers. com. Prof. A. Blum).

1.3 The focus and main purpose of this study

'Natural resource management' studies attracts many disciplines in the natural sciences (e.g., biology, ecology) and the social sciences (e.g., anthropology, sociology, social psychology, economics, etc.). From that point of view, a distinction is made between the biophysical, economics, and social actor perspectives (Röling, 1994).

The biophysical perspective uses simulation and other techniques to develop the models that can be used for controlling natural resource dynamics or for predicting the consequences of the actions of the people who live with the natural resources.

The economics' perspective differs from the first and focuses on the people's behavior. However, they are assumed to have a goal which is based on the maximization of the 'utility function' of their action. Therefore, models are developed for this purpose. Still, the complex nature of human is being ignored. There are studies which focus on the political theory and policy analysis to explore the conditions for the exploitation of natural resources (e.g., Ostrom, 1990). A particular aspect of the environment (e.g., property rights and public policy) for economic growth (e.g., Bromley, 1991) can also be a subject of studies.

The social actor perspective considers people as intentional beings. Unlike the economists' perspective, different goals depend on specific values and aspirations. These goals are sometimes conflicting and require accommodating strategies. In this perspective, many studies try to understand the use and the perception of natural resources by people and conflicts that emerge from interdependent resource use (e.g., Benda-Beckmann, 1992, 1995; Fairhead 1992; Croll and Parkin, 1992; Breemer *et al* 1995).

There are also several studies of natural resource management which combine different perspectives. This strategy is emerging in response, according to me, to the complex situations involved on the issue of natural resource management. The examples are many but one can mention Hanna *et al* (1996) who analyze the issue of 'property rights institutions' for natural systems from ecological, economic, cultural and political dimensions; and Perring *et al* (1995) who try to understand the issue of 'biodiversity loss' by integrating ecological and economic approach. Gundersun *et al*, (1995) integrate ecological and social science perspectives to learn about ways and strategies for surmounting barriers in other to renew ecosystems and institutions through 'adaptive management'. A growing number of studies in the field of 'natural resource management' has yielded important empirical material for the understanding of phenomena and problems involved in this issue. Yet very few studies (e.g., Röling, 1994, 1997, 1998; Maarleveld *et al*, 1997) provide 'theories', empirical materials or conditions for the facilitation of a systematic process whereby the natural resources can be regenerated as well as the amelioration of the conditions of the people who use them. The present study will focus on such a similar process.

Its main purpose is to explore the conditions for negotiated agreement or concerted action in critical natural resource use situations or through interactions between various stakeholders. In other words, the present study focuses on the 'soft-side' (cf Röling, 1997) of natural resource management.

To avoid confusion around the key concept 'natural resources' in the statement above, it seems essential to distinguish between the 'natural resource system' (example: a lake fishery, a forest) and the 'natural resource units' (example: fish for of a lake fishery, a tree for a forest). This conceptual problem, which is also raised by Ostrom (1990: 30), needs to be clarified in order to make visible what will be considered in the need to be 'managed'. The present study focuses primarily on the 'natural resources units' but it gives a particular attention to the nature and characteristics (e.g., complexity, organizing principles) of the natural resource systems (called later 'ecosystems') for the management of the 'natural resource units'.

1.4   A constructivist perspective in this book

Ways and the nature of knowing about reality are discussed to explain the underlying epistemology for the present study. The content of this book does not apply to the realist-positivist way of thinking, which assumes that 'there is a reality 'out there' which exists independently of anyone observing it, so that objective knowledge about that reality can be acquired as scientific and value-neutral truth. Studying natural resource management issues under these assumptions would involve for instance, on the one hand, the discovery of the causes and effects in the ecosystems and the design of strategies for an effective control. On the other, the behavior of the stakeholders and the impacts of their actions on the ecosystems they depend on, can be predicted. Therefore adequate policy measures can be taken, or research activities can identify the adequate innovations or technologies which can be transferred as the solutions to the problems.

The constructivist perspective is adopted in this book. A major assumption is that there exist multiple realities depending on sense making processes, i.e., the meaning given to it by different people like the stakeholders, the researchers, the policy makers, the development professionals, the donors, etc. For instance, knowledge about natural resource management is socially constructed (e.g., Berger & Luckmann, 1967) and reconstructed (e.g., Kloppenburg, 1991). Research activities, especially in laboratories, needs to be questioned with regard to their contextual and/or situational nature (e.g., Knorr-Cetina, 1981; Latour, 1987, 1994).

'The investigator and the object of investigation are assumed to be interactively linked so that the "findings" *are literally created* as the investigation proceeds' (Guba & Lincoln, 1994: 111). A problem is how the investigator (a researcher) and the object of investigation (e.g., resource users, intervention) know what they know? This question is critical for positioning the constructivist paradigm used for the present study which aims to generate a fresh perspective for natural resource management. Röling (1996: 41) warns about the danger of relativism-constructivism[9] by arguing that 'it is too easy to think that every construction can be deconstructed ... '. The most important underlying epistemology for a relativist is the construction of reality from the viewpoint of vested interests and power politics (Röling, 1996). But, as will be clear in this book, many natural resource management situations are problematic in the sense that the resource users, development professionals, policy making are

seeking for alternative solutions without knowing what to do. For that reason, I distance myself from the relativist stance. Accordingly with Scott & Shore (1979), if a research aims to provide a fresh perspective for empowering actions in resolving for instance NRM 'problems', it is important to comprehend another position: one which begins and ends with alternative perspectives. But how does one begin a perspective and what is the justification of ways of formulating it?

Mental mechanisms of the knower (a researcher) are determinant for thinking about perspectives. Existing background such as training, normative referential, practical experiences, ambitions, etc., are cognitive experience involve in the knower in a personal way. Writing chapter 2 of this book is an example. Knowing is effective action, that is operating effectively in the domain of existence (Maturala & Varela, 1992).

Röling & Wagemakers (1998) explain this way of knowing. They refer to the work of Maturala & Varela (1992) to argue that the external (social and biophysical) environment does not project itself objectively on the nervous system. The brain is an informationally closed system that reconstructs an external environment only from environmental 'triggers', memories and interaction with itself.

1.5   The structure of this book and an overview of its content

The structure of the book consists of three different parts. Each part forms a building block which contains one or more chapters. An introductory chapter gives the orientation of this book based on a discussion about its nature, the main purpose, and an overview of its different parts.

Part 1 consists of 2 chapters (chapter 2 and 3). Chapter 2 focuses on the problems and perspectives use for the study. It presents some ideas and concepts which are used for the analysis of the case studies (in part 2) and represents a core of this book. Key concepts in normative frameworks for the facilitation of intervention processes, be they Transfer of Technology, Farm Management, or Ecologically-Sound Agriculture (see Röling & Jiggins, 1998), have influenced the development of the perspectives used (in chapter 2). These concepts are: practices, learning, facilitation of learning, support institutions, and conducive policies. Chapter 3 discusses methodologies for this study. The two chapters in part 1 constitute a whole, and the second chapter complements the first one.

Part 2 consists of six case studies and six chapters. Each case study forms one chapter, has a different feature, and leads to a specific conclusion. Four case studies were selected in Benin and the two others in Burkina Faso (see §3.4)(see their location in map 1.1).

Map 1.1: Research locations in Benin and Burkina Faso

Burkina Faso

Research Locations
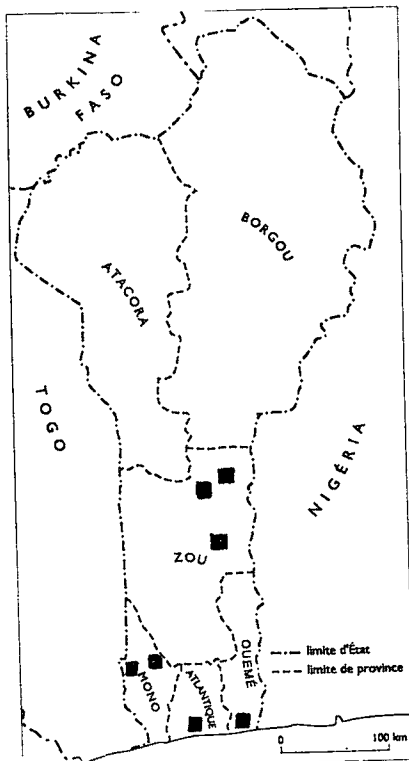
Research Locations

The first case study (chapter 4) focuses on the analysis of the evolution of the Lake Aheme fishery problem from the pre-colonial time (before 1894), where a successful indigenous organization was operational, to the recent democratization processes in Benin, a period during which an impasse emerged with respect to the governance of the lake. The fifth case study (chapter 8) of the *Forêt Classée de Maro* in Burkina Faso follows the same analytical path. The analysis is based on the evolution of the forestry problems from indigenous regulations to the recent intervention of the *Programme National de Gestion des Terroirs* based on a participatory regeneration of the forest with the villagers.

The second case study (chapter 5) concerns the management of 'resources' in rangeland ecosystems in the particular community of the *Chabe* ethnic group in the central part of Benin. The analysis focuses on the problems (e.g., crops eaten by cows, conflicts, and war) which emerge from the relationships between *Chabe* people and the herders who are sharing the same space for cultivation and herding. The sixth case study (chapter 9) on the *aménagement* of a *zone sylvo-pastorale* discusses the same problems in Burkina Faso. The need to initiate a process of the *aménagement* of a *zone sylvo-pastorale* (ZSP) by the *Programme Nationale de Gestion des Terroirs* results from the severe problems of transhumance, crop damage, clashing interests and conflicts between herders (cattle keepers) and crop-farmers (the native Bobo and the migrant Mossi). The Benin case focuses on two different attempts to resolve the problems: the first concerns what the stakeholders (*Chabe* people and herders) themselves do, and the second concerns an innovative intervention by a project which uses an approach called '*Appui-Conseil*'. In Burkina, the *aménagement* of a (ZSP) is a programme with the objective of realizing a (ZSP) (tree planting and herding zone). The analysis of this case focuses on two phenomena: (i) progress in the process towards the realization of a ZSP, and (ii) anticipation on some problems which can emerge, for instance, the maintenance of watering place, the protection of the trees (which will be planted), etc.

The third case study (chapter 6) concerns watershed development in two different eco-zones of Benin: high rainfall (South-West) and savannah (central part). The problems in this case concerns the degradation of land (e.g., soil erosion) in the two different eco-zones. The problems had specific features depending on the existing farming practices of the stakeholders who are living in the watersheds (Adja people in the high rainfall area and Mahi people in the savannah area). Chapter 6 focuses on the analysis of the facilitation of the resolution of problems in the two different eco-zones by the intervention of the *Projet de Gestion des Ressources Naturelles*.

The fourth case study (chapter 7) concerns 'resource-flow management' by a women group in Djeffa, South-East of Benin. The problems discussed are about the ways the fertility of the soils is improved for horticulture. Chapter 7 focuses on two different contexts for the analysis of the problems: before, and during the democratization process in Benin. In taking into account the shift in the global political systems (from 'Marxist' to 'Liberal' regime after 1990 it was possible to analyze two different situations. The first is characterized by the control of development organizations by the government. The second coincided with the opening of the intervention web which created several opportunities for the women's group.

Chapter 7 focuses on the analysis of the dynamic of the women's group and the role of the facilitation of collective action for 'resource-flow management by the NGOs, especially the REDAD.

Part 3 consists of two chapters. The first (chapter 10) presents a synthesis and a comparative analysis of the case studies in Part 2. Insights are gained about the concepts developed in the perspectives that are used to analyze the case studies. The second (chapter 11) discusses the conclusions and the recommendations for the present study.

Table 1.1 presents the overall structure of this book.

Table 1.1: Structure of the book

BUILDING BLOCKS	CONTENT	
	Chapter 01:	Introduction and an overview
PART 1:		
Problems & Perspectives	Chapter 02:	Problems and Perspectives
Paradigms & Methodologies	Chapter 03:	Paradigms and methodologies
	Chapter 04:	Breaking impasse: the evolution of platform for Lake Aheme's resource management
PART 2:	Chapter 05:	Overcoming barriers: developing platforms for rangeland resource management with *Chabe* people in Benin
Case Studies	Chapter 06:	Scaling up watershed development with indigenous people in two eco-zones of Benin
	Chapter 07:	Collective action and Resource-Flow Management for improving soil fertility by a Women's Group in Djeffa, Benin
	Chapter 08:	Regenerating the Maro Forest in Burkina Faso: the evolution of platforms for resource management
	Chapter 09:	Developing platforms for the *Gestion* of a Zone Sylvo-Pastorale in Burkina-Faso
PART 3:	Chapter 10:	Synthesis and Comparative Analysis
Synthesis and Conclusions	Chapter 11:	Conclusions and recommendations

Notes

1. The network of researchers concerns the dutch and the beninese students who did their research on the Adja people's knowledge under the supervision of Jan Brouwers (see Brouwers 1993: 47), lecturer at the Faculté des Sciences Agronomiques of the UNB. This network was exchanging experiences with another network (project UNIHO-DRA: research project between the University of Hohenheim in Germany and the actual *Institut National de la Recherche Agricole du Bénin* called INRAB) of researchers (see Floquet, 1994) who were doing research in the central part of Benin on the Ayizo and the Fon people's knowledge. Many doctorate studies were also done in Benin before the present study: Agbo, 1991; Tossou, 1995; Mongbo, 1995; and Vodouhê, 1996.

2. The main aim of the REDAD was to promote the '*agriculture durable*' (sustainable agriculture). The objectives of the REDAD were: (a) to create a linkage between farmers' organizations and NGOs, professionals in research and development activities, in order to strengthen local capacities in sustainable agriculture practices; (b) to exchange information on indigenous knowledge, and experiences related to sustainable agriculture (through joint field visits, newsletters, on-farm trial visits etc.); (c) to create a link between farmers' organizations and international development organizations/donors, so that they can be further active in the negotiation of their own "development" (see chapter 7).

3. During the democratization process, a political decision was made about the freedom to create any political, cultural or socioeconomic 'organizations' or 'associations' (before the government only could do that). This situation has favoured the emergence of many initiatives in Benin. Therefore, there was a tremendous increase of the number of NGOs and farmers' organizations in the REDAD.

4. All the farmers' organizations were motivated to get money for their activities even if there were no constraints which needed funding. Individual members of the REDAD (called resource-persons) were motivated to give punctual assistance in order to have money. The NGOs were motivated to provide technical assistance and get money even if they lacked a clear perspective to organize a collective learning with the farmers' organization (see chapter 7, §7.5).

5. The research project concerns the NIRP (Netherlands-Israel Development Research Programme) in Benin. It is entitled: "The knowledge systems to facilitate sustainable agriculture. The West African Case". It is a joint research project which involved Prof. Dr. A. Blum (coordinator) of the Hebrew University of Jerusalem in Israel; Prof. Dr. Ir. N. Röling (principal investigator) and Ir. S. Nederlof (research-fellow) of the Wageningen Agricultural University in the Netherlands; Dr. Ir. R.C. Tossou (principal investigator) and Ir. C. Dangbégnon (research-fellow) of the Université Nationale du Bénin.

6. I did my M.Sc. degree in Management of Agricultural Knowledge Systems (MAKS) at WAU within the NIRP project.

7. The NIRP research project was designed for the West Africa case.

8. These concepts have a broader meaning than the concepts 'farming system' and natural resource management in English. *Systèmes d'exploitation et de gestion des ressources naturelles* refer to social organizations, technologies used, land tenure and economic issues, cropping systems, farming system.

9. According to Cole (1994: 4-5), 'the approach to the sociology of science dominant today was first called "relativism-constructivism" and is now commonly referred to as "social constructivism".

Part 1: Problems, Perspectives & Methodologies

2   Problems and Perspectives for Adaptive Resource Management

There are solutions to the major problems of our time; some of them even simple. But they require a radical shift in our perceptions, our thinking, our values. And, indeed, we are now at the beginning of such a fundamental change of worldview in science and society, a change of paradigms as radical as the Copernican Revolution (Capra 1996: 4).

2.1   Introduction

This chapter[1] deals with the problems and perspectives for 'Adaptive Resource Management' (ARM). The problems are defined in a framework to capture the multiple dimensions involved: they can be identified either at the level of 'ecosystems' or 'stakeholders', and/or both. From that point of view, perspectives are elaborated on 'coupled systems thinking' with the recognition of social dynamics in resource use situations. The main purpose of this chapter is to assemble concepts, 'models' and concrete ideas for inquiry about ARM. The chapter starts, first, with the definition of key concepts. Second, resource management problems will be defined. This step enables the identification of a path towards the elaboration of perspectives (paragraphs §2.4 to §2.8). Finally, the research problem statement, objectives, research questions, and the relevance, will be discussed.

2.2   Ecosystems, stakeholders, and regenerative practices

Ecosystems: structure description, biodiversity and ecological services

Ecosystems structure description
The main concern in this study is the renewable natural (and man-made) systems such as fisheries, rangelands, watersheds, forests, wildlife, groundwater resources, farming areas etc. These can be aggregated as 'water and soil in conjunction with the plant and animal populations they support, often referred to as biomass' (Uphoff, 1986: 20).

'An ecosystem consists of plants, animals, and microorganisms which live in biological communities and which interact with each other and with the physical and chemical environment, with adjacent ecosystems, and with the atmosphere. The structure and functioning of an ecosystem is sustained by synergistic feedbacks between organisms and the environment' (Costenza & Folke, 1996: 13-4).

Ecosystems refer to the structural and functional interrelationships among living organisms and the physical environment within which they exist. Therefore a distinction can

be made between fishery ecosystems, rangelands ecosystems, watersheds ecosystems, forests ecosystems, etc. Farming is described as an agroecosystem (Conway, 1986, 1994).

Ecosystems are open-systems which transform inputs into outputs. The structure of ecosystems can be defined as energy flow interdependence, both directly and indirectly of each species, components, upon the other, at any prescribed time (Hannon, 1973). It enables interaction among components, and some functions such as conversion, cycling, and transfer to other systems of materials and critical chemicals that affect the renewability of ecosystems. Five elements can be distinguished in all ecosystems: inputs, components, interactions, outputs and boundaries. Components can be individual organisms in a population, or various populations in a biological communities. Their arrangement defines the organizing principles (vertical and/or horizontal). Boundaries are not always clearly known, and can be (as this will be explained later) purposefully or opportunistically set. Ecosystems are empirical systems that must be described to understand the characteristics and the organizing principles. The processes whereby inputs are transformed into outputs are triggered by biodiversity and ecological services.

Biodiversity and Ecological services in Ecosystems

Biodiversity is referred to as genetic, species, and (recently) ecosystem diversity. Accordingly with Costanza and Folke (1996), genetic and species diversity provides the units through which energy and materials flow, giving the ecosystem its functional properties. For example, soil flora (bacteria, actinomycetes, fungi, algae) and fauna (protozoa, nematodes, collemboles, beetles, centipedes, millipedes, ants, termites, rodents, moles etc.) play a major role in many soils processes and soil plant interactions: soil formation, soil structure creation, biomass decomposition to humus, nitrogen fixation, mineralization to free nutrient for plant growth, phosphate solubilization and uptake of nutrients by plant roots, etc. (Reijntjes, *et al*, 1992: 62). A previous study reveals, in a region called Adja plateau (Benin), that a severe degradation of lands leads to the cessation of soil life and to *champs comateux*, where plants can grow only if special management is applied (Brouwers, 1993: 74).

'Ecological services' are the tasks performed by the biotic and abiotic components of ecosystems for obtaining natural resources to human needs such as fish, pasture, fodder, crop-farm, trees, water (in catchment), oxygen (from photosynthesis). Costanza & Folke (1996: 17) argue that ecological services include the maintenance of the composition of the atmosphere; amelioration of climate, provision of food; maintenance of species and a vast genetic library; and also maintenance of the scenery of the landscape, the recreational sites, and aesthetic and amenity values. In that view, ecological services are perceived to support human activities or affect human well-being. The malfunctioning of ecological services can endanger the 'health' of ecosystems. Box 2.1 provides concrete examples of ecological services generated by ecosystems, and which enable the production of 'natural resources'.

Box 2.1: Example of ecological services which enable the production of natural resources

Provision services: capturing CO2 for photosynthesis; fixation of solar energy; fixation of nitrogen by growing plants; pollination of plants through natural processes; recapturing leached nutrients by deep rooting trees and grasses; recharge of water catchments and groundwater for several uses; securing favorable water and soil conditions (ecological niche); etc.

Production services: Assimilation, storage and recycling of waste; formation of topsoil and maintenance of soil fertility; biomass production (e.g., food-crops, fish, meat, pasture, woodlot); etc.

Regulation services: regulation of chemical compositions in inland fisheries depending on seasons; regulation of floods and runoff through hydrological cycle processes; prevention of soil erosion (natural vegetation cover); etc.

(Adapted from Costanza & Folke, 1996: 18).

Stakeholders and resource management

Stakeholders, be they farmers, herders, fishers, agroforesters, horticulturalists, irrigators, etc., are those who are directly concerned by the use of 'resources' generated or available through ecosystems. They are engaged in various activities by interfering with, and exploiting 'resources' in ecosystems for their subsistence. Stakeholders include all those who affect and/or are affected by the policies, decisions, critical events (collective impact of 'resources' depletion) with respect to the ecosystem under siege. Stakeholders can be identified on the basis of their interests on the ecosystem under siege, the practices they use and the type of 'rights', responsibilities and duties they have.

Stakeholders appropriate 'natural resources' for their livelihood. To avoid confusion, it is essential to clarify some concepts: 'natural resources', 'resources' and 'resource use'.

In this study, the concept 'natural resource' means all kinds of goods which stakeholders appropriate from ecosystems for their livelihood. These goods are not joint-use, but are subtractable, i.e., their appropriation by a stakeholder creates a diminution for the others (cf. Oakerson, 1992; Knudsen, 1995). In concrete term, fish stock harvested by one, is not there for someone else, the same thing for pastures consumed by one herder's flock. I consider these natural resources as common goods.

There are other types of 'natural resources' characterized by joint-use, which means one's consumption does not create the diminution for the others (e.g., air, oxygen, forest beauty). Infrastructures such as irrigation canalization, firebreaks, linked to ecosystems are also characterized by joint-use. They help exploit common goods (e.g., irrigation water) or maintain ecosystems in a better condition (firebreak). The consumption of joint-use natural resources and infrastructures poses the problem of exclusion, as Baden (1977: 138) puts it: 'people cannot be excluded from its consumption; in other words, property rights cannot readily be established ...'. I consider the goods characterized by joint-use as public goods (this concept will be later used also for 'institutions' and 'organizations'). The concept 'goods' is an economic term (cf. Samuelson, 1954 quoted by Bruin, 1991: 114-6). In this study, it is used strategically, which means that the common goods can increase and decrease and the quality of both the public goods can change through spatio-temporal scales. 'Resources'

concern common goods and public goods. Resource use means the appropriation of goods from ecosystems (example of fish stock).

Regenerative practices on ecosystems

Regenerative practices are applied ecological principles and all kinds of measures and actions that work to restore the productivity, functioning, resilience and the continuity of ecosystems. Measures and actions can be based on socioeconomic, political and cultural principles which will be explained below.

Ecological principles for regenerative practices

Inspirations from LEISA (Low-External-Input and Sustainable Agriculture) principles (Reijntjes *et al*, 1992) let me argue that ecological principles for regenerative practices can be grouped as follows:

- Securing and creating favorable conditions for ecological services to happen (e.g., habitat protection, soil conservation, mangrove protection, tree planting).
- Optimizing biodiversity for ecosystems' functioning and continuity (avoiding biodiversity loss, protecting keystone species for instance the role of bees in natural pollination, maintaining natural vegetation cover for water recharge, run-off regulation, soil erosion prevention, closing cycles, increasing biomass, etc.).
- Minimizing effects that endanger the effectiveness of ecological services (e.g., overuse of natural resources such as common goods, pollution, negative agricultural practices).
- Designing alternative ecological practices to respond to critical changing patterns of ecosystems (e.g., organic matter production, afforestation, water retention, increase water level, etc.).

Socioeconomic, political and cultural principles of regenerative practices

Inspirations from the works Pretty (1995), Hanna *et al* (1996), Benda-Beckmann (1995), and Wiber & Kearney (1996) stimulate me to argue that these can be grouped as the follows:

- Mobilizing - in face of imperfect knowledge - information from stakeholders to monitor the changing patterns of ecosystems.
- Rationing the use of natural resources, especially the common goods (e.g., stinting, quota).
- Restoring a taxation system for the maintenance of ecosystem (e.g., group membership cost, exploitation taxes).
- Involving local organizations in decision making processes about ecosystems.
- Defining institutions and policies that ensure a good governability of ecosystems (e.g., law, regulation, property rights institutions, monitoring systems).

2.3   Framing the problems of resources management

Emerging issues such as ecological, economic and social valuation of natural resources, in ecosystems, call for, in the one hand, the maintenance of biodiversity and ecological services for the functioning of ecosystems; and the other, the allocation (or exploitation), in many situations, of scarce natural resources between competing wants. But not all natural resources have the same values. The direct value results from the satisfaction of stakeholders 'needs', and the indirect one can be perceived from ecological services and the role of biodiversity for ecosystems functioning. The loss of biodiversity or the perturbation of ecological services may generate environmental feedback (at the level of ecosystems) and collective negative consequences for stakeholders. Natural resources' valuation can be biased by anthropocentric values, which means the emphasis on stakeholders' needs in particular and economic growth in general, while the ecological dimensions, the need to maintain ecosystems in good health, are forgotten. From that point of view, the problem of resource management can be framed as having three dimensions: (i) the use of scarce natural resources; (ii) degradation of ecosystems and critical events; and (iii) the maintenance of ecosystems in good health.

The problem of natural resources' scarcity and stakeholders' behaviour

Assuming 'scarcity' of natural resources - only of common goods because of their subtractive characteristics - emerges from the evidence that not all situations of their use are problematic. Problems occur 'where joint use of ecosystems and subtractive benefits are coupled with scarcity, and where in consequence joint users start to interfere with each other's use (cf. Wade, 1988: 184). The situations where scarcity is not so, will be discussed later as organization and coordination problems. From the use of scarce natural resources, stakeholders will face the problem of resource flow allocation in a competitive arena (Ostrom, 1990). Hardin (1968) predicts the 'Tragedy of the Commons' in such situations, if stakeholders have complete freedom, and there is no control over the access to the ecosystems which hold scarce common goods.

Also, game theory is mostly used to study problems of collective action in competitive arenas reflecting the situation of the use of scarce natural resources by stakeholders. Game theory is based on the assumption that (i) individual action is instrumentally rational, (ii) there is a common knowledge of rationality, and (iii) action is done within a rule (Heap and Varoufakis, 1995). The game can be defined as a situation in which the actions of one person perceptibly affect the welfare of another and vice versa. There are two main categories of games: cooperative and non-cooperative. Communication among stakeholders is forbidden or impossible while they are free to make a choice, either non-cooperative (egoistic) or cooperative. For each player, the defective choice is optimal compared with the cooperative one. Within the metaphor of the 'game', the critical problem of the use of scarce natural

resources can be defined as maintaining the cooperative choice for joint payoffs among stakeholders, in face of privately highest payoffs. This situation reflects the logic of social dilemmas (Dawes, 1980), specifically common goods dilemmas. The challenge for resource management may be the extent to which the problem of common goods dilemmas is overcome, which means that stakeholders agree to *'take less'* through collective choice.

Classic responses to this problem focus on the privatization and control over natural resource use. These perspectives are based on the assumption of narrow economic interests as driving behaviour and the incapacity of stakeholders to cooperate and engage in social learning (Herring, 1990: 88). But, it is also known through empirical evidence that stakeholders can generate rules and regulation and cooperate for successful collective action (e.g., McCay & Acheson, 1987; Wade, 1988; Warren, 1991; Mckean, 1992). Yet, a systematic process which generates a perspective on solution through communication is only now emerging (e.g., Röling, 1994, 1995). Within communicative approach (among others), overcoming common goods dilemmas would mean that stakeholders realize the collective negative effect of individual actions, agree to cooperate and ration the use of common goods (*take less*).

It is important to argue that common goods dilemmas are not the only problem associated with the use of scarce natural resources. There is also the 'assurance problem' which means that stakeholders in face of the scarcity of resource flow allocation, can change their behaviour and adopt individual actions instead of following the agreement made for collective choice because they do not have the complete assurance that the others are respecting the rules and regulations (Sen, 1967). Assurance may also be obtained through reliance on formal police, formal surveillance and the effectiveness of punishment structure (cf. Ostrom, 1992). It is argued that this strategy can also be costly. But, the magnitude of the assurance problem can only be established empirically because it is also known that corruption is a social phenomenon which weakens formal attempts to establish social order, mutual trust and reciprocity among stakeholders.

The problem of ecosystems degradation and/or critical social events

Ecosystems degradation and/or critical social events surrounding resource use, the concern of this study are environmental problems which have technical, technological and social dimensions. Sloep (1994) starts the definition of an environmental problem as any change of state at the level of ecosystems. It can be argued that, first, this change of state can result from the degradation of the structure of the ecosystems, and this endangers ecological services and the functioning of biodiversity. For example, habitat degradation, 'keystone' species loss, common goods depletion, disappearance of natural vegetation cover and exposure to soil erosion are some examples of factual causes of negative changes of the state of ecosystems (Groot, 1992). Second, it can result, in the one hand, from abiotic factors such as agricultural practices and water pollution through eutrophication with soluble nitrate and phosphate particles (Mannion, 1995), air pollution, negative effects of drastic climatic change on

ecosystems (droughts, desertification); and in the other, from biotic factors which can the emergence of new ecological order such as water hyacinth and its negative consequences on water resources, the modification of trophic chains for living being in ecosystems etc. An environmental problem is also any critical event such as an evolving difficult state of affairs, debate and paradox with respect to resource use in societies, especially among stakeholders. These concerns, also refer to the impacts of current individual practices on ecosystems as well as collective negative societal impact. Concrete examples of such problems are: high pressure of stakeholders in ecosystems to change existing practices, opportunities and norms; transhumance, animal roaming and crop damage (or crop eaten) by cattle; conflict and war over resource use; impasses, with respect to concerted action for resource use, etc.

Environmental problems described above can be effectively considered as problems to be dealt with, only if they are widely shared. Their perception depends on existing frame of reference, belief systems and norms of stakeholders (Breemer *et al*, 1995: 103-4), and of those who intervene or have the task to do 'something'. Soil erosion might not be perceived as a problem by stakeholders even where technical surveys have made it plausible. The problem needs to be socially constructed depending on existing (micro and macro) economic opportunities, strategic reasoning and the conception of ecosystems assets by the stakeholders. In empirical situation, it seems relevant to adopt an interpretative approach to the problem perception by various stakeholders and other actors (researchers, development workers, policy makers) in Non-Governmental Organizations (NGO), development federations and associations and Government Organizations (GO).

The problem of provisions for the maintenance of ecosystems and coordinated action

In the present study provisions are contributions in terms of money, labor, know-how, innovations, responsibility assignment and credible commitment. Provisions also call for solidarity which is the willingness to sacrifice 'resources' (mechanic solidarity) or immediate gratification for the welfare of others (organic solidarity), out of the feeling of unity (Galjart, 1976). Provisions are directed to improvements, infrastructures and coordinated actions for maintaining ecosystems in good health as well as the well-being of stakeholders. Improvements are all kinds of efforts that contribute to enhancing, strengthening or 'creating' ecological services which regenerate natural resources and or maintain the functions of ecosystems. Concrete examples of such type of improvements are: the production of organic matter, afforestation, or the reconstitution of mangrove for restoring fish ponds.

Infrastructures are different kinds of constructions which are parts of ecosystems, and help maintain them in a good health or prevent them from being destroyed by environmental factors. Examples of such kinds of infrastructures are firebreak for forest protection, gullies for erosion control, etc. There are other types of infrastructures which enable the exploitation of natural resources (example of canalization infrastructure for irrigation). The creation of infrastructures for ecosystems involve different phases: design, finance, construction and

maintenance (Ostrom *et al*, 1993). They can be seen as a response to environmental problem (e.g., construction of corridor space to avoid crop damage by cattle) described above.

A long-term perspective (repair, rehabilitation) and the governability of coordinated actions are required for maintenance. Provisions, in this context, are defined in terms of responsibility assignment, credible commitment and mutual monitoring for sustaining 'organizations' and 'institutions' (concepts that will be defined later), be they local, external or mix that govern resource use or coordinate and monitor investments and provision needed for the improvement and the maintenance of infrastructures. In that view, the situations where scarcity does not apply to the use of common goods, governing 'organizations' and 'institutions' will be needed or maintained (when they exist already) for anticipating on scarcity in the future since common goods are subtractive.

The kind of provisions discussed raise the difficulty of excluding potential stakeholders from the benefit of ecosystem health (which results from these provisions). Improvements, infrastructures and 'organizations' for coordinated actions define public goods situations which offer free-riding incentives, the opportunity to benefit without making any contribution. For example, investments in the reconstitution of a mangrove for the improvement of the productivity of a lake fishery will benefit all the fishing community including those who did not contribute. The motivation to free-ride, or to contribute too little, as could be expected, can increase since one can enjoy one's share of the benefits without contributing to them (Olson, 1978). Such situations are described in terms of public goods dilemmas: the choice between 'give some' or free-ride (Dawes, 1980).

The challenge for resource management seems to be the extent to which the problems of public goods dilemmas are overcome, which means that stakeholders agree to *give more* for the provisions. But, the metaphor '*give more*' can work only if voluntary collective action of stakeholders is effective. The resource management problem becomes: how to maintain the facilitation of voluntary collective action for the provision of public goods.

The assurance problem identified above appears also at this level. In face of the absence of incentives for the provision of public goods, stakeholders can change their behaviour and choose to contribute less instead of maintaining voluntary collective action because they do not have the complete assurance that the others *give more*. Assurance may also be obtained through reliance on control of contributions, through formal taxation, membership costs. Again, effective measures can only be identified empirically depending on situation and the nature of the public goods which need to be provided.

Synthesis: the nature of the problems and the puzzles for resource management

Framing the problems, discussed above, presents an analytical opportunity. But, in real situations, they seem to be intertwined. For example, scarce fishery resource use can reveal the problem of common goods dilemmas, while of the same time, mangrove destruction of this fishery is a kind of ecosystem degradation problem, although attempts to re-establish this

mangrove may need investments, the mobilization of stakeholders for maintenance. Then, public goods dilemmas situation can be identified.

The problems of natural resource scarcity and provisions can be solved if common good dilemmas and public good dilemmas are overcome, which means that stakeholders agree, respectively, on *take less* and *give more* games. Ecosystems degradation and/or critical social events about resource use can be perceived differently by stakeholders and interventionists, and then these problems can be solved if there is a shared understanding for collective responses. It seems that solutions to the different problems can be possible only if successful collective action is effective, although individual actions must be consistent with collective action, otherwise it can only provide partial responses by the organizations which intend to intervene. Organizations, - be they local, governmental or non-governmental - are those which mobilize resources (money, staff, facilities), perceive objectives and policies (e.g., existing government plans), deliver strategies, and use norms of societies to legitimate a process of change. Organizations also provide structure to human interaction. But they include political, economic, social, educational and cultural bodies (North, 1994: 5). For example, they involve political parties, regulatory agency, cooperatives, interests coalitions, training centers, etc.. Organizations are groups of individuals with a common purpose to achieve objectives. A distinction is also made between local organizations which are created by stakeholders themselves, and organization created by government (example: extension organization) or outside the local setting.

Hence, a main constraint remains: who/what triggers or maintains collective action among stakeholders? The first puzzle of resource management can be defined in terms of the extent to which the 'facilitation' of successful collective action can be effective.

Previous discussions are centered either at the level of stakeholders or ecosystems. The problems of resource use have multiple dimensions: technical (ecosystems degradation), strategic (common good, - and public good dilemmas) and organizational (critical social events). Therefore, multiple perspectives (cf Linstone, 1989: 5) seem relevant to provide responses to the resource management problems either spatially or temporally at the level of ecosystems, or among stakeholders. But, at which level(s) of the aggregation of stakeholders and levels of the ecosystem, are these responses effective? This question seems to raise a second puzzle for resource management: collective action needs to satisfy a kind of structural arrangement to enable effective resource management (the notion of 'platform' will be used later).

In face of such puzzles that unravel two different assets, the social asset (stakeholders) and the natural asset (ecosystem), 'coupled systems thinking' may provide ideas and insights for better perspectives with respect to resource management.

2.4   Conceptualizing coupled systems for resource management

Systems thinking is, among various scientific perspectives, an attempt to tackle the complexity of real-world through a form of thinking based on wholes and their properties (Checkland, 1981: 74). Complexity seems to be one of the motives for applying a systems perspective. According to Weinberg (1975: 3): 'Science and technology have colonized the planet, and nothing in our lives is untouched. In this changing, they have revealed a complexity with which they are not prepared to deal. The general system movement has taken up the task of helping scientists to unravel complexity, technologists to master it, and others to learn to live with it'.

Systems thinking is a way to look at the 'reality', to organize knowledge, to orient data collection and direct intervention in complex phenomena and social arenas (Checkland, 1981; Fresco, 1986; Engel, 1997). This section presents an attempt to apply systems thinking, especially 'coupled systems' to the study of resource management problems. Systems thinking is widely discussed by Checkland (1981, 1990), Wilson & Morren (1990), Bawden (1995) and Engel (1997). A distinction is made between 'hard' systems thinking and 'soft' systems thinking. The former is amenable to the discussion of Ecosystems and the latter of Human systems (stakeholders and other actors) with respect to resource management. These discussions will enable a 'theoretical' conceptualization of coupled systems.

Applying 'hard' systems thinking to resource management

Engel (1997: 25) describes the 'hard' system tradition as taking the world to be systemic. 'Hard' system thinkers take their systemic images to be models, simplified representations of real world wholes. 'Hard' system thinkers think of their systems as performing a function that can be described as transforming inputs into outputs. Modelling and simulation are important tools in Hard systems thinking (Fresco, 1986). But, according to the description above (see §2.2), unlike most mechanical systems [hard engineering systems], ecosystems are complex, boundaries cannot be simply delineated and components cannot be easily designated for ecosystems (O'Neill *et al*, 1986: 41). Ecosystems are 'natural' or 'designed' systems. They can be viewed across a wide range of spatio-temporal scales. They present difficulties concerning the behaviour and the structural organization of their components. Nevertheless, one can try to model and even simulate them because 'hard' systems can be assumed to really exist.

A recent study by ecologists (e.g., Grant *et al*, 1997) reveals that 'problems related to systems with relatively many, closely interrelated components [such as ecosystems] ... cannot be solved mathematically because an analytical solution to the set of equations describing the system, does not exist. On the other hand, dynamics of these systems cannot be represented statistically as average tendencies because interrelatedness of the components, or system

structure, causes non-random behaviour'. To overcome such difficulties, ecologists use the hierarchy concept to try to understand, first, the nature of complexity in ecosystems (cf. Allen & Starr, 1982). They distinguish a continuum of three types of complexity. First, *organized simplicity*, when the number of components is few with a high interrelatedness. Second, *unorganized complexity*, when the number of components is many with lower interrelatedness. Third, between the previous, *organized complexity* for which ecologists mostly rely on for modelling, simulation and systems analysis (see Grant *et al*, 1997).

Other complex system conceptualization exists. For example, Capra (1996: 35) rejects the hierarchy concept and argues that: 'living systems at all levels are networks ... There are only networks nesting within other networks'. However, what I need for the present study is an operational conceptualization of ecosystems to start with the analysis of resource management situations. For that reason, inspirations are gained from the way the concept 'holon' is used to explain hierarchical system organization (cf. O'Neill *et al*, 1986).

The concept of the 'holon' which deals with the whole/part dualistic way of thinking seems useful to be applied for classifying different types of Ecosystems. According to Koestler (1969), all systems [ecosystems] consist of sub-assemblies which have a certain autonomy. They are self-assertive, i.e., they manifest wholeness. But at the same time, they are parts of larger wholes, and manifest integration.

Beyond ecologists' conceptualizations, whose assets are the living organisms and their relation with their chemical and physical environment (see §2.2), one should consider the human dimension, especially, for the problem of ecosystem boundaries. In many circumstances, the concept of 'territoriality' is used to set up boundaries defined by stakeholders who use natural resources. Territoriality is the attempt by an individual or group to affect, influence, or control people, phenomena, and relationships by delimitating and asserting control over a geographic area' (Sack, 1986: 19).

In the present study, the holon is the level (or the levels), for a given ecosystem, at which, regenerative practices, resource management problems-solving such as measures for rationing resource use, response to environmental problems, and improvements can be effective (functioning of biodiversity and ecological services). For example, measures concerning the use of a fishery resources can only be effective at the level of the whole fishery resource system (e.g., lake). But a soil erosion problem can be improved at a part of the degraded land in the watershed. Cutting some trees at a part of a forest does not mean that the forest as an ecosystem has disappeared.

Based on the concepts of the holon and human territoriality (territory used later has the same meaning), four types of ecosystems can be distinguished (see fig. 2.1) for the purpose of resource management. Here the intention is not to verify this classification. However, it can be understood as one way to start analysing complex ecological systems. The types are characterized as the following:

- Type I: the whole ecosystem is an holon for resource management. Examples of ecosystems are: fisheries, wildlife park, ground water resource, water catchment.

- _Type II_: the whole ecosystem involves many holons which can be set up purposefully or opportunistically for resource management. Example of ecosystems are: watersheds, forests, common lands.

- _Type III_: the whole ecosystem has no clear boundary. The holon which is considered for resource management is a meaningful territoriality. The typical example of ecosystem is a rangeland system.

- _Type IV_: this type is considered to anticipate on the possibility of complex interconnected ecosystems. An example can be: a complex larger ecosystem involving watersheds ecosystem, and rangeland areas ecosystems.

Applying 'soft' system thinking to resource management

In soft systems thinking, the real-world is assumed to be problematic. Unlike the hard systems tradition, assuming 'systemicity' is shifted from: taking the world to be systemic to taking the process of inquiry or intervention to be systemic (Checkland, 1994: 80). In the 'soft' system tradition, the worlds do not constitute separate domains, like geographical territories with clearly marked boundaries, but rather forms under which we organize our attempts to reach a common appreciation of problematic situations.

Soft systems thinking works with ill-structured problems which do not provide a clear ground for assuming 'goals'. The goals seem to evolve as an 'emergent property' of the soft system since the cognitive abilities of humans enable them to have perceptions, change behaviour through interaction, construct understandings and explanations whether of a spiritual, mythical, empirical or scientific manner to guide action and to monitor the consequences of that action (Röling, 1988: 183). Soft systems are 'human activity systems' which are composed of intentional and sense making humans. Their goals are a bone of contention and the outcome of negotiation towards shared agreement and understanding.

The processes of change fit, to some extent, in Habermas' theory of communicative action which posits that humans have instrumental, strategic and communicative rationality (Habermas, 1990; Brand, 1990). From that point of view, shared goals emerge from processes by which humans move from strategic behaviour, aiming at advantage or winning, to a more communicative behaviour. Also, one can be aware that an ill-structured problem which reflects soft system thinking can move to hard system thinking in the sense of Havelock (1986) "problem solving model" when this problem becomes well-structured, and the `would be problem owners' well-defined goals setting and goal seeking behaviour predominate.

In many circumstances, resource management deals with multiple actors and stakeholders with conflicting interests in the sense of the 'actor-oriented perspective' (Long & Long, 1992; Long & Ploeg, 1989; Long, 1989). From the 'actor-oriented perspective, individual stakeholders have the capacity to process social life, they are knowledgeable and capable in resource use situations. Hence, interventions and resource management enter existing life-worlds[2], power structures and interfaces[3]. Making a difference, with respect to

Type I

holon

Type II

holon

——Human territoriality

——Unclear ecosystem boundary

Type III

holon   *holon*   *holon*

Type IV

holon   holon   holon

——Unclear ecosystem boundary
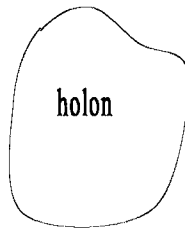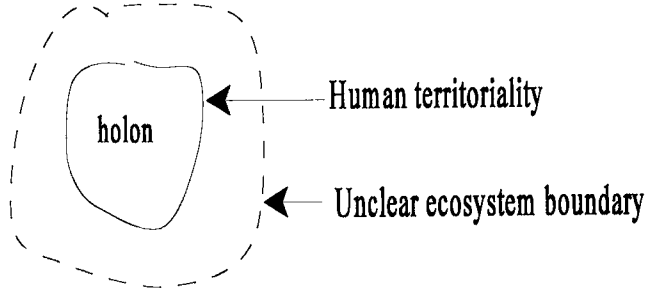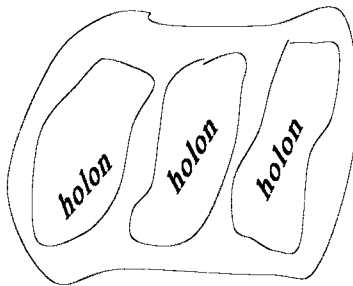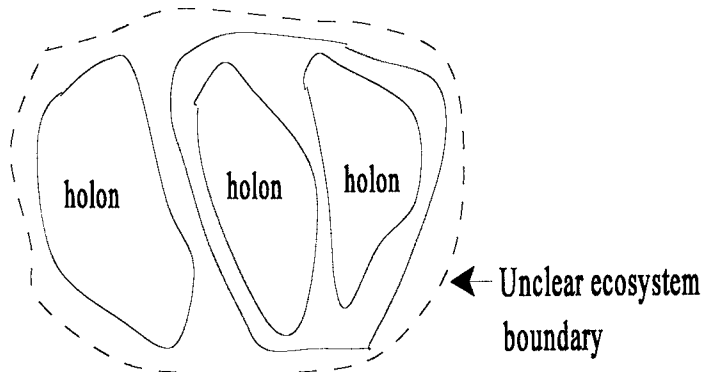
Figure 2.1:   Examples of types of ecosystems

resource management, in a pre-existing state of affairs or course of events will lead to arenas of struggle and power-play (Long & Villareal, 1994). According to me, in the soft-system tradition, the existence of such arenas (see also, Crehan & Von Oppen, 1988; Elwert & Bierschenk, 1988) are recognized. Rather, they stimulate reflection, offer the opportunity to identify potential interest groups, i.e., coalitions of stakeholders which would be relevant for debating resource management problems. Applying a soft system perspective means that the problems of resource management become the extent to which stakeholders perceive their interdependence, that they form a system towards shared agreement (e.g., to *take less* or *give more*) or, reach shared understanding on environmental problems (e.g., soil erosion, pollution, transhumance phenomena).

Soft systems thinking is criticized (cf. Jackson, 1985) for its strong reliance on an interpretative approach and processes of change based on ideas and communicative competence. All these aspects tend to ignore the political and economic factors linked to the people's 'worldview'. But, empirical evidence shows that the *éleveurs du Ternois* in France develop a common problem situation through dialogue (Darré, 1985). In the present study, emphasis is given to the empirical forces that constitute the grounds for shared agreements or understanding with respect to resource management problems. Critical systems perspectives (as emphasized by Jackson, 1985) are concerned with these harmonizing processes by giving a particular attention to the role of incentives, organizations, institutions, organizations and the political context in resource management (see §2.7).

As discussed in §2.3, resource management problems can be solved only if collective action is effective. To emphasis the necessity of collective action, it is also argued that individual actions provide partial protection to natural resources (Pretty, 1995: 131-2). Despite the importance of having collective action for resource management, ecosystems present hierarchical properties (discussed above) which raise the question of the level at which natural resources can be managed effectively (the second puzzle of resource management). As a response to this problem, soft systems thinking is used to formulate the concept of 'platform' for natural resource management (Röling, 1994, 1995; Röling & Jiggins, 1998). Platforms are based on soft systems thinking and emphasize the need to create 'collective agency' at a level of 'social aggregation' commensurate with the ecosystems level at which present sustainability problems are deemed manageable. The idea that a natural resource, at the levels of systems perceived as 'hard' (such as ecosystems) requires a platform to manage it sustainably leads to 'coupled systems thinking' (Röling, 1997). For the moment, the definition of platform concept seems to be abstract ('collective agency'? 'social aggregation'?) because it depends strongly on 'coupled systems thinking'. This will be discussed before the concept platform will be further elaborated in §2.5.

Coupled systems thinking for resource management

The use of coupled systems, in this study, is seen as an attempt to integrate hard, and soft systems thinking to organize a process of inquiry, and analyse the ways interventions can be directed for solving resource management problems in the complex natural, and social worlds. Patterns of 'traditional' West African thought, especially the invocation of Nature, reflect coupled systems between the Earth and Communities. Sometimes this takes the form of an alliance where 'the idea of Earth-spirit, considered as a principal spiritual guardian of the community, links with the assiduous cult of this spirit as the basis of the continued flourishing of the Community' (see Horton, 1993: 356).

Coupled systems are contained in the conceptualization by Maturana & Varela (1992) of 'structural coupling' between 'living beings' and their environment. 'Living beings' are reproduced by autopoietic systems, which are self-organized systems. There are dynamic interactions, structural congruence (or incongruence) and perturbations between the 'living beings' and the environment. The environments trigger change, but it is the structure of the 'living beings' that determines what changes occur in it. The idea of Maturana & Varela (1992) reflects coupled systems but it does not give a clear guidance for resource management because the 'living beings' concept covers 'organism' in hard systems (defined above) and 'humans' in soft-systems. This may present analytical problems. To make the discussion on coupled systems understandable, different types of ecosystems (hard systems) and platforms (soft systems) can be seen, respectively, as natural and social agents (Mougenot & Mormont, 1997). The emergent structural properties for problem-solving at the level of the natural agents (e.g., the holon defined above) imposes (minimal) structural forms for the social agents (perceived platforms), if effectiveness of resource management is to be expected.

Then, coupled systems look at the purposeful resource management problem-solving 'ties' between the two types of agents that can be taken as systemic. Also, emergent properties that can create 'ties' can be noticed through the key concept 'valuation'. For example, the french expression *patrimoine national* (national patrimony) has the meaning of a valuation of the natural agent as a patrimony, and a nation relies on it. Economic valuation has the meaning that the natural agent can be the basis of subsistence and prosperity for the social agent. Ecological valuation can create voices from the social agent to change the statu quo (e.g., rights to nature, conservation policies).

The voice of the natural agent can be heard from ecological feedbacks, the impossibility to satisfy in totality the needs of the social agent. This changing pattern impinges the re-consideration of the ties through new emergent properties such as new qualification and designation of the natural agent, social recognition, scientific valuation, constitutional choices and institutional changes, emergence of interests groups, organizations and networks (Lafaye & Thévenot, 1993; Mougenot & Mormont, 1997). These arguments show that the power of change at the level of the social agent seems to be rooted at the level of the natural agent. The raison-d'être of platform is the nature, especially, of ecosystems which hold 'resources' that

are perceived in the need to be managed sustainably. Platforms can be developed if the coupled systems notion is applied.

2.5   On coupled systems: developing platforms for resource management

Platforms as levels of 'collective agency'

Based on the coupled systems notion, effective platforms of stakeholders can be defined as the level of collective agency on holons in ecosystems. Collective agency, in this case, means the capacity of stakeholders to generate organizations capable of developing regenerative practices. Different effective platforms of stakeholders can be conceptualized depending on the type of the ecosystems (see fig. 2.2).

For the ecosystems Type I, problems can be solved only at the level of the whole ecosystem which is itself an holon. Only one effective platform of stakeholders is needed (fig. 2.2A). The second Type is different to the previous: stakeholders must agree (or set up) boundaries which is a human territoriality where an effective platform can emerge (fig.2.2B). The third Type reflects that many effective platforms of stakeholders can be operational. Solving the problem at the level of the whole ecosystem means that those platforms need to be integrated in another platform at a higher level (the highest, is the level of the ecosystem)(fig. 2.2C). At least, the fourth Type is more complex because it presents the possible situation that the previous types of ecosystems may overlap in a larger ecosystem. Fig.2.2D presents only one alternative. These discussions of platforms tell us that stakeholders must come together (through representations) at certain levels of an ecosystem (the holon) to enable the use of regenerative practices.

But two important points need to be raised. The multiple dimensions of the problems (see §2.3) call for other actors, the institutions and organizations beyond the platforms of stakeholders. It is also known from perspectives on political economy of rural Africa (e.g., Bates, 1983) and especially West Africa (e.g., Hart, 1982), that stakeholders are encapsulated in a wider socioeconomic and political administrative context, or the logic of a government 'ideology' (e.g., Godin, 1986). Zooming in at local, regional, meso, or macro levels of resource management reflects different levels of social aggregation. It is evident now that platforms cannot be conceived only at the level of stakeholders, it seems that the links with the higher levels of social aggregation remains important to focus on. The processes by which platforms of stakeholders expand to higher levels seem to be very complex depending on the nature of the resource management problems. For instance, redefining and enforcing property-rights for regulating the access to an overused fishery resources might not be easy with stakeholders, and require external intervention based on government political choice. The expansion of platforms of stakeholders can occur through scaling up processes, networks and probably other processes which can only be identified through empirical research.

Platforms of stakeholders

Eexample of ecosystems
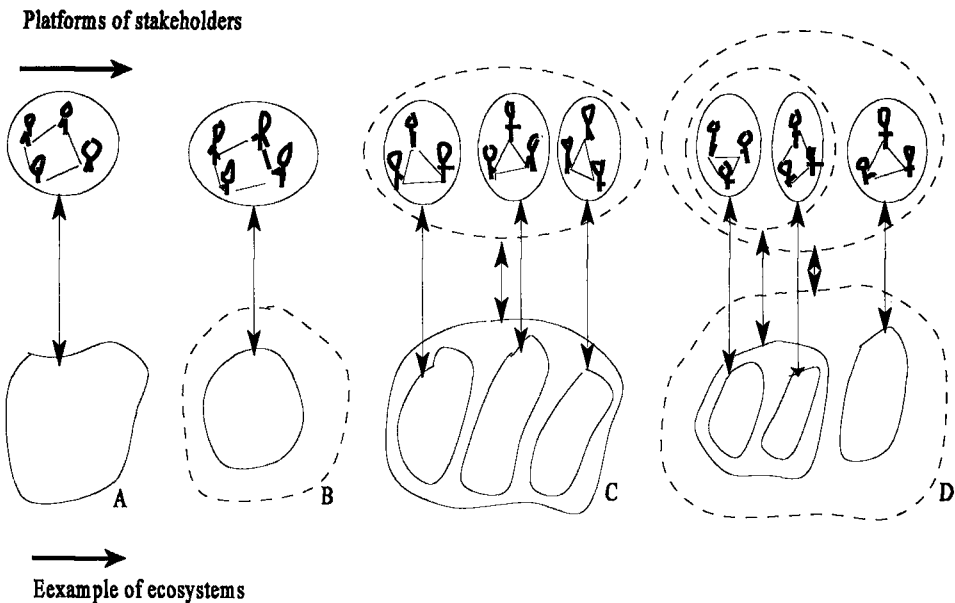
Figure 2.2   Examples of platforms of stakeholders
(after Röling, 1994)

Developing platforms through scaling up processes

The concept 'scaling up' is applied to grassroots NGOs to analyse the processes and different paths whereby they move beyond their original local constituencies to institutions, policies, donors, etc., and have larger impact (Uwin & Miller, 1996). Here, the discussion focuses on scaling up processes as alternatives paths whereby platforms can expand to higher levels of social aggregation for decision-making, implementation of policies, resource mobilization (e.g. credits), training opportunities, access to knowledge, integration of the body politic (e.g., raise ecological awareness), etc.

Scaling up processes by integrating many platforms of stakeholders

Many resource use situations present various interest coalitions of stakeholders be they ethnic groups, strategic groups (conflicting interests), categories of resource users, etc. Difficulties for developing a platform can appear especially for ecosystems Type I. Effectiveness can only be possible if all the interest coalitions of stakeholders join their effort instead of only one of them behaving as a platform. Scaling up processes may take the form of negotiation and contending interest coalitions of stakeholders in an effective platform.

There are also other types (e.g., type II) of ecosystems on which many effective platforms can evolve for resource management. Acting at the level of the whole ecosystem imposes a scaling up process which integrates 'intermediary' effective platforms to the one at the level of the whole. In real-situations, this may take the form of structuration at different levels of social aggregation, for instance, at the levels of the farming 'household', stakeholders in a village, federation of villages, region, etc. The same process can appear in ecosystems with unclear boundaries. Platforms evolve or are created at the level of a meaningful territory (e.g., a village territory). Scaling up processes may take the form of integrating different lower territories in a larger one. Another example is scaling up across administrative divisions.

Scaling up processes for collective decision-making

Within the context of a participatory approach, platforms of stakeholders can be linked up with government organizations to enable collective decision-making about ecosystems in terms of policies, planning, or identifying future actions to be taken. Scaling up processes can follow such paths which give the impression that programmes which are built at higher levels (ministries) emerge from fora and concerted action with stakeholders.

The resolution of certain conflicts over resource use (e.g., war between coalitions) are difficult for stakeholders themselves. A mediation at higher level (an authority or organization beyond the ecosystem under dispute) is necessary. For example the displacement of a Dogon population in Mali after a severe drought and their insertion to Bambara people, involved mediation at a higher level (cf. Tembely, 1991). Then scaling up processes can emerge from such chaotic contexts where other actors, at higher levels of social aggregation, are required for collective decision-making to happen.

Scaling up processes by linking up platforms of stakeholders with governmental (non-governmental) organizations or administrative bodies

Various organizations, be they governmental or non-governmental, are created in many societies for education, information exchange, production, in general for knowledge generation, exchange and utilization for the purpose of 'development'. It can be possible that platforms of stakeholders and organizations function synergically to support these knowledge processes towards innovative practices for resource management. From that point of view, scaling up processes can take the form of linking-up platforms of stakeholders with governmental and non-governmental organizations concerned with resource management issues at higher levels of social aggregation. For example, a platform of fishermen in a nation can be scaled-up with a national Department of Fisheries at a Ministry level, which is handling policy-making that might affect the destiny of stakeholders.

These examples of scaling up processes give analytical ideas for exploring the real-word situations which can vary (greatly) according to the type of ecosystems. But, the push by stakeholders, or the pull by other actors, of platforms of stakeholders towards higher levels of social aggregation, the forms the expansion these platforms may take, and the strategies for making this expansion happen, can only be known better through empirical studies.

Developing platforms through networks

Networks can be seen as alternative processes by which the impact of platforms can increase. Some literature shows that: (i) networks can be constructed through deliberate action by external stakeholders (e.g., Callon & Law, 1989); (ii) networks can emerge from stakeholders' interaction ('actor-network perspective, e.g., Verschoor, 1997); and (iii) network can be based on emergent issues from the Nature (e.g., Mougenot & Mormont, 1997). I rely on this literature to develop some ideas as a starting point for developing platforms through networks.

Developing platforms through a deliberated construction of networks from 'outside'

An example of a deliberate processes of the construction of (sociotechnical) networks, by three scientists, with the notion of 'translation' is provided by Callon & Law (1989). 'Translation' is defined 'as a process in which some sets of relations between projects, interests, goals, and naturally occurring entities - objects which might otherwise be quite separate from one another - are proposed and brought into being' (Callon & Law, 1989: 58). The distinction is made between *context*, which is like GOs or NGOs at higher levels of social aggregation; and *content*, which can be considered as a domain of activity of stakeholders. From that point of view, it seems to be analytically an advantage to look, within the field of resource management, at what interventionists or facilitators do in the real-world to bring *content* and *context* together. In other words, the process of stimulating, mobilizing and linking together various stakeholders and other actors.

Developing platforms through networks which emerge from new designation and qualification of ecosystems

The third process which can trigger the development of networks, and then the expansion of platforms is basically inspired from the statement that: giving a new value for certain objects in Nature (or ecosystems), qualifying and designating Nature, for instance making decision about the conservation of ecosystems, leads to the development of networks (Mougenont & Mormont, 1997). All the ecosystems valued or designated create networks with the corresponding stakeholders. These networks define other actors at higher levels of social aggregation through four poles: (i) the practices and scientific models, (ii) institutional practices, (iii) management organizations which describe nature, and (iv) the ecosystems under siege. The idea is amenable to the analysis of the expansion of platforms in terms of how new designation and valuation of ecosystems lead to joint and coordinated action of all interdependent elements composing the networks.

Sustainable development as the emergent property of platforms

Sustainable development means a development that meets the 'needs' of the present without compromising the ability of the future generations to meet their own needs (WCED, 1987). The concept of sustainable development, with respect to resource management is a paradox because it seems to raise issues like the satisfaction of the 'needs' of stakeholders, the economic growth, etc.; but in the same time, the yield and the productivity of ecosystems (in general earth's natural systems) must be maintained.

There are definitions which center 'sustainability' on concepts like ecologically sound, economically, socially just, humane and adaptable (Reijntjes, *et al*, 1992: 2). Other argue that sustainability means different things depending on worldview, experiences, thoughts, ways to go about thinking (Sriskandarajah *et al*, 1989: 2), value judgement on multiple criteria (Checkland, 1986) and social institutions (Lynam & Herdt, 1992: 212).

With regard to these few considerations (since several other definitions exist) difficulties appear to arrive with respect to a precise and absolute definition of sustainable development, a concept which is itself complex and contested (cf Pretty, 1995: 11).

But, like soft system thinkers, sustainable development is considered, in the present study, as the emergent property of platforms. This means that one can focus on how platforms learn their way to agree on what they consider as sustainable development and their capacity to cope with emerging complex issues (new ecological and social order) and the development of regenerative practices.

2.6   Dealing with the dynamics of coupled systems: focus on social learning

Ecosystems dynamics and implications on resource management

Ecosystems are not inert, but they perform different functions. Holling & Sanderson (1996) describes four basic system functions: exploitation, conservation, release, and reorganization. The first two functions reflects sucession. Exploitation means a rapid colonization - of recently disturbed areas - enabled by processes in ecosystems. Maize seeds sown by a farmer on cleared land (disturbed area) is an example of a rapid colonization. The growth of the maize plants (and also weeds) is an example of conservation function of the land. Conservation is a slow accummulation and storage of energy and material. This function will be completed when these plants become mature. If nothing is done (harvesting or any human action), degeneration will occur through natural process (e.g., biomass cycling). This function is called release or creative destruction which stimulates or creates the opportunity for the fourth stage, reorganization, where released materials are mobilized to become available for the next phase (Holling & Sanderson, 1996). Release and reorganization functions reveal self-organizing ability of an ecosystem, or its resilience determines the capacity to respond to the stress and shocks imposed by the predation or pollution from external sources. Release or creative destruction (degeneration) goes very fast but, reorganization (regeneration) is very slow. For example, if we consider a pasture in a savannah grazing area, fire can clear an hectare (in the dry season) in a few minutes, while the regeneration of the pasture in the same area can take several weeks or months.

The dynamics of ecosystems necessitate the observation of their behaviour for the purpose of resource management. Not all the changing patterns of ecosystems are visible. The specificity of their strategic dimension is that they do not speak for themselves, but are always represented by 'spokes persons' (Mougenot & Mormont, 1997).

Ecosystems dynamics stimulate the importance of temporal and spatial dimension resource management. It becomes, relevant therefore, to focus on historical and comparative approach to cope with these dynamics.

Social dynamics and implications on resource management

Many situations of social dynamics, with respect to resource management, comprise harmony and disharmony, congruence and incongruence with ecosystems (Holling & Sanderson, 1996; Maarleveld & Dangbégnon, 1998). Interactions between ecosystems and stakeholders are going on.

There are also perspectives which center the social dynamics at the level of a process of change from 'within' through an active experimentation, the production of knowledge and the development of skills and know-how (e.g., Biggs, 1980, Richards, 1985; Warren *et al*,

1995; Dupré, 1991). From that point of view, it is argued that intervention process as such as resource management, can be more efficient if the 'outputs' from social dynamics are brought about through a process of change through participation and interaction (Chambers & Jiggins, 1987; Röling & Engel, 1988; Engel, 1997).

In view of the above, one can focus on social learning as a way to cope with these dynamics. The concept of social learning can provide a framework which seems to expand our awareness of the effects of the strategic dimensions of stakeholders as intentional beings. Novel solutions to evolving conditions are to be expected through adaptive responses. Then, Adaptive Resource Management (ARM) - instead of resource management - concerns the integration of social dynamics into the 'facilitation' of change. The elaboration of the concept of ARM is one of the objectives of the present study.

Applying Social Learning concept in ARM

What is meant by social learning?
The term social learning is used in many circumstances with different attributes and different meanings (Parson & Clark, 1995). Social learning can take the form of a process of experiential (or action) cycle (cf. Kolb, 1984; Bawden & Macadam, 1991) or of integrating adaptive management and political changes towards sustainable economy (Lee, 1993). Parson and Clark (1995) after discussing the different contours of the social learning concept, provide four key operational concepts as guidelines for inquiry processes: who (what) learns? what kinds of things are learned? what counts as learning?

Among these questions, it can be argued in this study that, the kinds of things which are learned can be aggregated in three different poles: (i) the ecosystems, (ii) social processes involved in ARM, and (iii) platform development. At each of these poles, the learners can be defined and what counts for them as learning. But, one question which seems important for this study, does not appear in the framework of Parson and Clark (1995: 455-7): how do people learn? Therefore, one can focus also on the analysis of social learning processes, a core issue for ARM. Social learning can be interpreted as a dynamic process which involves continuous sense-making of the world through perspectives or frames of reference based on concrete experience-modified knowledge, beliefs, values. The outcomes of concrete experiences of the world are explanations, hypotheses or interpretations which emerge as 'new concepts' or 'theoretical propositions' and help evaluate the 'little bags of tricks' used, which in turn leads to adaptation of the perspectives or frames of reference. (see fig. 2.3).
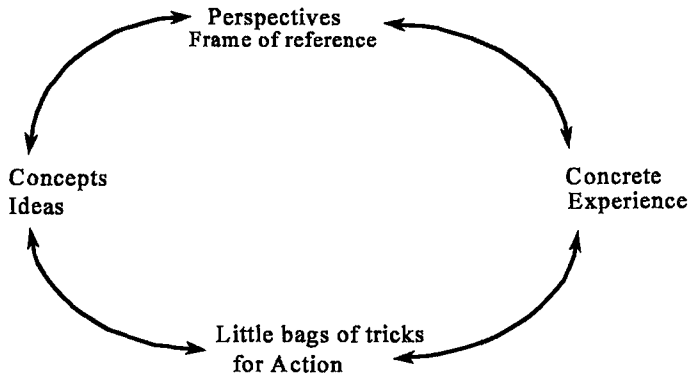
Figure 2.3:   Learning process cycle based on the experiential learning
               theory of Kolb (1984)

Learning about ecosystems

Learning about ecosystems can take the form of participatory processes with stakeholders for mapping, identifying indicators, agreeing on boundaries and classificatory concepts, and using analytical tools to 'make things visible'. The facilitators of such processes can be the researcher or others (development professionals, bio-physical scientists etc.). For the former, methodologies like Participatory Action Research are used, and for the latter, the study will account for what they do and what can be learned from their practices.

At the level of stakeholders themselves, learning processes can be based on the observation of ecosystems through decennia. Their contributions (as spokespersons) are, particularly, important for the type of ecosystems (e.g., lake fisheries) whose patterns of change or behaviour are not readily observable at a given temporal scale or without information from stakeholders.

Learning about social processes

Learning about social processes means, in this study, various interactions between individuals, groups or organizations, towards agreement or shared understanding on problems, consensus formation or accommodating perspectives (which means to demarcate what is permitted/chosen and what is forbidden/rejected) to take actions. One can argue, for instance, that the things that are learned concern negotiation and mediation with respect to collective decision-making and action implementation, and conflict resolution strategies. These processes can occur among stakeholders themselves and in the arenas of intervention.

Negotiation is defined as a discussion between two or more parties, be they individuals, groups, organizations, or political units such as nations, with the apparent aim of resolving a divergence of interest and thus escaping social conflict (Pruitt & Carnevale, 1993: 2). Particularly, in ARM, existing social practices, norms, and standards can influence ideas, arguments, motivations and negotiation processes. Mediation involves strategic choices which are the following (see also Carnevale & Pruitt, 1992: 538): (i) concession making, an attempt to reduce one's demands, desires, wants and aspirations with respect to resource use to accommodate the other party; (ii) contending, which is a strategy aimed at pushing the other party in the direction of one's wishes (for instance regenerative practices); and (iii) problem-solving, efforts to locate and adopt win-win solutions which means solutions that satisfy both parties' goals and current states of affairs in ecosystems. Conflict resolution emerges from clashing prejudices, desires and interests over resource use. It involves negotiation and mediation, and aims at discovering unifying bonds (Moscovici & Doise, 1994). The learners engaged in these processes are individuals and groups of stakeholders, or organizations which intervene in the course of ARM.

Learning about platforms development

The focus is on the understanding of phenomena involved in structuration with respect to platform development processes. Platform is defined as a level of collective agency on holon(s) in ecosystems where resources can be managed effectively. At the level of the holons, interdependence of stakeholders in ecosystems can be perceived. One can focus on the nature of this interdependence and on phenomena involved in the success or failure of collective agency.

Previous discussions raises alternative processes whereby platform development can occur through scaling up and networks. One can also focus on phenomena that motivate or hinder platform development processes. At this level, an anticipation on critical issues like 'power', 'group dynamics' and 'leadership' can help understand phenomena, while the variables can best be identified through empirical studies when there are blockages and barriers in the development of platforms for ARM.

2.7   The Facilitation of change in ARM

The term facilitation can be interpreted as a way to 'manage', especially in this study, a process of change in ARM towards a desired ends: regenerative practices on ecosystems and sustainable development, the capability of emergent platforms to engage in continuous social learning about evolving conditions. Here, facilitation has a broad meaning. It can be considered as an enabling condition, such as (local or external) institutions and policy contexts, for change. It can be viewed also as an intentional process whereby an organization (be it local or external) stimulates and guides change among potential stakeholders. But, it is essential to explain that the means or mechanisms by which an intentional process can be based vary from

'communication', incentives' to others like 'power and control of people'. For the latter, Seabright (1993: 117) argue that 'anthropologists and sociologists focus on the way in which individual behaviour is governed by rules and codes of conduct, the genesis of which is often explained by how well such rules serve the interest of the group'. Having in mind that some forms and content of facilitation which prevail in a given situation of ARM can only be best known empirically, five issues are discussed for resource management purposes. These are: (i) potential stakeholders and organizations; (ii) Communicative intervention; (iii) incentive design for stimulating or maintaining behavioural change; (iv) support institutions; and (v) the policy context.

Potential stakeholders and organizations

Potential stakeholders are those who are engaged in a process of change. Several concepts are used for their designation: target groups, clients, contact groups etc. But I consider stakeholders as problem-owners who evolve in a problematic context. Changing their current state of affairs with respect to resource management is an improvement. They are also the main concern for an intervention process which aims at improving their resource base. Stakeholders Analysis (for details see §3.3) can inform about their interest, concern, purpose, hope and fear about the processes of change.

A distinction can be made between the main organization, and others which are directly or indirectly concerned. It is also important to focus on the *raison-d'être* of 'ideologies' (e.g., *Auto-promotion*, *Développement local*, Grass-root development, Participatory development) which guide the strategies or praxeology the use and those who influence the background of the professionals. How much negotiation space is available to trigger or make effective a process of change? Negotiation space is an area within which the organizations at stake can enjoy a degree of autonomy from the existing context (cf. Callon & Law 1989: 62).

Communicative intervention

Using communication to intervene is a non-coercive strategy to achieve an ultimate goal. In this study, the goal is the extent to which platforms for ARM and successful collective action can be effective. Communicative intervention involves non-formal education methods, training, joint decision-making, and participatory methods.

Non-formal education can be considered as an empowering process of stakeholders, whereby they gain and utilize capabilities for collaborative problem-solving, influencing socioeconomic conditions and relationships through group action-taking (see also Kindervatter, 1979). NFE can enable the learners to critically analyse their own life situation, or gaining an understanding of and control over social, economic, and/or political forces to improve their current practices and ways of living in ecosystems. *Animation rurale* (out of school adult education) is a form of non-formal education (Adam, 1982; Moulton, 1977). Several methods

can be used in non-formal education mass media, focus groups, audio-visual, folk media (Van den Ban & Hawkins, 1996: 120-76). NFE can give stakeholders the principles for active experimentation and adaptation and for processing information (Röling, 1988).

Training concerns the acquisition of specific skills (technical or organizational) by stakeholders in order to be able to accomplish specific tasks, for instance, repairing agricultural materials. Few stakeholders who start in a training programme can move to the position of local trainers of others trainees to accelerate (even at low cost) skill acquisition by a large percentage of stakeholders. How training needs evolve, and the processes to realize them, is of particular importance.

Joint decision-making is considered as a negotiation process (Zartman, 1978). Here, it refers to concerted action through regular meeting to discuss about blockages in the course of actions being implemented, to evaluate the magnitude of progress, and to find solutions for future action.

Participatory methods that can be used are many. Some examples are Rapid Rural Appraisal (RRA), Participatory Technology Development (PTD), Rapid Appraisal for Agricultural Knowledge Systems (RAAKS), etc. Some general guidelines and principles to understand the methods used in real situation are discussed in next section (§3.4).

Incentives for changing or maintaining behaviour

Changing or maintaining stakeholders behaviour is partly determined by the way they perceive the external environment for resource management. To conceptualize this issue, I rely on the work of Kelman (1969) which makes the distinction between three processes of opinion change: 'compliance', 'identification', and 'internalization'.

Compliance results from the social control of behaviour, establishment of 'fences' for the limitations of choices, for instance with respect to resource use. In resource management situations, the power for controlling behaviour would be based on an effective means. Then incentives result from the realization that everybody is in the same condition.

Identification is a process of opinion change which is based on mechanisms such as attractiveness, satisfying self-defining relationships, and expectations. For instance in resource management situations, the stakeholders may change behaviour because they want to be accepted by attractive others.

Internalization is a process of opinion change based on a person's value system. For instance the process of change, with respect to resource management, matches with one's existing values. Change results from conviction.

These three processes of opinion change according to Kelman (1969) will guide reflection for analysing resource use situations. However, new insights may evolve from empirical investigations.

Support institutions

According to Ostrom (1986a quoted by Ostrom 1990: 51), 'institutions can be defined as 'the sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions'.

This definition contains some key elements that stimulate reflection: eligibility for decision-making, actions assignment, rules, procedures and provision of information. From that point of view, support institutions in ARM can be seen as frameworks which define these elements to trigger the facilitation processes. In concrete terms, examples of support institutions can be identified in the constitutions of nations, governments' decrees, property rights content, and conventions - of GOs, NGOs or stakeholders - in some arena.

Organizations involved in ARM can face some difficulties (e.g., changing property rights regime, financial resource constraints, ineffectiveness of a strategy to solve a problem) that existing frameworks of institutions do not allow to overcome. What do they do in such situations seems to be relevant, particularly in ARM. Therefore, an analysis of support institutions can focus, also, on networking among organizations to achieve their goal. But, institution and organization are commonly used interchangeably and this contributes to ambiguity and confusion. A differentiation between these concepts is made by North (1994, 1995) with metaphors and parables.

North (1994: 3) defines institutions as 'the rules of the game in a society or more formally, or the humanly devised constraints that shape human interaction'. The rules can be informal (unwritten) or formal (written). North (1994: 4-5) argues that: 'Like institutions, organizations provide a structure to human interaction. ... Conceptually what must be clearly differentiated are the rules from the players. The purpose of the rules is to define the way the game is played. But the objective of the team within that set of rules is to win the game - by a combination of skills, strategy, and coordination; by fair means and sometimes by foul means. Modeling the strategies and the skills of the team as it develops is a separate process from modeling the creation, evolution, and consequences of the rules'.

In concrete situations, these parables and metaphors can help to avoid confusion. Support institutions can be seen as rules within which organizations work. But the interaction between the two seems to be relevant for understanding changing patterns of institutions. Skills and knowledge that individuals and their organizations acquire can shape evolving perceptions - about opportunities, strategies, new ways to go about change; which can incrementally alter institutions. In turn, institutions dictate the kinds of skills and knowledge that are needed for organizations.

Policy context

The compass metaphor is used for adaptive management and policies are considered as important because they can be seen as experiments (Lee, 1993). The policy context can be seen as the compass, the legitimation of prerogatives for taking measures or not, perceived enabling conditions, in an attempt to affect or guide social change. The compass metaphor is used to emphasize the influence and effects of a policy context on individuals, organizations and societies. In the specific ARM situations, it can be useful to analyse how political orientations of a nation, region or locality affect the capabilities and initiatives of stakeholders and organizations, involved in a process of change, to achieve performance. For instance after a shift in general policy context (e.g., democratization process), one can look at new dynamics at the level of stakeholders and organizations.

By considering the facilitation process in ARM at the level of an ecosystem with a given community of stakeholders, prerogatives for taking measures or not would mean the extent to which the allocation of certain powers (e.g., statutory powers) is effective or not. Here the so-called issue of decentralization (more responsibilities and power for stakeholders) appears. It is argued that decentralization can offer hope for greater accountability in agricultural development (Scoones & Tompson, 1994: 9). Toulmin (1993) explains that decentralization has taken place largely at the level of rhetoric. The concept is used to describe government and donor policy. It seems important to focus also the analysis of the effectiveness of decentralization, as it is related to ARM, at the level of stakeholders and organizations working with them.

Enabling conditions are similar to what Pretty (1995) has called: 'policies that work'. Policies that work for ARM can be defined as a set of instruments or procedures to stimulate regenerative practices on ecosystems. These instrument can take the form of government declarations, priorities, grants, encouragement, better information, law, etc..

2.8   Towards perspectives in ARM for greater sustainability

A) The Ecosystem and Stakeholders

Understanding the ecosystem under siege
- Describing the ecosystem: making visible complexities such as organizing principles, boundaries, hierarchies and inputs/outputs for agroecosystems.
- Identifying the resources (which are valuated), the holon(s) and the type(s) of ecosystem which is (are) considered for inquiry.
- Explaining the implications of the type(s) of ecosystem identified for the strategies that can be used for identifying stakeholders

Identifying Stakeholders in interaction with the ecosystem under siege

- Appraising and locating the people who have voices and interests in the ecosystem under siege. Explaining, if necessary, their cultural diversity (e.g., ethnicity).
- Appraising and locating different groups of people who affect temporally/spatially the state of the ecosystem through their practices, 'rights', duties and responsibilities.
- Explaining the nature of the 'would be platform of stakeholders' at the level of the ecosystem

B) The Problem and Perceptions

Analysing and interpreting the problematic situations

- Observing ecosystems, and collecting information from stakeholders about the problematic situation.
- Analysing and interpreting the assets and the conditions, under which these situations evolve at the level of the ecosystems, or of stakeholders.

Identifying the problem and perceptions

- Identifying the 'would be problem owners': key stakeholders and (if necessary) other actors at higher levels of social aggregation.
- Identifying constraints, critical events and information about ecosystems and key stakeholders and (if necessary) other actors at higher levels of social aggregation.
- Adopting an interpretative approach to explain how the problem is perceived by key stakeholders and others.
- Synthesizing and defining the nature of resource management problems: metaphors, critical events, ecosystems degradation patterns, etc.

Identifying and analysing alternative solutions and approaches chosen for problem-solving

- Analysing how stakeholders agree or share understanding and see their interdependence at the level of the holon(s) in the ecosystems.
- Identifying the nature of platform(s) that can only help address alternative solutions to the problem. From that point of view, one can assess critically the solutions and approach chosen by stakeholders themselves or organizations which intend to intervene for solving the problem. One could focus also on the processes whereby such organizations become a problem-owner.

C) The Social learning processes in ARM

Learning about ecosystems

- Developing, using and accounting for participatory methods such as PAR for mapping, identifying classificatory concepts, agreeing on the boundaries of the ecosystem and the resources which will be managed.
- Incorporating indigenous knowledge to the understanding of ecosystem behaviour and pattern of change.
- Developing and identifying analytical tools to make things visible at the level of the ecosystem.

Learning about social processes

- Identifying and analysing negotiation and mediation processes for concrete issues such as collective decision-making, action implementation, etc.
- Explaining successes or failures, on the one hand, of agreement making or shared understanding on problems; and on the other, of consensus formation and accommodating perspectives about the solution or approach chosen for solving the problem.
- Making visible clashing interests over resource use and conflicting arenas. Analysing the process of conflict resolution and their outcome. Explaining reasons for successes or failure.
- Analysing knowledge networks, interfaces, and how these influence change in social practices, for instance through reflexive learning.

Learning about platform development

- Identifying the nature of interdependence on holon(s) in the ecosystem under siege. Explaining, depending on the circumstance, how stakeholders themselves perceive this interdependence.
- Identifying the phenomena involved in platform development either through scaling up processes, networks or other processes.

D) Facilitating process of change in ARM

Potential stakeholders and organizations

- Identifying stakeholders who evolve to be engaged in ARM
- Using Stakeholders Analysis to identify their concrete needs.
- Identifying organizations that emerge for the implementation of actions in ARM, their concrete objectives, 'ideology', and means available.

Communicative intervention

- Identifying communicative intervention strategies used (non-formal education, training, joint-decision making, participatory methods, etc.)
- Explaining the means used for making effective communicative intervention (media, focus group, audio-visual, etc.)
- Analysing effectiveness, also from the point of view of stakeholders, for the aim of triggering change.

Incentive designs strategies

- Identifying the nature of informal incentives that are available, and analysing how they are perceived and their effectiveness.
- Identifying incentive design strategies and the conditions for their provision.
- Analysing the raison-d'être of the provision of incentives, and its effect for stimulating collective action and platform development for ARM.

Support institutions

- Identifying (informal and formal) institutional frameworks available and relevant for ARM (eligibility for decision making, role development, rules, provision of useful information, etc.)
- Analysing institutional constraints faced by the organizations involved in ARM, and how they create networks with other organization to overcome these constraints.
- Analysing the legitimacy, efficiency of informal institutional framework (compared with formal ones) for overcoming problems in ARM.

Policy context

- Analysing the influence of the political context on processes (taking measures, room of manoeuvre available, space available for incremental development of initiatives) wit respect to ARM.
- Identifying and explaining concrete policies that work for ARM, and analysing the effectiveness of their implementation.
- Identifying and explaining concrete policies that hinder ARM. Analysis why these policies are launched.

E) The nature of Platforms for ARM

- Analysing the extent to which collective action (first puzzle) and effective platform development (second puzzle) are being achieved through social learning and the facilitation of change.
- Identifying, from the ground, concrete theoretical propositions (conditions) that explain platform development processes (successes or failures).
- Identifying, from the ground, the functions of platform with respect to ARM.

F) The Assessment of Greater Sustainability

- Analysing the effectiveness (applicability, constraints involved) of the regenerative practices identified, from the ground, in relation to the type of ecosystem under siege.
- Analysing the extent to which the nature of platform identified can <u>sustain</u> the regenerative practices identified on ecosystems.
- Analysing the extent to which the nature of platforms for ARM is capable of enhancing sustainable development. Explaining, if necessary, some risks of failure, and where they can be expected to evolve.

2.9   Research problem statement, objectives, and relevance of the study

Research problem statement

Of the many problems of ARM faced by scientists, policy makers and practitioners; the most critical is how to intervene in the real-world of resource use, characterized by conflicts, chaos, uncertainties and risks, to yield regenerative practices in ecosystems and achieve sustainable development.

In face of such theoretical and practical challenges and dilemmas, the perspectives developed above, platforms for ARM, are just one way to approach the problem, particularly in the context of Benin and Burkina Faso.

The overall problem addressed in this book is the extent to which the perspectives elaborated above help develop theories, practices and ideas, in the particular contexts of resource use in Benin and Burkina Faso, for the facilitation of ARM in various attempts to enhance regenerative practices and sustainable development in ecosystems.

Still, one must be aware of the philosophical paradigm distinction in that this problem statement, since the present chapter is theoretical while this problem statement calls for useful

contextual theories, practices and insights for regenerative practices and sustainable development in ecosystems. The next chapter will explain clearly the paradigmatic framework under which this study is done.

The objectives of the research

The objectives of this research can be stated as follows:

- To analyse various resource management situations from Benin and Burkina Faso.
- To gain insight in the reason why some resource management situations are successful and others fail.
- To generate from the ground, concrete theories, practices and strategies to support deliberate interventions for ARM.
- To make some practical recommendations for development.

The main research questions

Accordingly with the problem statement and the objective presented above, the research questions are:

- To what extent can various resource management situations from Benin and Burkina Faso, be analysed?
- What are the factors that affect the success or failure of the various resource management situations analysed?
- Can concrete and fresh theories, concepts and ideas, be identified to support the facilitation of deliberate ARM interventions towards greater sustainability?

The relevance of this study

The relevance of this study can seen from multiple point of view: theoretical, practical, wider development context, and the local setting.

First, Röling (1994: 392) argues that current approaches, with respect to resource management are dominated by technical and economic perspectives, while instrumental reasoning prevails. But these approaches lack an effective complementary social perspective which can add strategic and communicative reasoning by taking into account several issues like conflicting interests, competitive arenas, conflict resolution, negotiation, mediation and consensus formation, etc., which are omnipresent in resource use situations. The relevance of this study can be perceived through its attempt to incorporate this social perspective.

Second, this study is basically action-oriented, a deliberate effort to pursue improving social practices in ecosystems through platforms for ARM. Such a way of thinking is well addressed to current worries about increasing ecosystem degradation during the last three decades, particularly in Africa (Harrison, 1991). Problems are aggravated with endemic droughts which have made visible the relation between resource depletion and human hardships and suffering.

Third, in the wider development context, especially in Africa, economic growth is mostly the main concern, and agriculture is the target sector which provides foreign currency. But economic growth is always threatened by the uncertainty of the global market (Oasa *et al,* 1986) with subsequent increasing poverty at the level of stakeholders and increasing ecosystem degradation. The present study raises the importance of socioeconomic sustainability which aims at incorporating a social perspective in economic growth: to focus on stakeholders' needs and involve them in collective learning which can enable their capacity to respond to evolving conditions.

Fourth, the local setting, in the West African context, involves a high percentage of stakeholders (more than 70%) whose activities spread out over agriculture, forestry, fisheries, livestock production, water management, primary product processing, hunting, etc. One can think of local development (e.g., more foods, income based on natural resources, economic prosperity), if the resource base is maintained in good health. The present study seeks to enhance regenerative practices in ecosystems, which seems indispensable aspect of local socioeconomic development.

Notes

1. Initial reflection about this chapter is contained in: Dangbégnon, C.; Röling, N.; Blum, A., 1995 New perspective on complex environmental problem in Benin: platform for resource use negotiation. Paper presented at the International Congress on Agrarian Questions, Wageningen May 22-24, the Netherlands.

The present chapter makes use of many reflections contained in: Maarleveld *et al,* 1997. FASOLEARN, Social learning for collective natural resource management: facilitation, institutions and policies. Wageningen Agric. University, Dept. of Communication and Innovation Studies

2. Life-world according to Ubels (1989: 187), 'refers to material-economic dimensions, in terms of production and reproduction; to social dimensions, in terms of relations, networks, groups and organizations; as well as to the cultural and ideological dimensions of people's lives, in terms of their perceptions, values and ideas'.

3. Long (1989: 1-2) defines social interface 'as a critical point of intersection or linkage between different social systems, fields or levels of social order where structural discontinuities, based upon differences of normative value and social interest, are most likely to be found'.

3   Methodologies for studying Adaptive Resource Management

3.1   Introduction

This chapter explains the methodologies of the present study. Two different blocs of methodologies are developed. The first can be called Participatory Learning and Action Research, which involve curricula for discovery learning by a scientist, RAAKS, and PTD. The reason that these participatory methodologies are used will be explained. The second block concerns the concrete research methodology. Therefore, the main concern is about the nature of the research, the approaches chosen, the methods and techniques to collect information used within this approach, and data. The processes involved in the selection of the case studies, the methods and techniques used, and the analytical paths for comparative analysis are explained.

Various methodologies are combined within a constructivist inquiry. This perspective is different from the more classical way of doing research ('naive realism'). Emerging complex new social problems and demands call for new ways of carrying out scientific and development activities, and the previous ones that have become irrelevant are abandoned (Kuhn, 1970). First of all, this chapter starts with some initial considerations for a constructivist inquiry. Subsequently the problem of 'rationality' will be raised, the three rationalities of Habermas (in Brand, 1990) will be discussed, and some basic principles that underpin a constructivist inquiry will be explained.

3.2   Initial considerations for a constructivist inquiry

The problem of 'rationality' under a constructivist inquiry

Many situations of ARM involve different stakeholders, development professionals, a network of research organizations, universities, policy makers, donors, etc. Each of them is embedded in social processes through which reality is constructed (standards, norms, values, diversities, etc.) with respect to ARM. They are also active in the interpretation of the world around them (creation of 'artefacts'). It is argued that reality is socially constructed (see Berger & Luckmann, 1967; Leeuwis, 1993). Doing research in such situations becomes very complex, and this can be defined as how a researcher can integrate different social constructions into his or her inquiry process. Kloppenburg (1991: 520) discusses some problems which are related to the way a researcher can incorporate alternative sources of knowledge production which are qualified but have no voice in the contemporary technoscientific discourse.

However, the natural and social dimensions of ARM are characterized by uncertainty and alternative sources of empirical knowledge should be not neglected. Funtowicz & Ravetz

(1990) argue that decisions depend on evaluation of future states of the natural environment, resources and human society, all of which are unknown and unknowable. Funtowicz & Ravetz (1990) argue that science which can be relevant would be based on the assumption of unpredictability, an incomplete control, and a plurality of legitimate perspectives, all issues which are involved in ARM.

If one assumes a multiplicity of legitimate perspectives in ARM, then the notion of 'rationality' needs to be questioned. In many African rural societies, the context of this study, there are local perspectives based on the spirituality, for instance, some divinatory practices are used to transcend or anticipate critical situations related to perceived problems with respect to the use of their natural resources. For example, these types of perspectives which can be encountered in resource management raise the problem of 'rationality about how can one deals with stakeholders' perspectives which are apparently tinged with myth and superstition (IDS Workshop, 1989: 36). Hountondji (1989) argues that: 'beyond the existing superstition, or should one say instead of, beyond the mythical discourse - there is a strong core of real facts, empirically verified, unavoidable which the scientific rationality is incapable of accounting for'. The interest in this section is not to discuss what would be considered as 'rational' or 'irrational' but, how to go about the crucial notion of 'rationality' in order to legitimate what the laymen, the stakeholders, is doing, and to present some relevant evidence in the domain of resource management.

Using the three rationalities of Habermas

In face of this challenge, the three types of rationality (instrumental, strategic, and communicative) distinguished by Habermas (1990) and also in Brand (1990) can be useful. They can be applied within the constructivism paradigm (cf. Röling, 1996).

In studying resource management from a constructivist perspective, instrumental rationality would involve participatory and anticipatory experimentation (e.g., by stakeholders and scientists), making things visible, classification, etc. Learning about ecosystems with the stakeholders is an example.

Strategic rationality would involve the anticipation on the moves of others. For instance in resource use situations, stakeholders would behave selfishly. Maybe, 'adaptive management' (Holling, 1995) can stimulate reflection to look at dynamics and think for instance, about ways of responsive planning in resource management.

Previous discussions reveal the importance of collective action and shared understanding about resource management problems (see §2.1). Communicative rationality from a constructivist perspective has the following implications for studying resource management. Collective resource management and sustainability are the outcome of negotiated agreement and concerted actions. Soft-system thinking (see §2.4) is a perspective for guiding reflection during the inquiry for the present study.

In additional to the Habermas' types of rationality, one should argue, with a special reference to the African context, that beliefs, popular spirituality, certain types of knowledge (the so-called 'non-scientific' or indigenous), with respect to resource management, get a certain immaterial and material value in a certain perspective, and within a particular socio-cultural context (Bourdieu, 1990; Geertz, 1983). These situations are strongly concerned with interactive and empathetic learning processes with the stakeholders (cf Millar, 1996).

Interaction and hermeneutic processes: basic principles that underpin a constructivist inquiry

Interaction is, according to me, a very important principle within a constructivist inquiry. It enables mutual influence among the people participating in interactions. Interaction among various stakeholders, groups, coalitions, networks and organizations is one way to deal with different perspectives. According to me, interactions enable the penetration, influence, alteration of other people's modes of thought.

Geertz (1983) argues that the enterprise of 'the understanding of understandings' is nowadays usefully called hermeneutics. This definition seems useful in ARM because it allows an interpretation of meaning, symbols, conceptions, styles of using natural resources, in other words the imaginative cultural make up of a community, according to the interpretation of the stakeholders, and not according to one's own cognitive processes.

In a double hermeneutic (Giddens, 1984), (a continuous interpretation of the others' interpretations), an interventionist or a researcher can realize that his/her cognitive repertoire is enriched by the cognitive repertoires of others he/she is interacting with.

3.3   Explaining methodologies for defining resource management problems

Soft System Methodology (SSM)

Soft-systems thinking discussed in chapter 2 uses SSM which has been developed almost entirely in corporate contexts such as industry, civil service, National Health service, etc. (for more details see: Checkland & Scholes, 1990). Stakeholders and other actors involved in ARM face a completely different context than a multi-organizational situation, which is characterized, for instance, by cultural difference, autonomy for action, different ideas of the way to get to the same goal etc. For that reason, Woodhill (1993) calls for the development 'second generation SSM'. The application of SSM for resource management moves into the same direction to identify the problems of resource management in conflicting arenas. It involves the following:

- An exploratory study for the understanding of the ARM context and the identification of groups of stakeholders, interest coalitions, etc., that can be related to the would be platforms of stakeholders to manage their natural resources.

- The appreciation of the problematic situation of resource management according to key stakeholders and other actors. This process may enable making visible various perceptions and understandings of the problem.

- The interpretation and the analysis of what the would-be problem owners think about the solutions to the problems. One can also focus on the analysis of the existing approaches developed as perspectives to solve the problems.

Stakeholders Analysis (SA)

SA is developed and applied differently depending on the way the central concept 'stakeholder' is conceptualized.

Burgoyne (in press: 1) defines stakeholders in the domain of occupational and organizational psychology as 'those who affect, are affected by, any phenomenon of interest, experience or conceptualize it'. Stakeholders are 'actors, agents, interested parties, interests, interest groups' (Burgoyne, in press: 6). SA is defined as a research approach which 'proceeds by identifying some, many or all of the stakeholders and collects data about their actions, perception, behaviors, experiences, thoughts in relation to the phenomenon'. SA is conceptualized by Grimble *et al* (1995) and [by Grimble & Chan (1995)] as an approach for NRM. It starts with the identification of the problem and objectives of the stakeholders and ends with the definition of options for management. SA is also used for the purpose to identify contrasting perceptions through interviews and of conflicts among the landscape users. Then, these issues constitute the subject of debate in meetings to explore the possibilities of collective action (Ravnborg & Guerrero, 1997).

SA is based on the increasingly accepted principle that the processes of change related to ARM can occur more efficaciously when stakeholders are given the opportunity to define and meet their needs rather than passively accept the goals of the economic and development imperatives imposed by governments. The application of SA for ARM involves the following questions:

- What are the needs, wants and desires of the stakeholders?

    The needs, wants and desires that are shared by a set of stakeholders can constitute the basis for setting priorities or objectives for an intervention, or for making a policy with respect to ARM.

- What are the trade-offs which result from the needs, wants and desires of the stakeholders?

    A trade-off is the process of balancing conflicting objectives which result from the needs, wants and desires of a set of stakeholders (cf. Grimble & Wellard, 1996: 179). The satisfaction of the needs of a group of stakeholders can conflict with the needs of

others stakeholders, actors at higher levels of the social aggregation, and also the nebulous 'future generations' of stakeholders. The trade-offs can inform us about some issues which can stimulate a further negotiation process, a mediation or the provision of incentives.

3.4   Participatory Learning and Action Research

Participatory Learning and Action Research (PLAR) explained here, concerns a scientist's curricula for discovery learning, Rapid Appraisal for Agricultural Knowledge Systems (RAAKS), and Participatory Technology Development (PTD). Below the reason for choosing these methodologies are discussed. Using these participatory methodologies, by a researcher, requires new professionalism based on new norms and communication skills. One should, instead of imposing his or her idea, learn to listen more and share understandings. Therefore, avoiding an attitude towards 'knowing' is useful. 'Knowing' is based on the consideration that one has the 'truth' and is in a better position than the others for the understanding of how the 'things' are (see Pretty & Chambers, 1994).

Cornwall *et al* (1994: 1994: 43) present a checklist of many participatory methodologies of the 1980s-1990s. Most of them emphasize the key word 'participation'. Methodologies can be defined as the framework for selecting the means to find out about, gain a joint understanding of, organize a joint learning and decision-making about, stimulate reflection on, analysis of, ordering of, and self-discovery and behavioral change about a particular issue.

A scientist's curricula for discovery learning

A scientist curricula for discovery learning allow stakeholders to express themselves through an interactive and a multidimensional nature of knowing. It explores the ways in which messages can be conveyed and interpreted locally, and offers the opportunity for the facilitator(s) to collect data with the stakeholders, and for the stakeholders with respect to ARM. Stakeholders participate in the generation, representation, and analysis of the data. Stakeholders can perceive themselves engage in a process whereby they seek for clarity, understanding and improvement of their way of life. The researcher can understand the instrumental rationality of stakeholders and the functional value of natural resources, criteria for the assessment of social changes in relation to their natural resource base, and the nature of the social and institutional relations. Such curricula include participatory mapping and modelling, aerial photograph analyses, transect and group walk, matrix scoring and preference ranking, Venn and network diagraming, focus groups, well-being and wealth ranking, social maps, etc. (see Cornwall *et al*, 1994: 46).

Curricula for discovery learning can be used for the generation of knowledge with the stakeholders based on co-learning tools. The type of tools used depends on the creativity, the understanding of the problem context, and the nature of the stakeholders (e.g., illiterate or not).

Curricula for discovery learning are relevant for creating new understandings of a phenomenon, related to the use of the natural resources, with the stakeholders through co-experimentations, and later, a process of change can be triggered in ARM. For example co-learning tools are used in Australia to increase the ability of stakeholders to understand soil management practices (cf. Hamilton, 1995, 1998).

Rapid Appraisal for Agricultural Knowledge Systems (RAAKS)

RAAKS is a participatory methodology which involves stakeholders, extension staff, researchers, policy makers, traders and others. It focuses on the interaction among the actors, and the aim is to share knowledge and information for improving the performance of the social organization of innovation (Engel, 1995, with Salomon, 1997). RAAKS is based upon SSM, and it consists of three different phases: (i) defining the problem, (ii) analyzing constraints and opportunities, and (iii) strategy/action planning. Each phase provides different windows and tools (for details see Salomon & Engel, 1997).

Some windows of the RAAKS methodology, especially, those which help analyze constraints and opportunities can be used for enhancing the performance of the social organization of innovation in ARM. These windows which seem to be relevant for the present context are: knowledge network analysis, integration analysis, coordination analysis, and communication analysis. They can be used through interviewing the stakeholders and other actors by a researcher, consultant or a team of professionals. The aim is to explore the extent to which innovative performance in ARM can be reached.

Knowledge network analysis focuses on the analysis of the source of knowledge, and what type of knowledge is important for a specific perceived innovation-laden problem in ARM. Integration analysis looks at 'who has contact with whom? Why and how does it affect innovative performance in ARM? Coordination analysis focuses on who involves others in their 'projects'? Who has the means to implement important decision with respect to innovative practices in ARM? Communication analysis questions whether the actors use the same language (understand each other) or not.

Participatory Technology Development (PTD)

PTD is a process of purposeful and creative interaction between stakeholders and outside facilitators. It involves various processes such as:

- gaining understanding of eco-specific and cultural contexts
- defining priority problems and experimenting locally
- involving stakeholders in the process
- generating locally-adapted technologies
- internalizing the technologies developed

PTD process follows a different approach to collecting, codifying, interpreting and utilizing knowledge and information. It uses a combination of methods and enables the mobilization of stakeholders' for the generation of technologies. PTD practitioners can be based in any rural development organizations and project, and involve members of a local community, and as well as scientists.

PTD process and methods are explained by Jiggins & de Zeeuw (in Reijntjes et al, 1992: 135-62). Six steps are distinguished to generate technologies with the stakeholders. The same path is followed to explain how PTD can be used in ARM. These steps are:

- Getting started

  Several methods and methodologies can be used at this level for ARM. For instance, SA, PRA and PLAR explained above can help describe and clarify the problem areas and the priorities.

- Looking for things to try

  At this level, a workshop with stakeholders can be organized to agree on a research agenda and identify options for an improvement.

- Designing experiments

  The main output of this step is to agree on protocols which present shared criteria for monitoring and evaluation.

- Trying out things

  Stakeholders are involved in the implementation of ideas, observation of the experiments (stakeholders become expert in the process), monitoring and evaluation.

- Sharing the results

  At this step, key issues concern the critical analysis of the results and their internalization or the process is revisited.

- Keeping up the process

  Enhancing multiplier effects and self-discovery from other stakeholders, and stimulating an horizontal diffusion of the technology generated.

3.5   Concrete research methodology used for the study

Exploratory research approach

The exploratory research approach is one of the many existing research approaches for social studies. Rap (1997) summarized some basic characteristics of the exploratory research approach. It uses qualitative methods and is less concerned with quantitative relation among variables and the testing of hypotheses. It considers the research objects in their daily or natural circumstances and not in artificial or experimental settings.

In exploratory research, sampling is purposive rather than random; the concern is with information richness, not representativeness; and the analysis is not linear but iterative process (cf. Zyzanski *et al*, 1992). The data in the exploratory research are qualitative: logs, diaries, jottings, memos, notes, field notes, reflexive notes etc. But existing quantitative data can also be used to support analysis in an exploratory research (cf. Rap, 1997: 7). A main strong point of an exploratory research is that one can concurrently frame and reframe, not only the research questions, but the sampling procedure, the analysis, and the theory construction. This flexibility can increase the likelihood of gathering data which are very rich in detail.

For the desire to improve the perspective developed in chapter 2 through the present study, according to me, the exploratory study seems the best way to yield novel and fresh ideas and concepts from the empirical world. Another reason for choosing the exploratory study results from the fact that this approach matches with the consideration of the constructivist paradigm for ARM, which calls for more creativity and pragmatism. The exploratory research enables the analysis and interpretation towards grounded insights on specific contexts, the generation of hypotheses based on observation of phenomena in real situations, for instance with respect to notions such as platform development in ARM. The hypotheses generated, whether theoretical, can best inform concrete action in the real situation instead of increasing an understanding of, or verify old 'truths'. Exploratory research can be done within case studies and allows comparative analysis.

Case study and comparative approaches

The exploratory character of the research and the intention to grasp different aspects (e.g., local arrangements, interventions, etc.) of resource management seem to motivate the choice for a case study research approach. Another reason for choosing a case study research approach is the flexibility (several cases studies can be conducted simultaneously), and the diversity concerning the methods of research applied to them. According to me, it is also the only way to display various situations which aim at increasing the 'trustworthiness' and the 'authenticity' (explained further) of the emergent perspectives from the study. Multiple case study design was used (cf. Yin, 1984) in order to cover the different types of ecosystems which are considered in chapter 2.

The ways in which the case studies were used in this study are likely to form a combination of what Mitchell (1983: 193-96) described as an`extended case study' and `heuristic case studies': the former traces the events in which the same set of main actors in the case study are involved over a relatively long period; and the latter is meant by the deliberate choice of some case studies in order to gain theoretical insights. The inspiration I gained from the extended case study allowed me to base the analytical path of several cases selected according to the possibility to display temporal and spatial variations covered by the case studies. This may help to look at the changing patterns that occur with respect to the phenomena involved in ARM. The concept of the heuristic case study raises the awareness to cover several types of cases in order to grasp as much as possible the different contours of ARM.

One can notice from chapter 2 that there is a diversity in the resources which are in need of being managed, depending on the type of the ecosystem under siege. In searching for common principles and similarities that can constitute the basis for ARM, a comparative approach acquires its relevance in the present study. The adoption of the comparative analysis can allow me to isolate and synthesize the common principles and similarities with respect to the key variables (the nature of the problem, the social learning processes, the facilitation of change, the regenerative practices that can be learned, the variables involved in platforms development processes).

Having the comparative approach in mind, I always felt the need to diversify the resource management situations. One can argue that the comparative approach achieves information-richness. It offers many possibilities for the replication of a study. However it is also argued that the comparative approach presents the weakness of losing the specificities of a situation, which the case study investigated. Being aware of this problem, the present study analyses and draws a specific conclusion for each case, before a comparative analysis and synthesis were attempted.

Using grounded theory principles to gain theoretical and practical insights

The grounded theory approach is discussed as a way to build theory based on the empirical data in qualitative research (cf. Glaser & Strauss, 1967; Strauss & Corbin, 1990). Grounded theory principles concern the systematic set of analytical induction, interpretation, comparison, and coding procedures to develop a theory that is grounded in data collected in the real-world. This means that the research does not start with a preconception of the reality through the definition of hypotheses derived from existing theories and which are ultimately tested. Therefore, one can argue that some concepts and ideas at the beginning of a research can only be seen as a guide for the exploratory research, although the finding, the theory, must be contextualized.

The grounded theory principles can offer, during the exploratory study, the opportunity to gain novel concepts, ideas, metaphors and methods which can be reiterated into the emerging relevant theory for ARM. Instead of using an existing theory or 'truth' to explain

(or understand) phenomena involved in ARM, it would be more useful to be creative and pragmatic concerning the way to go about this issue. To paraphrase Rap (1997: 7), one can argue that the intention is to look at the problems of resource management, as they are related to societal problems, from fresh, unprejudiced, sometimes counter-intuitive, yet well-founded points of view and to call into question the self-evident.

Preparing the inquiry: selection of case studies

The choice of the case studies was influenced by the NIRP programme under which the research was done. One of the objectives of this programme was to do the research in Benin and another country of the West (Francophone) Africa. For this reason, Burkina Faso was chosen. The fact that Burkina is a Sahelian country was a great advantage because of the diversity of the ecological zones covered by the present study. Benin and Burkina Faso are two neighboring countries. In physical environment patterns, these countries create together a wide range of ecological settings. From the South of Benin to the North of Burkina Faso, the environment becomes drier (from highly humid zones in the former to desert in the latter). The two countries are characterized by a ethnicity diversity. But, the block Fon ethnic group represents 47% of the population out of 5,000,000 inhabitants in Benin, while Mossi ethnic group represent 44% (3,500,000 out of the 8,000,000 inhabitants) of the population in Burkina Faso (Ouedraogo, 1990: 21). Linking ethnicity, politics and socioeconomic development is a common practice in the two countries. They gained independence the same year (1960), they share a common official language (french), the same currency (franc CFA) and they experienced a 'Marxist' regime (cf. Allen, 1989; Baxter & Somerville, 1989). The land area of Benin is 112 600 square kilometers and 274 000 for Burkina Faso. About 80% of their populations are in the rural areas.

The selection of the case studies was done gradually through time and spaces (see fig. 3.1). The number of the case studies definitively selected could not be foreseen at the beginning of the study. One of the rules that guides the choice of a case can be defined as the following: the progress and the 'discovery' of some phenomena during the inquiry about a case which was selected, stimulate the need to select a new case which can be expected to generate the counter-part of, or complement the previous 'discovery'. For instance, the investigation of a case in an ecozone A can stimulate the choice of the same case study in an ecozone B for comparative purpose or for making the conclusions more consistent about the issue under the study. In the process of selecting the case studies (described below) particular attention was given to a maximum variation of the cases by focusing on strategies which consisted on looking for typical cases, deviant or critical cases, politically important or sensitive cases, convenience cases (for example: save time, money and effort), etc. (cf. Kuzel, 1992: 38).

The first case study selected in 1994 was the Lake Aheme in the southern part of Benin. The choice of this case was influence by some key concepts used (e.g., 'common property resource' use negotiation') at the beginning of the research. The Lake Aheme was also known in Benin for the repetitive and the seriousness of conflicts which occurred between

the stakeholders. One of the main objectives at that period was to find an interesting case which might constitute the basis for building a useful perspective on 'CPR use negotiation'. From this point of view, the Lake Aheme was attractive because it involved the stakeholders' interaction, the intervention of government organizations and political concerns. I assumed that these opportunities would offer diverse empirical data which might be interesting for the stimulation of a theoretical, methodological and practical reflection at early stage of this study.

Progress in the selection processes and the investigations

	1994	1995	1996	1997
CASE STUDIES	Lake Aheme case	Lake Aheme case revisited / Watershed case in Mono	Rangeland case A / Lake Aheme revisited / Watershed Mono revisited / Rangeland case B / Preparing Burkina cases	Watershed case in Zou / Women's case in Djeffa / Rangeland case B revisited / AZSP case in Burkina / FCM case in Burkina

Figure 3.1:   Processes of the case studies selection

A second case study on watershed was selected in 1995 in Mono (South-West of Benin) under the influence of the NIRP project whose one objective was to do a research on three case studies in Benin. This case was not too far from the Lake Aheme area (80 kilometers), and for this reason it presented a strategic advantage because of the possibility to do the fieldwork alternatively in the two locations. Another advantage was the fact that this period coincided also with the implementation of the PGRN project, a deliberate intervention which was seeking for the improvement, with the *Gestion des Terroirs* approach, of the watershed chosen as a case study. I also assumed that this situation might offer the opportunity to focus on a joint-learning process between the stakeholders and the intervening agency. This region was known before through the previous studies about the 'IKS' of the Adja people. Although, I was motivated to see how the PGRN project would learn to live with the Adja people's knowledge.

The third case study concerns rangelands. It was selected at the beginning of 1996 in the *sous-prefecture* of Savè where the Tchabè ethnic groups are living. Savè is one of the region in Benin where rangeland problems, especially the relationship between the herders and

the crop-farmers, are conflicting and problematic. The fact that there were conflicts between the stakeholders, interactions would occur and the chance to study some processes like negotiation, mediation and conflict resolution would be high. The *Chabe* people are one of the ethnic groups in Benin which make use of their local organizations and institutions for the preservation of their natural resources (Essouma, 1992). For all these reasons, the rangelands case was attractive. During the same period, the case of the Lake Aheme and the watershed in Mono were revisited. In Mono, the team of the PGRN project informed me about the existence of an intervention on rangelands which was using the *appui-conseil* approach towards concerted action between the farmers (in a village called Kêmon) and the herders. The rangelands case in Savè was extended to the *sous-préfecture* of Ouesse (northern part of Savè), especially Kemon, where the Tchabè people are living. The situation in Kemon complemented the one in Savè because of the possibility to focus on how the PGRN team was cooperating with the local organizations and institutions of the Tchabè people.

As explained above, the judgement of rigor in the constructivist inquiry is a predisposition at a different stage of the research process. At the end of 1996 the previous case studies were evaluated. Under the influence of the principles of the constructivist inquiry during this evaluation, the need to select other case studies was felt. A concrete example was that the watershed case in Mono revealed three important characteristics (Adja ethnic group - coastal humid ecozone - team of watershed managers controlled by the PGRN headquarter) which influenced the data collected. The same variables in another way were identified for a watershed improvement activities in Ouèssè: Mahi ethnic group, savannah ecozone, NGO team for the execution of the watershed project. This procedure enabled the selection of a second watershed case in Ouèssè.

The same procedure of the evaluation of the case studies which were investigating led, in the first hand, to the selection of the Djeffa women case. A motive was to incorporate the REDAD experiences (see background in §1.1) into this study. In the other hand, some ideas were developed for the selection of case studies in Burkina. For instance, the need to focus on the forestry problem was felt because the case studies in Benin did not cover this issue. Suzanna Nederlof, a dutch researcher, joined the research project to assist in conducting the Burkina case studies. The fact that she had some previous experiences, background, and many contacts in Burkina was a great advantage.

At the beginning of 1997, the fieldwork of the two new case studies in Benin started. At the same period, Suzanna Nederlof started a pilot exploratory study in Burkina. Her objective was to provide background information for the selection of the case studies in Burkina. After this step, the coordinator of the NIRP project went to Burkina for the pre-selection of some cases which could be interesting for a research (or could enrich or complement the Benin cases). In April 1997, the fieldwork started and a final selection of two case studies was done: The *aménagement* of a *zone sylvo-pastorale* and the Maro Forest. I focused on the *zone sylvo-pastorale* case while the Maro forest case was done by Suzanna Nederlof. The Burkina case studies gave the opportunity to study the intervention processes

through the PNGT actions, a similar situation with the PGRN project in Benin, an advantage for a comparative study.

Research methods and techniques applied for the case studies

The research methods and techniques applied in the case studies comprise unstructured and semi-structured interviews, the snow-ball technique and life histories, the participant observation, the use of documents as an additional source of information, and imaginative methods and techniques.

Unstructured and semi-structured interviews

The unstructured interview is known for its flexibility to learn from the respondents (Bernard, 1988: 205-09) and to preserve an original meaning of information that is called the emic approach by Pelto & Pelto (1978: 55-60). According to me, a crucial problem faced by a researcher in doing unstructured interviews is how can one improvise, restructure and guide the information flow from the interviewed persons. Carruthers (1981:275) provides a mental construct (facts, reasons? alternatives? review procedure and forecast) that was used in the conditions of the unstructured interviews. These interviews had two basic purposes during the study. First, it enable to focus on what the stakeholders and other actors themselves do and think in the arenas of resource management. Second it enabled an immersion into the wider cultural, social, economic and political existing systems for the particular issue of resource management. The unstructured interviews covered several issues such as the identification and perception of the resource management problems by the stakeholders themselves and other actors, the ways they experienced them, the social processes that occurred and the solutions according to them.

Semi-structured interviews complemented unstructured interviews and were used on the basis of an interview guidelines, opportunistically designed according to the data and information collected through unstructured interviews and the ideas/concepts from the perspectives of the researcher. Semi-structured interviews would mean that the role of the researcher is not completely neutral. It was also useful to cross-check the information, analyze them according to different windows (notes). Semi-structured interviews were done with some key informants carefully selected as is explained later. A key informant is an individual stakeholder, a representative of an interest coalition, an actor in development or research organization (GO or NGO), a political or administrative representative, a representative of a funding organization, etc.

Snow-ball technique and life histories

In most of the case studies, the snow-ball technique was used to identify the key informants for the interviews. This method is a type of sampling procedure in which, for example, choosing one informant may generate information about other persons which leads the

observer to contact one of these others as a second informant, who in turn directs him to a third informant etc., in an extensive chain of contacts (McCall & Simmons, 1969: 64). Snow-ball technique leads to non-probability sampling based on reasoning, trial and error, literature assessment and creativity to cope with the complexity of a particular situation (Bertaux-Wiame, 1981). The danger of the snow-ball technique is the fact that the selection of the key informants through this method, can lead to a 'false' image of a community because a chain of informants can reflect a group of people who share some ideals, opinion or adopt a specific about a natural resource use practice. One way to minimize the bias was to diversify the chains of informants obtained through the snow-ball techniques.

In using the snow-ball technique, a particular attention was paid to some stakeholders who had some particular duties, responsibilities or leading roles with respect to resource management. Those type of stakeholders got a special treatment by what is called here the life-history approach. Pelto & Pelto (1978: 75) argue that life histories represent the lives of exceptional rather than representative or average persons in the community. Selection of potential stakeholders in this approach is based on a purposive strategy (cf. Bertaux-Wiame, 1981). This method, in this study, reflected the richness and personalized nature of some particular stakeholders. It enabled a vividness and integration of cultural information that are of a great importance and value for understanding particular lifeway in the relation to resource management.

Participant observation

Participant observation is widely used during the course of this study. Bernard (1988:148) explains the `art' of participant observation by saying:

"It involves establishing rapport in a new community; learning to act so that people go about their business as usual when you show up; removing yourself every day from cultural immersion so you can intellectualize what you've learned, put it into perspective and write about it convincingly."

In participant observation, the observer *shares* in the life activities and sentiments of people and his role reflects the social process of living in society (Bruyn, 1966). The delicacy of this task requires to be tactful (Berreman, 1972). The hypothesis-generating ability of participant observation stems from the observer's ability to apply a theoretical perspective to his observations and to respond to both uniformities and regularities in what he sees. Theoretical richness is obtained through an analysis based upon the observer's frame of reference (Pelto & Pelto, 1978; McCall & Simmons, 1969; Peacock, 1986).

I was in the field for all the case studies. This gave the opportunity to observe stakeholders in their day-to-day activities (farming, fishing, cattle keeping, etc.), social events (conflicts, conflict resolution, meetings, collective activity) and the activities of professionals and researchers. According to Billaz and Diawara (1981: 112), it is in the field that the 'rationality', the organizing principle of what stakeholders do and think, can be understood.

The use of documents as an additional source of information

According to May (1993), the type of documents that can be used historical documents, official statistic reports, government records (i.e., ministerial records, debates, political speeches, administrative and government committee records and reports; and one must add also consultancy and evaluation reports. The danger of using secondary sources of information is mainly related to the fact that they often emphasize the positive dimension (successes) of what had happened. The document might not cover negative dimensions (failures, mistakes, negative impacts), for instance, of a resource management project. In order to minimize these problems, it was important to do some historical interviews in order to reconstruct, to some extent, the past of resource management activities.

Documents which were relevant for the case studies concerned: (a) government reports on general policy for resource management; (b) resource management project documents; (c) consultancy reports; (d) basic/applied and socio-economic reports, and historical documents which give a view of the past and the present of a resource management process.

Imaginative methods and techniques

Imaginative methods and techniques concern all kinds of creations and the *bricolage* of a researcher during the fieldwork. They are difficult to specify clearly because they evolve spontaneously according to the imagination of the researcher in searching for a way to introduce himself/herself in a community, i.e., using a metaphor to explain the purpose of the study, to obtain a type of information, and to learn with the stakeholders about a specific issue. Imaginative methods and techniques can be based on visual imagery and iconography (e.g., Pryce, 1996; Harrison, 1996) to generate information on a concrete ground with the stakeholders.

3.6   Comparative analytical framework and research questions

The analytical paths for the inquiry

The case studies discussed are expected to provide the basis for learning to develop ideas and concepts for ARM. At this level, the notion of paradigms (positivism and constructivism) explained above appears again. For this reason, it would be useful to make explicit this issue in order to show how can distance one paradigm from another in an analytical path.

The positivist inquiry accordingly to what is explained by Maarleveld *et al*, 1997 is mainly concerned with an attempt to seek a causal relationship among a set of independent variables (a, b, c, d, ...) which can hopefully explain or predict the dependent variable (see fig. 3.2). For example, the concept effective platform could be considered as a dependent variable and the analytical path would focus on ways for seeking a causal relationship between independent variables which can predict the conditions for the occurrence of an effective platform.

Four criteria which are used for ensuring rigor in the positivist inquiry are discussed by Guba & Lincoln (1989: 234-5): internal validity, external validity, reliability, and objectivity. The first criterion (internal validity) is used to test the degree of isomorphism, the extent to which the findings of a study correspond to a presumed reality 'out there. The second criterion (external validity) is used to test the extent to which the results obtained on a small sample are generalizable to a larger sample. The third criterion (reliability) concerns the consistency, the predictability and the possibility to repeat the same study and obtain the same phenomena if the same instruments are used. The fourth criterion (objectivity) means that the inquiry process is free of bias, values and/or prejudice. The researcher has no influence on the research process. Guba & Lincoln (1989: 236) analyze critically these criteria for the positivist inquiry and conclude that they cannot be relevant in the constructivist inquiry.
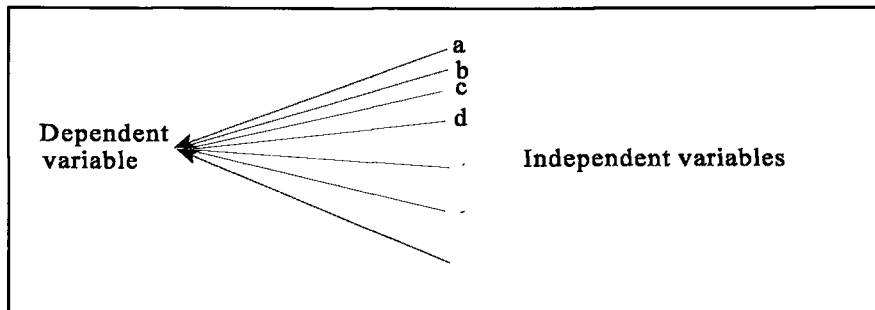
Figure 3.2:   Realist-positivist analytical path

In the present study, I distance myself from the positivistic way of inquiry discussed above and elaborate analytical paths which seem to be relevant for the analysis and the comparison of the data from the case studies in a manner of a constructivist inquiry. The identification of a common pattern of variations for the issue under investigations can be, according to me, a starting point for building a framework for the analysis in a constructivist inquiry. During the discussion about the perspective for ARM (see chapter 2) the importance of temporal and spatial variations at the levels of the ecosystems and the social dynamic of the stakeholders became apparent. Here, one can suspect that the consideration of the temporal and spatial variables in the path would be a predisposition for ensuring rigor in the constructivist inquiry. Two analytical paths are considered: the first follows a temporal variation of the case study (see fig. 3.3) and the second focuses on sub-cases which present spatially different characteristics for a case study (see fig. 3.4).

How to proceed in the analytical path 1 (temporal variations) ?

*   Define time scales according to some perceived events or assumptions which seem to be relevant for the changing patterns of the case study in terms of the problems of resource management.

- Describe the ecosystem under siege and identify the stakeholders at the period of the study. It could be done also through the times scales defined. But the difficulties for obtaining, for instance, data about the changing state of the ecosystems in the present study did not make it possible.

- Proceed the analysis through the time scales by using the key variables defined in the perspectives for ARM: the problems, the social learning, and the facilitation of changes.

- Draw conclusions, through a retrospective look at the data, about the nature of the platform(s) and the assessment of greater sustainability.

Four case studies, as they were presented further, follow this analytical path: the Lake Aheme, the Djeffa women, the *zone sylvo-pastorale* , and the Maro forest.
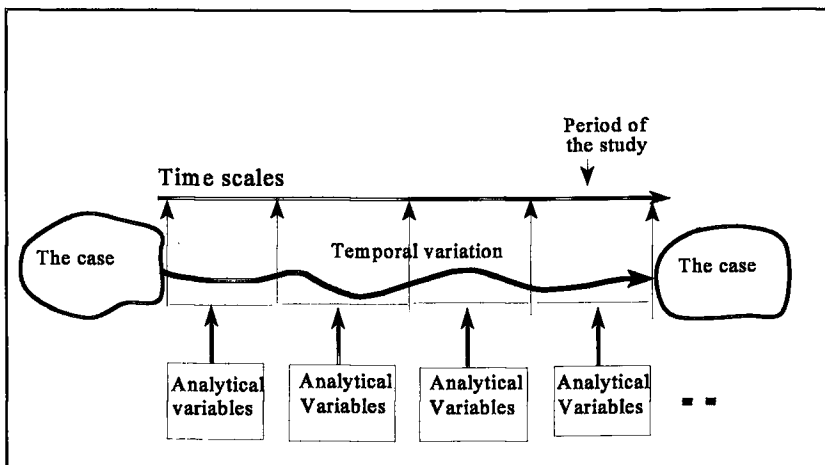
Figure 3.3:   Analytical path 1 within a constructivist inquiry

How to proceed in the analytical path 2 (spatial variations) ?

- Making visible the variables which constitute the ground of the spatial variation of the case study in several sub-case studies. The relation of the variation of the sub-cases in terms of the problems of resource management is also important to take into considerations.

- Proceed in each sub-case by using the key variables defined in the perspectives for ARM: The ecosystem and the stakeholders, the problems, the social learning, the facilitation of changes, and the nature of platform.

- Compare the sub-cases (mainly the differences) and provide a synthesis. A specific conclusion will be drawn for the case study.

Two case studies follow this analytical path: the Rangeland in *Chabe* community and the watershed development.
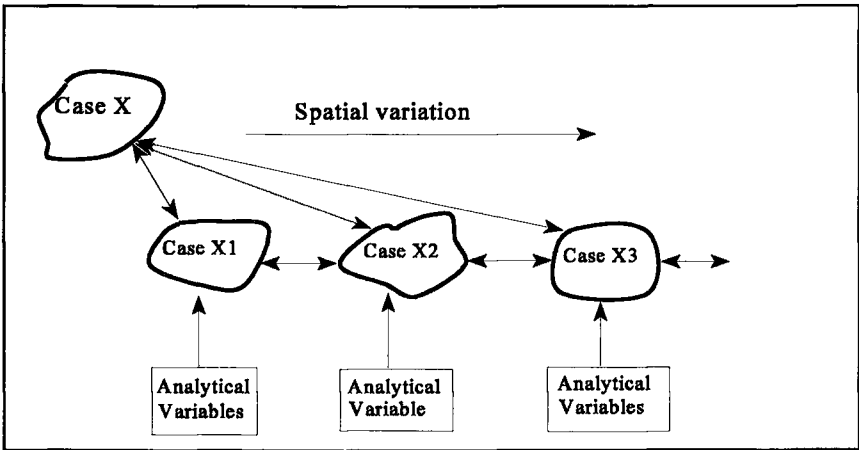
Figure 3.4: Analytical path 2 within a constructivist inquiry

The criteria for ensuring rigor are explained in details by Guba & Lincoln (1989). Table 3.1 presents these criteria. The trustworthiness is defined in terms of sub-criteria paralleling the ones which are used in the positivist paradigm (see Table 3.1). The first is credibility which can be defined in terms of the relevance of the outcome of an inquiry for the stakeholders and the other actors involved. The transferability is the extent to which the outcome of an inquiry can be used or adapted to a new situation. The dependability and conformability are mainly concerned with the methods and the sources used for obtaining the quality of the data. The authenticity criteria (ontological, educative, catalytic, and tactical) are mainly concerned with the gains from the processes of the inquiry, their usefulness for undertaking and sustaining actions.

Table 3.1:   Criteria for ensuring rigor in the constructivist paradigm (after Guba & Lincoln, 1989)

Main criteria	Trustworthiness	Authenticity
Sub-criteria	Credibility (paralleling internal validity) Transferability (paralleling external validity) Dependability (paralleling reliability) Confirmability (paralleling objectivity)	Fairness Ontological authenticity Educative authenticity Catalytic authenticity Tactical authenticity

Part 2: Case Studies

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4 Breaking The Impasse: The Evolution of the Platform for Lake Aheme's Resource Management

4.1 Introduction

This chapter[1] deals with a lake fishery problem. A specific feature concerning fisheries is the difficulty of designing any deliberate intervention for the control over fishery resources, and of the people who use them. A typical example is given by Anderson (1987) for the Malaysian fisheries. Another feature of fisheries is that their resources are used under imperfect information and knowledge. One cannot easily know the quantity, the diminishing and increasing rate of the fishery resources, and devise a model for their 'rational' use.

This case study concerns the Lake Aheme fishery in the southern part of Benin. Some important literatures about the fisheries in the South of Benin and especially Lake Aheme (e.g., Pliya, 1980; Dagba, 1986; Mondjannagni, 1977), and the history, origin, and socio-cultural organization of the people around the Lake Aheme area (e.g., Manning, 1982; Meideros, 1984; Pfeiffer, 1988) were available. Other sources of information which concern the reports of the government organizations; the *Direction des Pêches* (DP), the fishery department, and the *Centre d'Action Régionale pour le Développement Rural* (CARDER), the government extension organization which intervenes in fishery issues; were also used. Several research methods and techniques were used for this case study. Individual (and group) interviews were used to collect the data from the stakeholders and other actors outside the lake area. Key informants for the interviews were selected with the snow-ball technique but particular attention was paid to the bias, the pretension of the informants to guide the researcher towards other informants who should have the same opinion (e.g., agree or against a fishing practice) about the problems of the lake. Snow-ball techniques worked as a strategy which enabled me to enter the arenas in the lake area. The life history approach was adopted for the particular stakeholders who hold (or held) some important responsibilities concerning the Lake Aheme. Participant observation was used during many field visits.

This chapter starts with the description and understanding of the Lake Aheme ecosystem, and the identification of the stakeholders at the period of the study (§4.2). But this does not mean that the past of the Lake Aheme and the stakeholders is neglected. Rather, a historical approach was adopted to analyse the evolution of the problems, the learning processes, the facilitation of change, the practices on the lake, and the platforms for resource management at four different periods: pre-colonial times before 1894 (§4.3); colonial times, period: 1894-1960 (§4.4); post-colonial times, period: 1960-1990 (§4.5.); and during the era of democratization after 1990 (§4.6). This case study draws specific conclusions (§4.7) about the extent to which greater sustainability is being achieved and the factors involved in successes or failures of fishery resource use.

4.2   Lake Aheme Ecosystem and Stakeholders

Lake Aheme Ecosystem

Lake Aheme is located in the Southern area of Benin and is (partially) a natural frontier between the Atlantic and the Mono provinces in Benin (see map 4.1a). From the administrative point of view[2], the people in the two provinces and the *Sous-préfectures* of Comé, Houéyogbé, and Bopa (in Mono province), and of Kpomassè and Ouidah (in Atlantic province) use the lake. Several villages are established around the lake.

The lake is deeply embanked between two plateaus of the *Terre de barre* (red soil): the plateaux of Comé and Bopa in the West, and of Allada in the East. At the Northern part, the lake receives the River Couffo. With 24 km in length, the lake's surface is 78 square/km during low levels of water and 100 square/km at the periods of the inundation of the floodplain (Dissou, 1986: 68). The Northern part is deep (2.10 m) while Southern part is less deep, 0.30 m during periods lower water levels.

The connection of the Lake Aheme to the sea goes through a complex channel called Aho, with 10 km in length, which joins the lagoon of Grand-Popo, a crossing point other rivers flowing into the Atlantic ocean (see map 4.1b). During the dry season, the water flows from the sea through the Aho and causes increasing salinity in the Southern part of the lake. This phenomenon happens very often in March according the stakeholders. When the rainy season starts, the River Couffo flows abundantly into the lake and causes decreasing salinity. The interest here is not to focus on ecological understanding from this dynamic, but this description aims at establishing the ground for the understanding of the fishing practices and strategies which are used by the stakeholders (to be discussed later).

The lake's shores were covered by mangroves (e.g., *Rhizophora racemosa* and *Avicennia africana*) which provided shelter, refuge, shade, food, and fish ponds for the lake's species (Pliya, 1980). But this physical state of the lake has changed. According to Mondjanangni (1969) and Pliya (1980), the mangroves were completely destroyed, despite their importance for providing a suitable ecological niche for the reproduction and the growth of the Lake Aheme fishery resources.

Actually, there are many natural resources in the lake, which have important economic value. The further discussions will reveal that the economic valuation of the lake's resources had emerged, and the more scarce they are, the more interesting economic value

Map 4.1. Location of Lake Aheme

Map1: Republic of Benin

Burkina Faso

Niger

Borgou
Province

● NATITINGOU
Ata cora
Province

PARAKOU
●

NIGERIA

Togo

LEGEND
_ _ _ _ _ _ COUNTRY BORDER
_ . _ . _ . _ PROVINCIAL BORDER
● TOWN

Zou
Province

● ABOMEY

1/
2,500,000
0   25   50 km

Mono
Pro   Atlantique
vince Province

LOKOSSA
●

Ouema
Province

● PORTO-NOVO

COTONOU Atlantic Ocean

Lake Aheme

Gudzin ●

OUIDAH ●
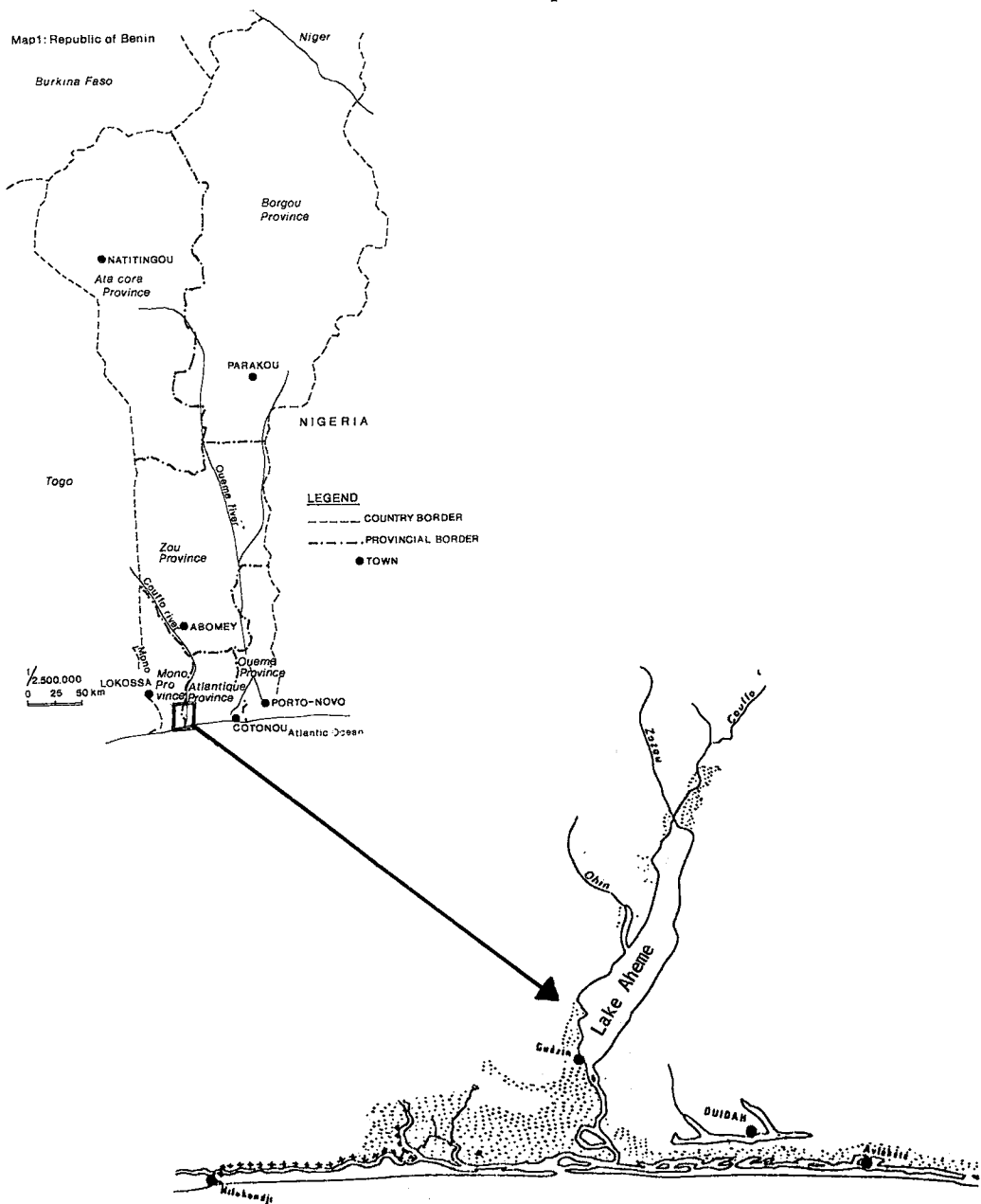
they have, and the more complex is resource management. The stakeholders explained that the fish species of the Lake Aheme, called (in Pedah) *akpavi, guessou, siko, nongban, blolo, ahouè* are well-appreciated in the markets (see table 4.1). Other species like *degon, asson* and *todan* have a very high economic value (see table 4.1).

Table 4.1:   Example of the Lake Aheme fishery resources which have important economic value according to the stakeholders (source: this study, and Pliya, 1980)

Local name (Pedah)	Scientific name
Akpavi (fish)	*Sarotherodon melanotheron*
Guessou (fish)	*Mugil cephalus*
Siko (fish)	*Polynemus quadrifilis*
Nongban (fish)	*Elops lacerta*
Blolo (fish)	*Chrysichthys migrodigitatus*
Ahouè (fish)	*Ethmalosa fimbriata*
Degon (shrimp)	*Penaeus duorarum*
Asson (crab)	*Callinectes latimanus*
Todan (eel)	*Myrophus punctutus*

The stakeholders of Lake Aheme

The first attempt to identify the stakeholders of the Lake Aheme was based on the data about their socio-cultural diversity and the social practices which characterize them. This idea came from the historical sources (e.g., Karl-August, 1984; Pazzi, 1984; Merlo & Vidaud, 1984) which were available. From the social cultural diversity side, two important ethnic groups, the Pedah and the Ayizo were identified.

The Pedah people are the dominant ethnic group of the lake (cf. also Pliya, 1980). They are at the Western side of the lake, and live in the consecutive villages Agatogbo, Gonguê-gbo, Kpétou, Acodeha, Houégbé-Pedah, Sêhomi, Tokan, Tossouhon and Ouèdemè (see map 4.2). At the Eastern side of the lake, Pedah people are dominant in the villages Agbanto, Sègbohouè and Adjatopka. The Ayizo people live in the Northern part of the lake in Bopa (Western side) and in some important villages, Dékanmè, Tokpa-Domè, Yêmê, Houago, Houêdjro and Kpago at the Eastern side (see map 4.2).

Map 4.2: Villages around Lake Aheme

Kpindji
Tchanhouě
BOPA
Gantitomě
Yěmě
Houago
Děkanmě
Kokponawa
Moumotin
Ouassa
Kpago
Houědjro
Possotomě
Ouokomě
Sěhomi
Zounta
Kpěrěkan
Domě
Ouědámě
Lokogbo
Tossouhon
Dagouă
Tokan
Houěyogbě Aklomě
Houěyogbě Kpodji
Doga
Adjatokpa
Kpátou
Oakondji
Sěgbohouă
Gonguěkpě
Gonguěgbo
Agatogbo
Ahouandjigo
Ouězin
Agbanto
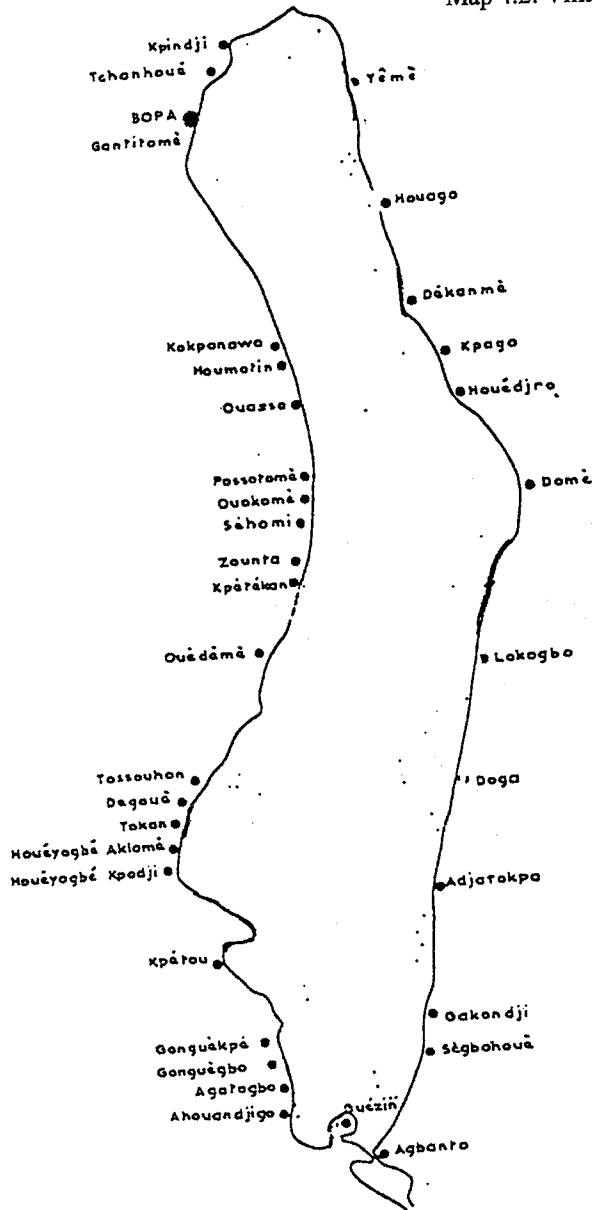
Scale: 1/100,000

(Adapted from Pliya, 1980: 147)

There are some similar cultural patterns with respect to beliefs and religious practices in the two ethnic groups (Aguessi, 1984). Tado (in Togo) is considered to be the place from where the Pedah and the Ayizo people originated (Pazzi, 1984; Karl-August, 1984). There is a resemblance in the language used by these two ethnic groups.

From the social practice side (especially the economic dimension), the Pedah people are fishers while the Ayizo people are fishers-farmers. The fact that fishing activities are common for the two ethnic groups means that they hold a stake in Lake Aheme and may have different voices and interests. The methodological dilemma which was related to this situation, concerned the identification of different categories of the stakeholders and their social practices and interests.

Guézin was identified (on the basis of information outside the lake) as a village which is historically remarkable as a centre where some people had played a crucial role for the governance of and the control over the lake. Starting intensive interviews from Guézin helped me to identify other key informants (snow-ball technique) in the other villages of the lake. The practices and the methods used for the fishing activities, especially those which presented conflicting grounds, were identified. They constituted the basis for the identification of the following main groups of the stakeholders of the Lake Aheme: The Dê (=King) Zounon, the Xha people, the Akaja users and others.

The Dê Zounon is the King of Guézin. The dynasty of the Zounon was governing the Lake Aheme and the kingdom was supported by the catches from a fishing practice called Xha which is a kind of fishing barrier installed at the southern part of the lake (see photograph 4.1). The Xha enables the owner to catch shrimps and fish species which migrate from the sea. The Xha people are the relatives or the family of the Dê Zounon[3]. They practice the Xha in the lake. The Akaja users are the stakeholders who designed the Akaja system, a kind of fishing device based on the principle of setting dense masses of branches in the shallow water (see photograph 4.2), which attract a large number of fish because of its resemblance to the mangrove. This fishing device is used at the deeper Central and the Northern parts of the lake. The owner of the Akaja is the only one who appropriates, after a certain period (6-12 months), the catches of a large quantity of fish which is in this fishing device.

The Xha and the Akaja fishing practices enable few stakeholders to catch more natural resources like fish, shrimps, crabs, etc. in Lake Aheme. The majority of the other stakeholders have little and became frustrated and they use some fishing methods and tools which are perceived as one of the causes of the depletion of the lake.

According to the discussion above, if the Lake Aheme is to be used in a concerted manner, an agreement among the different groups of stakeholders seems to be the only way for developing perspectives on solutions at the level of the whole lake. This argument was emphasised in another way by the stakeholder Sagbo (see Box 4.1).

In the further discussions, emphasis is given to the way the different categories of the stakeholders, the institutions, and the organization for governing the lake, emerged, the interactions among the stakeholders and how they seek solutions for the problems of the lake.

Photo 4.1: Xha in Lake Aheme

Photo 4.2: Branches used for Akaja

4.3   Lake Aheme during the pre-colonial times: before 1894

The problems and perceptions of Lake Aheme

The problematic context of the settlement around Lake Aheme

The problems of Lake Aheme during the pre-colonial times can be well-understood on the one hand, through an analysis of the chaotic circumstances (tribal wars and migrations) whereby the settlement of the Pedah people around the lake was affected, and on the other, through the representation of the lake in their life-worlds.

From historical sources, Pedah people were living in a village called Sahè[4]. They created the historical place Gléhoué called Ouidah at the coast of the Atlantic sea in order to develop commercial activities with the Europeans. The success of the Pedah Kingdom in Sahè attracted the Kingdom of *Danxomè*[5], and the King Agadja of Danxomè conquered Sahè in 1727 in order to control the economic activities with the Portuguese (Karl-August, 1984). In these difficult circumstances, the Pedah people fled towards Lake Aheme to find a place which protected them against the soldiers of the *Danxomè*. They found a refuge place they called Mitogbodji[6] which is a small island in Lake Aheme. The soldiers of the Kingdom of *Danxomè* (a plateau region) who did not know how to swim were not able to cross the lake to reach them. Lake Aheme was used as a natural protector against enemies. The context was also characterised by the slave trade, insecurity and the many raids to enslave people (see Manning, 1982). .

The Pedah people had learned to become fishers. From Mitogbodji, they created the village Houégbé-Pedah and many others around the lake. Their adaptation to the fishing activities in the lake for subsistence started since their settlement. Following this event, the Ayizo people of the Allada plateau who were farmers and hunters, settled in the North-east of the lake. They created some villages like Tokpa-Domê and had learned fishing.

The generation of local organizations and institutions for governing Lake Aheme

According to local mythology which is known by the stakeholders, and the existing sacred places in Guézin, the panther had a great significance for the generation of the local organization for Lake Aheme in the past. The mythology concerns a hunter called Ekloussè who left Niaouli (village at the Northeast of the lake) and reached Guézin while hunting on the Eastern shore of the lake. In Guézin he killed two panthers which terrified the Pedah people. For that reason, Ekloussè was welcomed and he started fishing activities with a kind of basket-trap he made with the veins of the oil-palm tree (*Elaeis guinensis*). The tool was efficient and Ekloussè had the idea to design a fishing barrier in zigzag in the lake and fixed the basket-trap in the angles along the barrier. Fish, shrimps and crabs were captured in the basket-trap. Ekloussè was admired by the Pedah people in Guézin because of his astute way of fishing with the Xha. The Pedah people had benefited from his catches (cf Pliya, 1980: 91). After killing the two panthers, and inventing the Xha practice, Eklousse was named the *Zounon* (which

means literally: '*the mother of work*'). He was appointed the King of Guézin (or *Dêh Zounon* in Pedah) by the Pedah people.

The *Dêh Zounon* extended his authority to all the people (Pedah and Ayizo) around the lake. He succeeded to realize the unification of those ethnic groups. He was appointed the king of the Lake Aheme by the Pedah people. The agreement was made that the *Dêh Zounon* was only one allowed to practice the Xha as a means of support for the Kingdom. The *Dêh Zounon* took the control of the voodoos, the spiritual representations of God, such as *Dagboe-hounsou* in Houèdjro, *Kpohon* in Sêhomi, *Kpassè* in Houégnogbé and *Tohonon* in Kpindji, which were perceived as the protectors of the lake and the stakeholders. He appointed the priests of these voodoos and they formed together the local organization for governing the lake. The priests were strategically located around the lake (see the villages underlined on map 4.2) in order to enable an effective control of the stakeholders.

The fact that the authority of the *Dêh Zounon* covered the economic, moral, social and spiritual dimensions of the people of Lake Aheme provided some prerogatives to the local organization of the lake, i.e., setting rules, regulations, the protection of the environment, sanctions, treat of different conflicts, protection of villages, etc. The institutions for Lake Aheme, generated by the local organization, are synthesized in the Box 4.2. Some taboos concerning the King Zounon were defined, for instance, he was not allowed to put his feet in the water because, according to the local people, this would provoke the anger of the spiritual representations which would create serious floods in the agglomeration of Guézin and a lot of diseases for those who were living there.

Box 4.2: The local institutions of the Lake Aheme during the pre-colonial times

•   The Djêtowlé (jumping in the lake) is forbidden in order to protect the spawning ground of the fish.

•   The Dobou-doboui (chasing the fish by hands towards the fishing net) is forbidden.

•   The Amèdjrotin (putting leaves in the water to attract the fish) was not allowed.

•   The use of "Mandovi" (a fishing net with a small mesh) and "Djohoun" (a fishing tool which holds a lot of hooks) were forbidden.

•   The fishers were not allowed to practise fishing activities two days per week.

•   During the periods of the cult for the voodoos protecting the lake, fishing activities were not allowed. The cult ranged over 5 to 7 days.

The interpretations and identification of the problems of the Lake Aheme

The motives of using the local institutions were aimed at keeping the Lake Aheme from being destroyed. The local institutions of the lake revealed an ecological connotation, for instance, the fact that the *Djêtowlé* and the *Doboui-doboui* were banned, can be interpreted as a way to avoid habitat degradation of species in the lake. They included the idea of restricting the catches by reducing the fishing activities to 5 days in the week and of preventing the use of *Mandovi*, *Djohoun*, and *Amèdjrotin*. They involved a form of investment which can be defined in terms of the contributions required for the spiritual cults (goat, chickens, alcohol, money,

etc. for the ceremonies) which stimulated the productivity of the lake, ensured the subsistence and the prosperity of all the stakeholders.

One can interpret that maintaining the local institutions and organization for governing the Lake Aheme was the crucial problem. The problems were related to the trust on the local institutions because the willingness to cheat by some stakeholders existed already at that period. The provision for the effectiveness of the local organization through the mutual control of the fishing activities is a dimension of the problem. The notion of spirituality required that the stakeholders believed in, and participated (contributions needed for the ceremonies) in the cults of the voodoos which mastered the prosperity of both Lake Aheme and the stakeholders. The main question which seems relevant is how the stakeholders learned to cope with their problems, and what contributed to the process of change for managing resources in the Lake Aheme?

The stakeholders' learning about their way of living with Lake Aheme

The representations and ways of learning about Lake Aheme Ecosystem
According to the interpretation of the stakeholders, the Lake Aheme is a part of the natural world on which they depend. The natural and the social worlds are under the control of the spiritual world (see fig. 4.1) which have several representations of God.
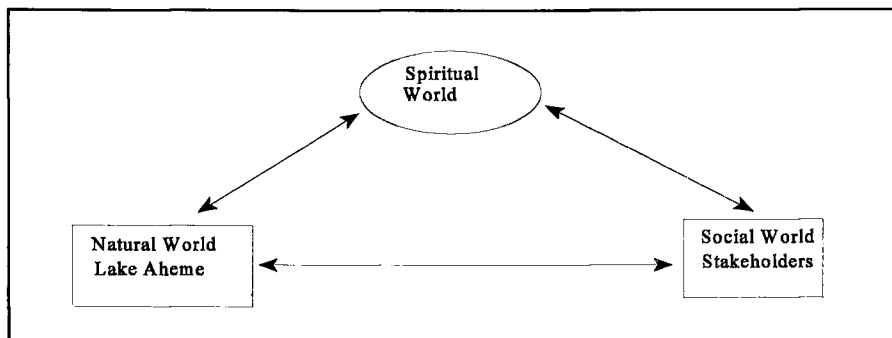
Figure 4.1:   The representation of the Lake Aheme in the frame of reference of the stakeholders in the pre-colonial times

The stakeholder Dossou used the parable: 'a *person who is at the top does not know what is happening at the bottom, he can only imagine*', to explain that the Pedah people knew how to handle the Lake Aheme. They knew when one should go to fish and when one should not. They knew what should be done or should be avoided to have a specific type of fish species in the lake. They respected these rules. According to Dossou, the Pedah people understood not only phenomena related to the lake but they made use of their magic and sorcery to transcend different kinds of problems at the level of the lake. When something happened, they implored their voodoos and the fish would appear again in the lake for all the stakeholders. Spirituality

was a repertoire of the local understanding and interpretation to decision-making about the lake (cf. Pliya, 1980).

Decision-making processes about Lake Aheme by the local organization

In relation to the belief systems of the stakeholders that the lake was under the protection of several voodoos, the decision-making about the lake was in the hands of the spiritual authorities: the King Zounon and the religious priests of the lake. The communication with the spiritual world was done through the consultation of the oracles which would enable anticipation on the anger of the voodoos which might create surprises in the lake area (inundation, decreasing of fish catches, etc.). According to the existing legends, the King Zounon had the possibility to influence the productivity of the lake with the aid of magic and supra-knowledge.

For any problem about the Lake Aheme, the King Zounon convened the religious chiefs of the lake for a meeting. They consulted the oracles and entered into communication with the spiritual representations of the lake and analysed the situation. Their meeting was done at one of the locations where the priests were living (Bopa, Sèhomi, or Houèdjro), especially in a secret woody place. At the end of a meeting the new rules which would be applied by the stakeholders were declared by the King Zounon. The communication with the spiritual world helped to know the magnitude of the angers of the supra-representations of the lake. These issues were the ways the stakeholders identified, anticipated on their destiny in relation to the lake. The nature of the offerings to voodoos of the lake was noticed by the King Zounon. The Adipkonon, the priest of the voodoo Dagboehonsou of the lake was in charge of the organization of the offering ceremonies in Houèdjro. The stakeholders around Lake Aheme believed in the deliberations of the local organization which was governing the lake and they were following its rules. However, one can explore the means by which the local organization had to maintain collective behaviour.

On spirituality, magic and witchcraft: resolving collective problems

Under the local arrangement, the punishment structure and sanctions for the non-respect of the institutions for the Lake Aheme were severe and very efficient according to historical sources (e.g., Pliya, 1980) and the information provided by the stakeholders during this study. There were different levels of sanctions for those who did not respect the local institutions (cf. also Pliya, 1980). Simple sanctions concerned the confiscation of non-authorized fishing tools which were publicly burnt in the village of the defector. Dossou explained what he had learned from his grandfather about the most severe sanctions of the defectors of the rules in the local institutions for the Lake Aheme (see Box 4.3).

Box 4.3: Dossou explained the nature of the sanctions in the local perspective

In the old times of our ancestries, the respect of the practices which were banned by the authorities of the lake, was a very serious affair. At that period, the religious priests and the old men in the villages were in charge of punishing those who were violating the local institutions of the lake. The sanctions were really severe and without any compassion to pity. At worse, you will be killed with the witchcraft power or the magic of the spiritual priests and the old men. After the tragedy, everybody would say that this was done by the voodoo Dagboehonsou, the guard of the lake. The body of the dead person who had violated the local institutions would be passed through the whole village to show to the other inhabitants that he had violated the law of the old men (*la loi des vieux* he said in french). There were many realities in our culture.

The sanctions were embedded in the spiritual world. The stakeholders believed at that period that those who did not trust the institutions for the lake would raise the anger of the voodoo Dagboehonsou, a spiritual guard of the lake, which would create a difficult situation and a collective consequence on their livelihoods. This conception was an important motivation for a mutual control for the implementation of the local institutions and the detection of the defectors.

Learning about the development of the platform of the stakeholders: why was it successful?

The platform of the stakeholders under the local arrangement consisted of the King Zounon and the local religious priests who adopted a concerted action, at the level of the Lake Aheme Ecosystem. The development of the platform of the stakeholders was based on a spiritual power which enabled the mobilization of the stakeholders. Spirituality, magic and witchcraft were the instruments for exerting a certain coercive power towards an accommodating perspective. One can argue that magic and witchcraft created fears and reinforced trust on the the local organization which was governing the lake.

The unification of all the stakeholders by the King Zounon was favoured by the common religious practices of the stakeholders. This argument is strengthened by the fact that Aguessi (1984) demonstrates the existence of 'religious convergences' among the Adja, Ewé and Yoruba, especially the Pedah and the Ayizo (which share same cultural roots with the Adja). From that point of view, the existing spiritual values which were shared could be a powerful driving force for bringing the stakeholders to accommodate on the platform for resource management on the Lake Aheme at that period.

From the historical point of view, the situation of the Pedah people at the beginning of their settlement seemed to create a kind of interdependence. All the stakeholders were caught out by tribal wars. The fear to be enslaved was a common problem. One can arguably say that they did not have other choices but to develop a platform for the implementation of the local institutions which would enable their subsistence with the lake's resources.

What can be learned from the local perspective for the facilitation of change about a fishery resource management problems?

From the local arrangement of Lake Aheme, some ideas emerge, could be useful for the facilitation of changes in resource management on the lake: the satisfaction of the need of the stakeholders, the importance of communicating with others and the role of incentives for the local organizations which were generated by the stakeholders.

As explained above, the platform of stakeholders chaired by King Zounon brought all the stakeholders on the lake together for an effective management of the resources of the lake. At that period, beyond the problems of peace and security, the subsistence of the stakeholders was also important (cf. Pliya, 1980).

The processes of communicating and influencing the behaviour of the stakeholders were embedded in magic. The messages were sacred acts in the frame of reference of the stakeholders. Communication can be interpreted as having a function of informing the stakeholders about the new norms and rules of the local institutions of the lake which might be internalized by the stakeholders. Another function of communication processes in the approach of the local organization was to act as a means which enabled contact with the spiritual world by a divination system.

Under the local arrangements, the fact that King Zounon, the chairman of the platform of the stakeholders for governing Lake Aheme was the only one who used Xha in the lake seemed to be a great incentive. This could be also interpreted as a way to sustain the effectiveness of the local organization and stimulate the stakeholders to maintain trust in the local institutions for the lake.

4.4   Lake Aheme during the colonial times: 1894-1960

Problems and perceptions

New socio-economic order with colonialism and its implications for the exploitation of Lake Aheme

During the colonization of Dahomey (Benin from 1975), a new law (Decree of 23rd, October 1904) stipulated in the whole federation of Francophone West Africa that the State had the right to control all water resources. 'Public domains' (e.g., fisheries, floodplain, etc.) belonged to the State. The *Service des Eaux et Forêts (SEF)*, Water and Forests Service was created in 1907. The existing local organization and institutions for the lake were not used while the new external organization, the SEF did not define the new institutions for the lake until 1939 (*cf.* Pliya, 1980).

The King Zounon held concurrently his position in the local organization lake and the one of the *Chef de Canton* (formal political authority at the local level) of the Pedah. Despite

the fact that the feet of the King should not touch the water of the lake, his new position gave other prerogatives to him and he always organized frequent tours in the villages where the Pedah people were living in the lake area. Then his activities were beyond the prerogatives of the Kingdom. This situation influenced negatively the credibility of the local organization because the king was not allowed to have frequent mobility.

The fishery resources of the Lake Aheme acquired economic value. Beyond the subsistence of the stakeholders, there was an increased demand for fish and market opportunities were offered (cf. also Pliya, 1980). The development of transport services and the facilities for joining market places encouraged the stakeholders to catch more fish in the Lake Aheme.

Changing conditions about the Lake Aheme and the stakeholders

Lake Aheme attracted other ethnic groups like the Toffin and the Goun from the South-eastern part of Benin and the Ayizo farmers who were living in villages not so far from the lake. The lake covered several administrative divisions which were created. Several poles for the treatment of conflicts between the stakeholders emerged. The idea of maintaining one authority system for the lake was not applied. The sanctions of the stakeholders who were not cooperating for the implementation of the local institutions of the lake were no longer effective. Any attempts to revive the local arrangement at the end of the 1930s were not successful because the *laissez-aller* reached a certain level which created a loss of trust in the local organization, especially King Zounon (Pliya, 1980: 119).

The emergence of market opportunity, a new valuation of the fisheries resources, and the mounting population around the lake, all these issues favoured an increased pressure on the lake (see arguments of Comlan in Box 4.4). The problem of scarcity of the fishery resources emerged already at that period.

Box 4.4: Comlan, a sixty year old stakeholder, explained the changing situation around the lake

My father told me that when he was young, they were not in a large number in the lake area. The fish was in the lake and they did not have any serious problems. The shore of the lake was covered by Akpontin (mangroves in Ayizo) which constituted the place where the fish increased in weight after three months. Many people came to exploit the lake and the Akpontin were destroyed. The fish was not sufficient for everybody and they migrated to Ghana, Côte d'Ivoire and Gabon.

What is the nature of the problems and the solutions to the emerging issues?

During the colonial period, the local organization and institutions serving the use of the lake were weakened. In face of the new socioeconomic order and the changing conditions with respect to the stakeholders and the lake, defining and enforcing new institutions for the lake might be the immediate problem for external organisations. If formal institutions for the lake were defined, another dimension of the problem would be related to the cooperation of the stakeholders to enable their enforcement.

There was also the evidence that the physical state of the lake was changing negatively, the mangrove was destroyed (Pliya, 1980: 48). The need to find the solutions for maintaining the productivity of the lake was a crucial problem. The most important idea of the *Service des Pêches* for improving the productivity of the lake was the Akaja practice[7]. How did they learn to arrive at this stage? What happened with respect to the introduction and execution of the Akaja practice? How was the use of Akaja facilitated?

The social learning emerges from the use of Lake Aheme

Learning about Lake Aheme Ecosystem

According to the previous discussion, the perception of the lake by the stakeholders was based on the social, natural, and spiritual worlds. During the colonial period the economic world entered the frame of reference of the stakeholders (see figure 4.2). Market opportunities altered the local perspective based on spirituality. This new context did not enable as a successful control over the lake as has existed during the pre-colonial times.

Investigations which were done by scientists at that period revealed that the ecological conditions for the reproduction of the species in the Lake Aheme were degraded (*cf.* Pliya, 1980: 143). The need to innovate and improve the productivity of the lake was felt. The Akaja practice was found as a solution. The officer of fishing development activities at the CARDER Atlantic explained that the idea of Akaja was inspired by the fishermen of another lake (Lake Nokoue) in Benin. Those fishers observed that the fish were attracted by the mangrove and through a process of informal experiments, they put some branches in the shallow water of the lake to attract the fishes.
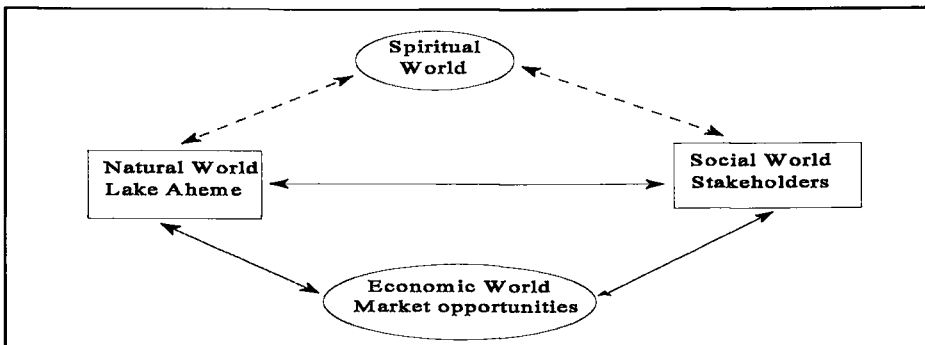
Figure 4.2:   The new representation of the Lake Aheme in the frame of reference of the stakeholders

Sagbo explained how professionals of the *Service des Pêches* learned about the idea of Akaja which was not known by the stakeholders (see Box 4.5).

Box 4.5: Sagbo explained the learning processes about the lake by scientists

We were in our village with our lake which was depleted. The yovos (white men) came. They took several samples of the mud in the lake. They left and we heard later that the only way to have more fishes in the lake was to accept the idea of Akaja that would be installed in the lake. We didn't know anything about it. We refused because we did not know that it would solve our problem. When the idea reached a village, everybody refused because they thought the yovos wanted to 'take' our lake.

Learning about the implementation of the Akaja practice

The Akaja was installed in Lake Aheme under the control of the *Service des Pêches*. This process started in a context which was characterized by the absence of formal institutions for Lake Aheme and a of social organization of stakeholders for the use of Akaja. The problem was seen only from the technical point of view and one could wonder about the effectiveness of the Akaja practice because the organization of the stakeholders was missing (cf. Pliya, 1980: 151). The stakeholders took advantage of two conditions to learn about the Akaja practice: the weakness of the intervening organization and the absence of instruments to implement sanctions (see Box 4.6).

Box 4.6: Abemou explained what happened after the implementation of Akaja

In 1956, the people of the *Service des Pêches* took the initiative to design Akaja in Lake Aheme. At the beginning of their action, they constructed three Akajas in the lake in order to provide the conditions which would enable the rapid growth of the fish according to what they said. One Akaja was designed in the lake at the level of Segbohouè, the second between Topka-Domè and Possotomè and the third between Dékanmê and Bopa. The Akajas were constructed at the places where the lake was deep. At the beginning the stakeholders did not fish in the Akaja because nobody knew its importance. After a year, the branches of the Akaja were untied, by the people of the *Service des Pêches*, to spread the fishes in the lake for all the stakeholders. Following this first experience, everybody had learned that they could get more fish in the Akaja. The local authorities ordered some people to fish the Akaja and the catches were offered to the guests who arrived in the villages. These special privileges were becoming a rule for the local administrative authorities to benefit more from the Akaja. The other stakeholders were frustrated and they went to fish in the Akaja during the evenings. After this experience, a decision was made by the *Service des Pêches* that the Akaja would be exploited collectively and the money which was obtained should be used for the realization of infrastructures (road, wells for drinking water, health centre, etc.) in the communes around the lake. This idea did not work also because everybody went to fish the Akaja during the evenings, they were completely destroyed. The independence of Dahomey came and the experience of the collective Akaja continued in other way (see Box 4.7 in §4.5).

From the explanation above, participatory methods were not used for making visible the problem of the lake. But after the design of Akaja, the stakeholders were observing, analysing and evaluating carefully the performance of this innovation brought by the intervention. Akaja which was not perceived as a relevant practice by the stakeholders at first, was experientially learned by them. They realized that they should take advantage from the economic opportunities which were offered. Instead of maintaining the original practice of the Akaja which allowed everybody to benefit from the productivity of the lake, they were all interested

any individual incentive for the stakeholders in using the Akaja practice for a collective benefit.

Parallelling the strategic behaviour of the stakeholders, several scenarios were tried (see Box 4.6) by the professionals. They reviewed and evaluated their own intervention practices to seek for improvements. The intervention itself was transformed into a learning process by trying to find the best way which would enable equitable benefit of improvements which resulted from the Akaja in the lake.

What can be learned about the new development of the platform of the stakeholders?

The oneness of the authority system, i.e., the local organization for the governance of the Lake Aheme, was destroyed. The economic opportunity came to dominate individual interest and the stakeholders did not perceive the collective consequences of the impact of their individual fishing practices. However, these could be the foundation of their interdependence with respect to the use of the lake. The stakeholders did not realize that they should maintain the local organization for the governance of the lake. Nevertheless, in face of the individual economic interest of the stakeholders, a platform should not be conceived only at their level. Other actors at a higher level of the social aggregation than the lake would be required for mediation of dispute and decision-making about new ways for using the lake. The *Service des Pêches* probably did not perceive this important issue to act to strengthen the existing local platform for the lake.

The nature of the facilitation for introducing Akaja

Stakeholders analysis and objectives

The goal of introducing the Akaja system was to improve the productivity of the lake and reduce the sufferings of the stakeholders. From that point of view, one can argue that the concrete need of the stakeholders was taken into consideration, the desire to have more fish for subsistence and the market. The *Service des Pêches* was the main organization which was implementing this idea. The rationale behind Akaja was to enable all the stakeholders to benefit from the increasing fish stock in the lake. At the beginning of this intervention, the local organization chaired by the King Zounon was not functioning in order to compensate the non-existence of formal institutions for the lake. The trade-off of the Akaja innovation was the danger of cutting the trees (e.g.,the mangrove) for Akaja and the degradation of the vegetation and the emergence of a new problem such as the scarcity of fuelwood for the stakeholders. The reduction of this trade-off should be negotiated with the stakeholders by implementing a specific tree planting project to compensate the changing practices on Lake Aheme.

Analysing the effectiveness of the intervention for the implementation of the Akaja

The introduction of the Akaja revealed that the intervention practices of the *Service des Pêches* was oriented towards technical designs as a basis for solutions concerning the problem of the Lake Aheme. This process should have been complemented with training of the stakeholders for mutual monitoring and self-evaluation of the situation of their lake. For instance, a non-formal education programme for the stakeholders should have been implemented in order to raise their awareness about the importance for agreeing upon new behaviour to avoid the depletion of the lake. In seeing the resolution of the lake's problem at the technical level, the *Service des Pêches* did not perceive the importance of the social organization of the stakeholders. Pliya (1980: 1980: 151) puts it:

' ... the experience of the Akajas in Lake Aheme proves that the solutions of the development problems depend first, to some extent, more on the organization of the people and a judicious and strong authority system than the only technical structures which were operational. We repeat again, the Akajas collectively used under a regulation represent an interesting and valuable solution to the critical situation of Lake Aheme. Unfortunately, this solution did not work and the decision-making processes neglected the fundamental human problems' (translation CD).

Another problem concerning the effectiveness of the introduction of the Akaja in Lake Aheme was the absence of incentives for maintaining behaviour which should enable the collective exploitation of the Akaja. The failure of the *Service des Pêches* to realize this condition did not provide any incentives or assurance for the stakeholders to maintain the Akajas in a good condition.

Support institutions and the policy context for the development of the Akaja

The institutional framework for the development of the Akaja was not consistent with the nature of the lake's problem. A reason was that the *Service des Pêches* had a technical orientation while the socioeconomic and political tasks were more important. The definition of laws or new rules and regulations was not done while the local institutions were not used. The absence of a research institute or a development centre on fisheries or aquaculture in Dahomey was a constraint for the provision of useful information about the Lake Aheme which could have improved the performance of the professionals.

During the colonial period, fishery resources' development was a neglected dimension and drew less attention from the colonial authorities who were more interested in cash-crops (e.g., cotton, tobacco, oilpalm trees). Some concrete examples (cf Boon *et al*, 1997: 267) were the *Société de Commercialisation du Tabac* (SOCOTAB), a tobacco company, the *Sector de Rénovation de la Palmeraie* (SRP), oil palm development initiatives, and the *Compagnie Française pour le Développement des Fibres et Textiles* (CFDT), a company which was promoting cotton production. One can understand why the idea Akaja emerged in fishing communities who were adapting themselves to the changing conditions of the fisheries, and reshaped for intervention.

4.5   Lake Aheme after the independence of Benin: 1960-1990

The problems deepened and the perceptions changed

The beginning of conflicts and wars about scarce fishery resources on Lake Aheme

As explained in §4.3, the Xha was used by King Zounon, and this derogation was legitimated by the stakeholders. But during the colonial period, the Xha became a practice, not only for King Zounon, but for the relatives of the Zounon family. Under the influence of the economic opportunities the stakeholders had during the colonial period, the local institutions for Lake Aheme were modified. From 20 lines of Xha in the lake during the old times, the number was increased to 100. A stakeholder argued that, since the death of the last King Zounon in 1975, nobody was chosen for the throne. For this reason, if the local rules which were defined during the pre-colonial period were to be implemented, the Xha would not be practised from 1975 onward until the enthronement of a new king. This situation created frustrations for the stakeholders who perceived that the local institutions for the lake were changing.

Parallelling this changing situation in the Southern part of the lake which led to the emergence of the Xha people, the failure of the *Service des Pêches* to organize the stakeholders at the beginning of the 1960s (explained above) favoured the development of Akaja in other way than intended as Abemou in Dekanme explained this (Box 4.7).

Box 4.7: Abemou explains the new development of Akaja practice

After 1963, my uncle, a retired civil servant, decided to start fishing activities. He experimented with new ways of using in other way the Akaja practice which was done by the *Service des Pêches*. He collected some branches near the lake to construct a small Akaja like those which were introduced. This private initiative was successful. He got a lot of money and the other fishermen were amazed by this success and took also the same initiative The majority of the people who could not do Akaja were obliged to provide labour for the minority who did. They could get 200 to 500 FCFA[8] and at this time (around 1967) I think it was a good job. Later the Akaja users found an alternative to design and harvest their Akaja cheaply. They invited labourers in the village to transport the branches to the lake area for the construction of the Akaja. If you were lucky, they would offer you a meal. They would not pay you the cost of the labour and would promise to give 1/3 of the harvest. Sometimes those labourers were not invited to harvest the Akaja. The Akaja users preferred the Toffin (an ethnic group from the Lake Nokoué) who are considered as the specialists or "inventors" of Akaja. The Toffin people know the secret to harvest the Akaja efficiently and they were called the `men of the water'. This opportunity had favoured the settlement of some Toffin around the Lake Aheme (cf also Dagba, 1985) and they were used by the Akaja users. The other fishermen who did not have the financial mean to construct the Akaja were very angry. Most of them were opponents of the Akaja users.

Merchants, capitalists in the cities, and administrative bureaucrats were attracted by the Akaja and they provided financial means to some stakeholders for building them. The catches were shared between the outsiders and the stakeholder. Many stakeholders were against this practice and they caught fish clandestinely in Akaja which did not belong to them. Conflicts and fights were frequent when they were surprised by the owners. Many stakeholders were stabbed or

killed and they were found dead in their boat. The proliferation of the Akaja reduced the areas where people could fish with their nets.

In 1969, Welcome (in Pliya, 1980: 145) investigated the situation of Akaja use on Lake Aheme on the basis of an aerial photograph. He estimated the number of Akaja in the lake to be 2,600 and each has a circular form with 28 metres in diameter. The intensification of individual catches was a danger for the Lake Aheme ecosystem.

The degradation of the Lake Aheme ecosystem

The Akaja practice increased the pressure on the lake. After the work of Welcome (1971) on the inland fisheries in Benin, especially Lake Aheme from 1967 to 1970, he found that the pressure on the lake was very high and the size of the fish caught from the lake too small. Then, he recommended that government measures might be taken quickly to save the fisheries in Lake Aheme.

According to the stakeholders, the meshes size of the nets had 5 or 4 'fingers' for catching the species which migrated from the sea (e.g., *nongban, siko*) and 2 fingers for catching the *akpa* (fresh water species). After many people started using Akaja widely in the lake, it was difficult to catch more fish and everybody was using fishing with a small mesh size (1 finger instead of 2 fingers) to catch the *akpa*. The situation is changing, according to Dossou. Before, a fisherman could spend a month to make a fishing net. Today, one can buy hundred of fishing nets a day in the market if one has money. In the market different types of fishing nets are available, including the ones with a very small mesh size. Why should the customers allow the introduction of such fishing tools in the market (according to Dossou)?

The professionals use the concept of the 'fishing effort' as an indicator to explain the changing patterns of the physical use of the lake. The 'fishing effort' is defined in relation to the way the tools used by the stakeholders are changing. The fishing effort of the stakeholders increase when they use more powerful tools, i.e., a fishing net with a smaller mesh size. According to the director of the *Projet Pêche Lagunaire,* the 'fishing effort' increases without an increase in the catches. This is perceived as a sign of the degradation of the lake.

Changing perceptions of the problems: the difficulty of concerted action as a solution

When the idea of Akaja was introduced, the stakeholders did not know that it could provide economic opportunities. They discovered that the Akaja is a very good solution to the problem of fishery resource scarcity. Through an empirical observation and learning by the stakeholders, the Akaja became the only way to catch fish in the lake for some stakeholders. The Xha people perceived their practice as a legacy of their ancestors. The Xha became a means for subsistence instead of a privilege given to the *Dêh Zounon*. Everybody knows this 'reality' (see Box 4.8) which created a blockage for a concerted action with respect to the solutions of the lake's problems.

Box 4.8: Changing perception of the Xha practice on the Lake Aheme, according to a Xha owner

You are now in our village to see the real things and to know the truth. So after that, you will work on it. You see yourself that we are surrounded by water. There is no land where we can farm. Our main activity is fishing. If you go in other villages in the Atlantic part of the lake, you will find the water (Lake Aheme) and lands with crops. So they can fish and cultivate their land. Me, and an old man of the Zounon family assisted a meeting at the Ministry of Rural development with the Minister, on the problems of the Lake Aheme. We explained to the Minister that Xha was in the lake since our ancestors. It is not a problem if the government wanted to remove it, but which amount of money (salary) they would provide us to survive. So we should sign a paper and the periods we should get the money be known. If not, the old men like us who specialized in Xha activities should suffer. The Minister did not say anything. If you have a field and someone takes it without providing anything, what are you going to eat? What about your future?

There were many stakeholders who introduced new fishing tools which provided the possibilities to catch more fish. According to the stakeholder Abemou, most of the people who used these tools knew that they were doing the wrong thing. With the presence of the Akaja and the Xha in the lake, there were no alternative ways to catch fish from the lake. Everybody was fishing as much as they could without any worries about the 'carrying capacity' of the lake. Several conflicts emerged in complex arenas because one use of the lake's fishery resources started interfering with other uses. The problems of Lake Aheme were deepened.

The social learning processes in complex arenas after the introduction of Akaja

Learning about the Lake Aheme ecosystem

In the context of uncertainties, the stakeholders started observing carefully the behaviour of the lake instead of believing only in the role of spirituality for the governance of the lake. Many stakeholders learned from the observation of the lake that a good fishing period always followed the higher water level of the lake after inundations, i.e., the periods when the fish found a good ecological niche in the vegetation around the lake, for both their reproduction and their increase in weight. Three months after the inundation disappears, fishing activities are very fruitful. This idea is also used by stakeholders to explain the importance of Akaja. The stakeholders learned empirically that the shrimps are abundant in the lake from October to January and after the first rains from March to April (Pliya, 1980: 79).
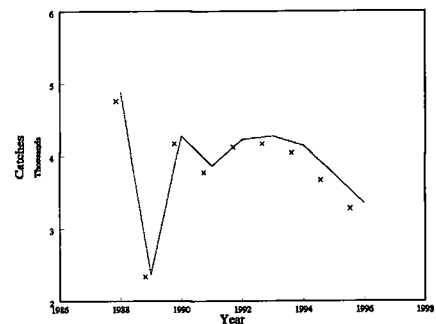
Figure 4.3:   Evolution of catches from Lake Aheme

The DP started collecting in 1988 statistical data about the catches in the lake area in 1988. Fig. 4.3 is based on these data (Statistics of the DP from 1988 to 1996). It shows that the catches are decreasing seriously in the recent years. Moreover, the stakeholders increased their fishing effort and the size of the fish caught is

decreasing (pers. com. of the fishing officer in the CARDER Atlantic). But, from 1988 to 1992, the evolution of the catches did not show a continuous trend. One can argue that an attempt to predict the productivity of the lake should be very difficult. However, data about the evolution of the catches can inform the policy makers, professionals and stakeholders to think about new ways for using the fishery resources and avoid the degradation of the lake.

Learning about the government measures in complex arenas and uncertainty

After the failure of the implementation of the Akaja for collective use, which started since the colonial times, from 1964 the government took new measures despite the absence of new ideas to help the stakeholders improve their economic situations (Pliya, 1980: 144). The fishing police was established for sanctioning the stakeholders who would design Akaja without permission. In 1965 for instance, more than 200 people from the lake area were arrested. Dossou explained that after a certain period, these measures were not effective compared to the ones which were applied during the pre-colonial times. Everybody knew that with a little money the stakeholder who who caught could be released the same day. From 1970 onwards, the fishing police was not effective and the Akaja was widely used by the stakeholders and nothing was done. Frequent conflicts let the government to remove Akaja from the lake successively in 1970, 1980 and 1985. However, the stakeholders always found different ways to go around the decision of the government. For instance, Akaja was designed by them in a way that it would not be recognised because the branches and shrubs used were immersed in the shallow water of the lake. The user knew the location of his Akaja and exploited it. Pliya (1980: 151) argues that:

'the experiences of the Akaja in the Lake Aheme revealed that, in many cases, the solutions to this problem depended first, on the organization of the people and the existence of an authority system. These issues are more important than giving a more technical content to the intervention on Lake Aheme. From a technical point of view Akaja was a solution to the problem of the degradation of the lake if it is used under a regulation for a collective benefit for the stakeholders as it was implemented at the beginning during the colonial times' (translation, CD).

Any measure of the government was circumvented in some way by the stakeholders of Lake Aheme. The DP realized that these measures would not be effective if the stakeholders did not have any alternative solutions. Then Hwédo found as an alternative economic opportunity. Hwédo is a kind of local aquaculture developed by the fishermen in the River Ouémé (cf. Nonfon, 1988). The principle is that the floodplain of the River Ouémé is flooded for at least four months each year and both plain and the river support fisheries based upon the natural stocks. During the dry season the plain is left dry and used for agriculture and grazing cattle. The fish population is confined to the main river channel and to a series of artificial ponds which were dug on the flood plain by the stakeholders. These are known locally as Hwédo.

The nature of the facilitation of the introduction of Hwédo

Stakeholders analysis and organization for Lake Aheme

The rapid development of Akaja by the stakeholders in the lake area was an indicator of their desire to get more fish from the lake in order to satisfy their needs. The deliberate intention to practise the Akaja by the stakeholders, after the government intervention, was a sign that their economic problems were serious. Since the fishery resources are produced under the natural processes, the gets of the stakeholders cannot always equal their wants even if the lake is depleted, so that everybody will suffer. Hwédo was an alternative solution to respond to the needs of the stakeholders at the expense of their efforts instead of depleting the lake. Unfortunately, this opportunity which was introduced by the CARDER- Atlantic, was only relevant for those who are at the Eastern shore of the lake, the Atlantic province. This situation resulted from the fact that the Hwédo project for the Lake Aheme was designed according to the existing administrative structure. Therefore, the necessity to cover all the stakeholders at the level of the lake was not perceived. The CARDER-Mono which was supposed to cover the Western side of the lake was not implementing any project for the development of aquaculture as it was done by the CARDER-Atlantic supported by the German Development Organization (GTZ).

Analysing the effectiveness of the intervention based on the Hwédo innovation

Some stakeholders of Lake Aheme were trained to use Hwédo according to the way it was shaped by the fishing specialists of the CARDER-Atlantic. A small channel drains the water of the lake into the fishing pond, the Hwédo, which was dug for the aquaculture. The fry are obtained from nurseries and raised in the Hwédo. The small channel which communicate with the lake is closed to avoid fish moving to the lake. The type of fish used for the Hwédo is *tilapia* which is well appreciated in the market in Benin.

The formation of the *Groupement Révolutionaire à Vocation Cooperative* (GRVC), a pre-cooperative structure during the revolution period in Benin (for more information see Tossou, 1995), by the stakeholders, was the condition for obtaining credit for the Hwédo innovation. This idea attracted the stakeholders and they adopted the Hwédo in groups. Lacking the economic opportunity which was offered by the introduction of the Hwédo, the motivation to continue with Akaja was accordingly higher on the part of stakeholders on the Western side of the lake. The effectiveness of the implementation of the Hwédo idea depended also on the institutions which supported the intervention and the policy context.

Support institutions and the policy context for the development of the Hwédo

The definition of the institutions for the inland fisheries, especially Lake Aheme, moved to a higher level, the President of the Republic, because the problems deepened (conflicts, high pressure on the fisheries, etc.). Information provision for the development of the fisheries was left to the experts like Welcome who made many suggestions to the government (see Welcome,

1971). But, a closer look at the content of the government decree which was proclaimed this to ease the problem revealed that the ideas prevalent in the local government institutions were mostly used. Thus, the obligation for stakeholders to apply for a fishing permit was emphasized. Unfortunately this decree was not applied. The great political instability after the independence of Benin was not favourable for long term policies for fishery resource development. Also, agricultural development policies continued with the logic of cash-crops development as explained above. The *prise de conscience* for the development of fishery resources was visible in the late 1970s when the political engagement for the promotion of the aquaculture in Benin emerged. A concrete example was the creation of the *Centre Piscicole de Godomey*[9], a centre for aquaculture.

When the government failed: the initiative of the Xha people for generating new institutions and organizations

A platform development process and collective decision making

During the execution of the Hwédo project, serious problems occurred. The fish which were being raised by the stakeholders in the Hwédo escaped into the lake. According to a fishery specialist at the CARDER-Atlantic, the Hwédo failed. The crucial problem of defining and maintaining institutions and a new organization for collective use of the fishery resources was not perceived by the government organizations. The stakeholders, especially the Xha people in Guézin, decided to take the initiative and create a platform for collective decision making. In face of the incapacity of the political authorities to ensure the governance of the lake, they realized the need to have an organization at the level of the whole lake like the situation was during the pre-colonial times.

In March 1990, different representatives of each village around the lake, the priests of voodoos in the fishing communities, met at the place called Mitogbodji which has historical importance (see §4.3). They discussed the problems of Lake Aheme and identified new rules, regulations and sanctions (see Box 4.9). The participants made the decision to create a committee called COGEHEN (*Comité de Gestion de Ehen* = Committee for managing the lake) for the implementation of their decisions. After a month, another meeting was organized in the village Guézin by the Xha people. The members of the bureau of the COGEHEN were elected[10]. The local priests of the lake became the advisers of the bureau. This idea was to revive the role of spirituality in the enforcement of the new institutions for the lake. A local police of the lake was created. It consisted of a group of 15 to 30 stakeholders appointed by the COGEHEN according to the size of the villages. Their role was to detect the stakeholders who would defect and to enable their sanctioning (see Box 4.9). These activities were effective for a certain period but failed in the end as is explained below.

Box 4.9: Law and regulations set at Mitogbodji

- The design of Akaja is forbidden;
- The use of small-mesh fishing nets like Mandovi and Gbagbalulu is forbidden;

- The fishing method called Tohounga during the day is forbidden. The fishers are allowed to use this method from 6 hours p.m to 6 hours a.m. The number of fishing nets will not exceed 5;

- The fishing technique called "Djohoun" during the day and at the place on the lake which is not deep is forbidden;

- The fishing method called Gbodoego is forbidden;

- The fishing method with hand called "Lohè" or Gbaha is forbidden

- The space between the Xha for boat circulation must be increased;

- One day per week (from 6 hours p.m of every Saturday to 6 hours p.m of every Sundays) is retained to not practise fishing activities (this day is called TOSSE = `law of Water' or resting day for the lake);

- Every 8th of January is used to commemorate the death of a militant of COGEHEN on the 8 th of January, 1990 during the removal of the Akaja from the Lake Aheme. This day will be followed by one week resting of Lake Aheme called also TOSSE.

- Sanctions defined at Mitogbodji: the fishers who do not respect these law and regulations will have to pay the following amends: 20 litres of Sodabi (local alcohol distilled from palm wine), 2 bottles of Royal Gin (imported alcohol), 6 bottles of bier, 6 bottles of youki (minerals), 4 chickens (or 1500 FCFA), 1 goat (or 3000 FCFA) and 10.000 FCFA. Destruction of boats; burning of fishing nets.

Learning about platform development: why the Xha people initiative failed

In view of the discussion above, the initiative of the Xha people can be seen as a process which was aimed to develop a platform for concerted action at the level of the lake. The idea of involving village representatives by the Xha people was aimed at creating one perspective at the level of the whole lake. One can argue that the stakeholders knew that they could not solve the problems of the lake without the creation of COGEHEN, a platform for decision-making and the implementation of the local institutions of the lake.

But the weakness of the COGEHEN was that the Akaja users were excluded. From that point of view, the COGEHEN solved only the half of the problem of having an organization at the level of the lake because the Akaja users formed an important coalition. There are also many prerogatives which were in the hands of the government, at various levels of social aggregation, i.e., the CARDER-Mono and CARDER-Atlantic, the DP, the Ministry of Rural Development, etc. The context has changed and the Xha people should not believe that the way the lake was governed during the pre-colonial period could be reproduced.

4.6   Lake Aheme in the democratization era: after 1990

Various perceptions, interests and impasses: where are Lake Aheme's problems going?

The problem perception by the stakeholders

The stakeholders in Lake Aheme are now the Xha people, the organization of the Akaja users (as will be explained later) and other stakeholders who were against the Akaja users or the Xha people. The local kingdom of Guézin which disappeared after 1975, was re-established in the

democratization era[11]. King Zounon again became a stakeholder. The discussion with the stakeholders revealed that there are too few fishery resources (fish, shrimps, crabs, etc.) in Lake Aheme. The immediate problem perceived by all the stakeholders concerning the lake was defined in this way and the key concept used to explain this fact was: the *Ehen is impoverished* by the Akaja users according to the Xha people or by the Xha people according to the Akaja users. The economic value of the fishery resources increased after the devaluation of the CFA currency [note]. Before the devaluation, for instance Dagba (1985:82) found that the cost for using a big Akaja can range between 100,000 - 200,000 FCFA and the profit obtained by the user was estimated to be between 200,000 - 500,000 FCFA. Despite the depletion of the lake, all the stakeholders were motivated to use fishing methods and tools which enabled them to catch more (see Box 4.10).

Box 4.10: Synthesis of the ways the stakeholders interpreted their situations

The stakeholders have different interpretations of the problems of the lake. A closer look of their opinions revealed the magnitude of their complex situation and why agreement on a common perspective for the solution was difficult. According to King Zounon, the kingdom was related to the existence of the Xha which was a privilege and the source of income. He explained that if the Xha practice was banned, the kingdom would not have any economic means for its maintenance. The Xha was also the only thing which made the difference between King Zounon and the other fishers of Lake Aheme. According to the Xha people, they do not know other ways of fishing and when the Xha was removed in 1985 they had suffered and some of them died in Guézin. The Akaja users explained that they have peace when the Akaja is in the lake. One of the them gave many arguments to emphasise the reason why one cannot stop using Akaja. He said: 'when you practise Akaja you can buy cement and build your house, you can do anything you want, for instance, send your child to school or to vocational training and cover the costs ... Akaja is what we do to take care of our family, for instance when they are sick, we can buy medicines'. The young fisher Codjo in Guézin was using a fishing tool (called *Gbabalulu*) which was banned (see Box 4.9). He said: 'I have 16 *Gbagbalulu* and I use them to save more than 80 women in this village (Guézin). They came to me with a deposit to buy the *Todan* (see table 4.1) which are used to catch crabs. They sell it also in Nigeria. I am tired to go and fish everyday but my clients come with money and I am forced to use *Gbagbalulu*'. Nestor is another young fisher in Guézin who was frustrated because his fellows use Gbabalulu to get 2000 FCFA to 5000 FCFA/day depending on the importance of the catches, while he could not get anything by using 'conventional' fishing nets. Then he was obliged to use *Gbagbalulu*, waiting until the period where the new law and regulations will be established and respected by all the fishers.

The problem perception by the Direction des Pêches

The DP is a government organization, at national level, which is under the Ministry of Rural Development (MDR = *Ministère du Développement Rural*). According to the perception of the development officer who was in charge of the inland fisheries at the *Direction des Pêches*, the situation of Lake Aheme was critical in terms of the size of the fish caught and the increasing fishing effort. The Direction des Pêches recognized the failure of the fishing police which was established in the past and the difficulty to control the lake during the days and the evenings. The need to organize the stakeholders for enabling the use of the fishery resources on the basis of a consensus was explained (see Box: 4.11). As will be shown, the perspectives of the DP were based on administrative divisions, which the need to generate a strong organization at the level of the whole lake was not emphasized (see Box 4.11).

Box 4.11: The perception of new organizations for Lake Aheme according to the DP

The director of the *Projet Pêche Lagunaire*, inland fisheries, said: " ... I can say it is impossible.. That is why we are thinking about the way to organise the fishers in the `*Comité Communal de Pêche*' (Communal Fishing Committee)". The legal text (*"the statut et règlement"*) which will explain the organisational functioning of the CCP was written at the DP. The main emphasis of the text was the definition of laws and regulations for Lake Aheme, the resource use taxation which was non-existent, and the setting of an organisational structure of the fishers. The organisational structure is intended to be created at the "commune" level (CCP) and the "Department" level ("Comité Départemental de Pêche=CDP: Fishing Committee at the Department Level). Each committee will include all the representatives of the adepts of different fishing techniques and methods (Xha, Akaja, different types of fishing nets). Those representatives in the CCP and the CDP could come to a consensus for the use of the Lake Aheme ("consensus" for the *"gestion rationnelle"* of the lake) so that the law and the regulations provided by the DP might be respected.

The problem perception by the CARDER organization

The CARDER is the governmental extension organisation at the level of the province in Benin. The CARDER is an organization under the Ministry of Rural Development. The DCVP (*Direction du Contrôle Vétérinaire et Phytosanitaire* = Directorate of Animal and Plant Care) a division of the CARDER organisation is involved in the development of fishing activities on Lake Aheme. The main issue raised by the fishing development officers of the CARDER was the need to support the decision-making about the increasing pressure on the lake by some concrete and relevant projects for the stakeholders. The problem was addressed in terms of the socio-economic well-being of the stakeholders versus the intentions to safeguard Lake Aheme through implementing of laws and regulations. From that point of view, the introduction of the aquaculture was 'legimated' as a solution for the problems perceived by the CARDER. In practice the CARDER Mono was implementing a programme of aquaculture through the Integrated Rural Development Project which started at the beginning of the 1990s at the Western shore of the lake.

The dimensions of the problems and the nature of the perspectives on solutions

Organizing the stakeholders for concerted action concerning the exploitation of the lake was perceived by the stakeholders and the government organizations which intervened. However, the motivations of the stakeholders for continuing with their individual strategies were high. The importance of controlling the use of new fishing practices in the lake was twofold: first, the necessity to avoid that a few stakeholders appropriate all the fishery resources and create frustrations and conflicts on the lake; second, to promote an equitable access to the fishery resource and ensure social justice vis-à-vis the exploitation of the lake. The definition and the implementation of new institutions for Lake Aheme were the crucial problems. Nevertheless, governments were not able to do that since the colonial period. According to the stakeholders, the idea that the lake needs to be dredged was perceived by the government, but nothing was done. The decisions made by the governments were not implemented and one can argue that the stakeholders discovered the weaknesses of the formal organizations in face of the problems of the lake.

Both the stakeholders and the government organizations faced the difficulty to find solutions which satisfied the various interests of the stakeholders and the need to avoid the danger of the degradation of the lake. Many attempts to solve the problems were not successful and always led to impasses. From that point of view, one can ask where are the Lake Aheme problems going?

However, the continuation of the search for a better solution by the stakeholders themselves and the government implies that one can explore the ways they learn, and facilitate change to establish a new order for Lake Aheme. The main problem can be stated as the extent to which strategies can be defined for breaking the impasse.

The social learning processes for establishing new order for Lake Aheme

Learning from the situation of the lake: negotiation and mediation by the Akaja users

The situation of the Lake Aheme is becoming more complex and the stakeholders have no choice to collectively find the solution to their problems and reduce the negative consequences of their individual actions on the lake. The Akaja users had learned from the actions of the COGEHEN that an incomplete coalition of stakeholders would not be able to define and enforce new institutions for the lake. The representation and involvement of all the interest coalitions around the lake in collective decision-making was a necessary condition for successful action at the level of the whole lake (see Box 4.12).

Box 4.12: The Akaja users are engaged in negotiation and mediation for establishing a new social order

After the emergence of the COGEHEN, the Akaja users created their organization chaired by a president who was elected. The stakeholders at the two sides of the lake were represented. The Akaja users perceived the need to take the initiative for the resolution of the problems of the lake. The motive of this process was probably grounded on their frustrations which resulted from the fact that the COGEHEN forbade Akaja (see Box 4.9). During a discussion in Kpago, the Akaja users decided to organize a meeting in Bopa for collective decision-making about Lake Aheme. They agreed that if the Xha people accepted to remove their Xha, they would do the same for their Akaja. In February 1992, a general assembly was held in Bopa. The Sous-prefet was at this assembly with the Commander of the local police of Bopa and some gendarmes. One Deputy of the parliament of Benin was interested in the assembly. Concerning the fishing communities, all the priests of voodoo were invited. The COGEHEN was at this meeting with their representatives. Most of the village at the West and the East side of the fishing communities sent their representatives to attend the meeting (*Chef de village*, *notables* etc.). The main objective of the meeting was to stimulate reflections on the problems of the lake in terms of how it could be safeguarded from being destroyed and how the conflicts between the stakeholders could be reduced. During this meeting, a consensus was difficult to achieve because the Xha people did not want to make any concession like the Akaja users. But the majority agreed that the only way to realize peace was that each party (interest group) accepted to lose something. The decision to remove Akaja and Xha was made. The organizers of the meeting helped by the Sous-prefet of Bopa obtained the help of the *gendarmerie* to implement the decisions. They invited their fellows to themselves remove their Akaja. They started, but when the Xha was immediately reinstalled, they stopped. The vicious circle was installed and the stakeholders failed again to solve their problems themselves.

Unlike the COGEHEN, the initiative of the organization of the Akaja users moved to the level of the whole lake. But the Sous-Préfet of Bopa does not formally represent the highest political authority of the Lake Aheme according to the administrative division in which the lake is involved. Only few villages of the lake were under his authority. The majority of the participants to the meeting adopted the win-win solution (remove Akaja and Xha) for Lake Aheme but they did not have really the means to implement this choice. Thinking and learning together with the stakeholders to identify other economic opportunities were missing. But this alternative strategy required the mobilization of qualified human resources (e.g., communication professionals) and the engagement of the government to provide the means.

The journée de réflexion: the government effort for establishing a new order

Following the consecutive failures of the stakeholders to solve their problems, the first government at the beginning of the era of the democratization in Benin decided to find solutions to the problems of the stakeholders in a 'participatory way' (negotiation and mediation). The idea of the *journée de réflexion* emerged. The *journée de réflexion* involves a debate about the problems of the lake for finding a compromise with very high political authorities. The DP was responsible for the preparation of this initiative of the government. The critical issues of the process concerned the methodology adopted for identification and selection of the participants, the collective decision-making procedure, and the solutions generated (see Box 4.13).

Box 4.13: An overview of the journée de réflexion: processes and outcomes

The preparation of the *journée de réflexion* stated with the difficult question which was defined in terms of who should be the representatives of the stakeholders? This question has also its *raison-d'être* because the existing local organizations were not officially recognized because they were not created according to the official procedure defined by the government (official registration at the Ministry of the Interior). However, the president and some members of the organization of the Akaja users, the Bureau of the COGEHEN, some representatives of the women organization (UFGE: *Union de Femmes de Guézin et Environs*) were invited. Some representatives, for instance the local priests, the local leaders, of the stakeholders were identified by CARDER organizations. A particular attention was given to the *Association de Développement*. All the political representatives of the State in the lake area: the *Chef de village*, the Maires, the *Sous-Prefets*, the *Prefets*, the representatives of the CARDER (Mono and Atlantic) were invited. The Minister of Rural Development was the chairman of the *journée de réflexion*. Many professionals of the Ministries of the Rural Development, of the Environment, and of the Interior were identified as participants. The 28th of July 1992, all the participants were in Ouidah, the town where the meeting was held. The cost of transport and sustenance of the participants was covered by the government. At the beginning, the Minister of Rural development gave a speech and invited all the participants for comprehensive discussion during the meeting. As he said, the main objective of the meeting was the negotiation of another way to use the lake. The participants were invited to give a speech concerning their wishes, the problems and ideas which were relevant for the resolution of the difficult situation of the lake. Unfortunately the stakeholders, depending on the interest group they belonged to, were defending their interests. The Xha people argued that their fishing practice is heritage of their ancestors. The Akaja users argued that they can have fish in the lake only if they use Akaja. However they can make the concession to remove the Akaja if the Xha people should do the same. The participants found that the only to way halt the conflicts between the stakeholders was to remove Akaja and Xha from the lake. Meanwhile, the participants did not identify any alternative economic opportunities for the stakeholders during the *journée de réflexion*. The second idea was the creation of the *Comité de Suivi* (follow-

up committee) for the implementation of the decisions of the *journée de réflexion* and the continuation of the negotiation with the stakeholders about their difficult situations about Lake Aheme.

Like the Akaja users initiative, the *journée de réflexion* chose the win-win solution which means in this context that the different potential interest groups lost something. But, beyond the conflicts between the stakeholders, their problems have an economic connotation. Therefore one should explore problem-solving directions and trying to locate options that satisfy both the parties in the conflict. In concrete terms, the engagement of very high levels political authorities like the Minister of the Rural Development and the professionals at the Ministry of the Rural Development and Ministry of the Environment was not exploited. Priority should be set up and human and financial resources negotiated. For instance, a joint committee of scientists, development professionals and stakeholders should be created and mandated publicly to continue the reflection and to develop alternative solutions to the problems of Lake Aheme. Unfortunately, the *Comité de Suivi* created by the government after the *journée de réflexion* involved 41 people and the *Bureau* of the *Comité de Suivi* consisted of 5 people and did not involve any stakeholder of the Lake Aheme (see Box 4.14). In face of the complexity of the lake's problems, one can critically analyse the effectiveness of such a committee decreed by the government (*Arrêté: No714/MDR/MISAT/DCAB/SA*, year 1992).

Box 4.14: An example of a platform generated by the journée de réflexion
Composition of the Comité de Suivi
- 16 representatives of the fishers
- 5 representatives of the Notables
- 1 representative of the syndicate of the fishers and craftsmen in Benin
- 5 representatives of the Association de Développement
- 3 commanders of the "local police" in Mono and Atlantic Provinces
- 5 Sous-Prefets who were at the journée de réflexion
- 2 General Directors of the CARDER organisation (Mono and Atlantic)
- 2 representatives of the Ministry of Rural Development (MDR)
- 1 representative of the Ministry of Interior (MISAT)
- 1 representative of the Ministry of the Environment (MEHU)

Composition of the Bureau of the Comité de Suivi
- President: Representative of the MDR
- 1st Vice-President: Representative of the MDR
- 2nd Vice-President: Representative of the MEHU
- Members: 2 representatives of the 'Association de Développement'

Critical analysis of the platform generated by the government at the journée de réflexion

The representatives of the stakeholders in the *Comité de Suivi* cover the whole level of the lake area. The *Comité de Suivi* is extended to involve the political authorities and professionals at

different levels of social aggregation. From that point of view, the *Comité de Suivi* generated by the *journée de réflexion* is a platform for decision-making about Lake Aheme.

But the fact that 41 people are in the platform raises doubt about the way the coordination of the activities between the members of this platform can be done. The roles of different categories of representatives (e.g., political authorities, professionals) in the platform were not specified. In practice, the functioning of this platform should not be effective because the members did not known a clear statement of the actions they are supposed to do in order to solve the problems of the lake.

The most critical issue for the platform generated concerned the *Bureau* of the *Comité de Suivi* which can be seen as the operational unit for coordination, monitoring and evaluation of the actions implemented at the level of the lake. Unfortunately, the bureau of the *Comité de Suivi* did not involve the stakeholders who are daily experiencing many problems in the lake area. How can the professionals at the levels of the ministries respond promptly to the problems of the stakeholders? Maybe, the *Bureau* of the *Comité de Suivi* had other objectives, (as this will be analyzed later) such as the control of the stakeholders instead of living with their problems.

Another critical issue of the platform generated by the *journée de réflexion,* is that of the involvement of the '*Association de Développement*' ('Development Association') in the bureau of the *Comité de Suivi*. At the beginning of the creation of the *Association de Développement* (AD) in Benin, the idea was that they should be active in the development processes at the grass-roots level. However, the objectives of the ADs changed in the era of the democratization because the leaders got involved with political parties. Controlling the people to gain a political position became more important than acting for 'development' at the grass-roots levels. The presence of the AD in the *Bureau* of the *Comité de Suivi* would not help to for resolve the problems of the stakeholders. The leaders of the AD would try to control the people for their political interests. Yet promoting ecological awareness to resolve complex problems like the situation in Lake Aheme did not emerge in Benin.

Breaking the impasse: seeking alternative solutions for Lake Aheme

The failure of the implementation of the government decision

After the the *Journée de réflexion* in Ouidah, the win-win solution chosen was implemented. This action was financed by the government. Unfortunately, according to the director of the DCVP (*Direction du Contrôle Vétérinaire et Phytosanitaire*), the money was not sufficient. The Akaja and Xha were partially removed from the lake. The stakeholders were asked to continue themselves but they refused. Later a stakeholder in Guézin started the Xha practice. The members of the bureau of the *Comité de Suivi* were not in the lake area to react. The other stakeholders took many initiatives and forced the mediation of the political authorities (Box 4.14).

Box 4.15: The failure of the conflict resolution and mediation by the government

After the break down of the win-win solution by the Xha people, the President of the Akaja users was informed. He went to the *Direction des Pêches* in Cotonou (about 60 km from the lake area) to inform the director. The Minister of Rural Development went to the lake area with the director of fisheries. They organised a meeting in Kpomassè. After a discussion, the Akaja users said that if the Xha was not removed they would start Akaja. The political authorities in Kpomassè asked the *gendarmerie* to intervene in Guézin to solve the problem. But the local police forces did not react because they explained that the Xha in Guézin was not in the Sous-préfecture of Kpomassè. The local police force of the Sous-préfecture Comé gave the same argument. The coercive intervention became complex because the village Guézin is partially in the Sous-préfectures of Comé and Kpomassè. The Director of fisheries organized another meeting in Comé with some members of the *Comité de Suivi* in the lake area, the *Chef de villages* and the Sous-Préfet of Comé. The Maire of a commune around the lake assisted this meeting. The Sous-préfet and the director of fisheries asked him to solve the problem. He refused and found the task very dangerous because he could not face eventual revolt of stakeholders in Guézin.

The *Bureau* of the *Comité de Suivi* did not function as it was explained above. All the members were outside the lake. Coordination, monitoring and evaluation with the stakeholders of any actions were not done and nobody knew how the livelihoods of the stakeholders are affected when the Akaja and Xha are removed. The failure of the government intervention in 1985 was based on the incapacity to maintain the win-win solution they adopted (without negotiation). Why should the same solution be repeated again? The representatives of the government did not learn from their own practice to make the *journée de réflexion* more effective in terms of the resolution of the problems of the lake. From that point of view, the discovery by the stakeholders, of the weaknesses of the government for the maintenance of the actions which were implemented did not provide any incentive for changing their practices on the lake. The stakeholders did not believe that the professionals and the political authorities were able to find solution to their problems which can be defined in terms of economic opportunities.

What should have done by the government for Lake Aheme?

Following the analysis above, the *journée de réflexion* should have created a committee for starting a learning process with the stakeholders. The implementation of the decisions of the *journée de réflexion* should have been followed with the evaluation of the situation of the stakeholders to know how it changes in relation with the fishing practices. This task should be done with the learning groups. Since the problems of the lake were collective concerns for the stakeholders, they would be motivated to participate in such learning groups. Then together with the development professionals and scientists, they should make visible the trade-offs of the decisions about the fishing techniques used in the lake and seek for alternative solutions and the improvement of their economic situations.

The training of the stakeholders about the ecological problems of their lake, for instance the role of the mangroves which were destroyed, should be a priority for curriculum

development. But this means that professionals need to be active in the lake area and that intervention processes should be transformed into joint-observation, discussion and reflexive learning in order to generate local leaders for ecological movement for the Lake Aheme. This objective can be achieved when the recognition of the danger of some practices used by the stakeholders are internalized.

These arguments require communicative professionals and a clear institutional framework which reward efforts for solving complex problems at the grassroots level such as the situation of the lake. This issue is particularly important because the roles assignment among the government organizations for Lake Aheme were not very clear. For instance, the Direction des Pêches and of the CARDER both work for the development of the fisheries.

There was also the pretence that the resolution of the conflicts about Lake Aheme was in the hands of political authorities who have the power to mobilize government military forces to solve the problems. The consequence was that the government organization which intervened, neglected mediation, negotiation and conflict resolution as alternative strategies for solving the problems of Lake Aheme.

The *journée de réflexion* should have focused on the ways the problems of the stakeholders could be approached, and on the generation of collective learning processes, supported by the political authorities. The critical evaluation of the intervention practices of government organizations should have been a discussion topic at the *journée de réflexion*. If these were not able to provide opportunities for the stakeholders to solve their problems, their *raison-d'être* needed to be questioned.

The influence of the policy context

The political context presented many dilemmas for improving the critical situation of Lake Aheme. On the one side, any attempt for breaking the impasse on the lake has a political connotation, i.e., the decision-making for new rules, regulations, investments and resources mobilization. On the other side, the political decisions were difficult in the multiparty system adopted by the Beninese in the democratization era because the difficult situations of the stakeholders are exploited by the politicians during their campaigns: when the government decided to take some actions on the lake (e.g., remove Akaja and Xha), the political opponents would promise the re-establishment of these fishing practices to the stakeholders to obtain their votes. In face of this dilemma, most of the efforts of governments were abandoned because they also missed the support of strong organisations, for instance, ecological movements among the stakeholders.

The stakeholders also learned through decennia the relationship between the changing political context and their situation and to behave accordingly. It was not surprising that the president of the Akaja users explained, during this study, that any government effort towards the situation of the Lake Aheme should only be done after the political elections. The recent development on the lake confirmed his analysis.

Beyond the political barriers many plans of the government involve the idea for developing the fisheries by mobilizing the stakeholders at the grass-roots level (cf PAE, 1992, 1993). Still, these actions were not taken and the control of the votes of the stakeholders may be more important than the promotion of grass-root development.

4.7   Conclusions

The analysis of fishery resource use in Lake Aheme shows the evolution of the effective platform for resource management from the pre-colonial period onwards. The Lake Aheme case illustrates the dynamics with respect to the lake's problems, and the institutions and organizations for its management. Also, multiple stakeholders' responses to various interventions and changing patterns of policy contexts are dynamic from the pre-colonial period to the recent democratization period in Benin. The platform for resource management was successful before the impasses emerged. This situation presents a strong ground for drawing some conclusions about the factors that affect the success or failure for resource management in Lake Aheme.

A main factor related to the success of managing the lake's resources during the pre-colonial time was that the stakeholders agreed upon a platform for governing the Lake Aheme. Other related factors for success were the functioning of the institutions, existing local monitoring systems, periodic meeting of the local organization for decision making and deliberation, and the effectiveness of sanctioning structures. However, the success was achieved in a context for insuring the subsistence of the stakeholders. The local arrangement failed beyond this context. The problems of the lake moved to the levels of external supports and policy, without success.

Factors related to the failure were the difficulty for various interventions to set up new institutions for the lake, and enforce them. Inconsistent policy frameworks did not allow concrete actions like facilitating the development of a new organization among interest coalitions that emerged.

The major lesson from Lake Aheme is that, beyond technical interventions for manipulating the ecology of the lake towards higher productivity (e.g., Akaja, Hwédo), and beyond biophysical studies to monitor the ecological state of the lake, greater sustainability can only be achieved if the stakeholders agree upon management rules, institutions and policies. The sustainability of Lake Aheme is an emergent property of a soft-system.

Notes

1. Initial reflection about this chapter is contained in: Dangbégnon, C. 1996 Breaking the impasse: Platform for Common Property Resource use (The Aheme lake case, Benin). Paper presented at the Sith Annual Conference for the International Association for the Study of Common Property Resources. June 4-8, 1996 Univ. of Berkeley,

Berkeley California (USA).

The present chapter makes use of: Dangbégnon, C. 1995   Towards Common Property Rights in Fishing Communities: a platform for negotiating sustainable resource use (the Aheme lake case, Benin). Unpublished M.Sc. Thesis. Wageningen: Wageningen Agricultural University.

2. Benin is divided in 6 provinces. Each province (called *Département*) comprises many districts. Each district (called *Sous-préfectures*) comprises many Communes. Each Communes comprises many villages. Some villages are divided into hamlets.

3. Zounon family is an 'extended family' of the dynasty of the Zounon in Guézin. A chronology of all the King Zounon in Guézin is shown at a sacred place in Guézin.

4. Sahè is actually called Savi in the Atlantic Province in Benin

5. The Kingdom of *Danxomè* was one of the military and politically units organised at that period. This kingdom conquered many other local kingdoms in the past. The centre of this kingdom was Abomey in the present Zou province in Benin.

6. Mitogbodji is a small island in Lake Aheme. Actually, Mitogbodji is considered as a spiritual place by the Pedah ethnic group. Nobody is living there.

7. A practice like Akaja existed already among the fishers, especially in Lake Nokoué in Benin.

8. FCFA is the currency in the Francophone African Countries. After the devaluation at the beginning of 1994: 100 F CFA = 1 FF = 0,20 US dollars

9. The *Centre Piscicole de Godomey* was created in 1978. The objective was to supply fry for the aquaculture activities in Benin. But this centre collapsed and is not functional nowadays.

10. The *Bureau* of the COGEHEN was led by a president and comprises nine members.

11. There was no King in Guézin from 1975 till 1993 (revolution period 1972-1989). Many local kingdoms were recreated (include the one in Guézin) in 1994 after the *Conference Nationale* in Benin, which was the starting point of the democratization process in Benin.

5   Overcoming Barriers: Platforms for Rangeland Resource Management with *Chabe* People in Benin

5.1   Introduction

Among the many existing studies in pastoral development in the African context (e.g., Scoones, 1995) the exploration of crucial interactive issues, such as negotiated agreements and conflicts resolution among the stakeholders, are neglected. This chapter deals with concrete problems and efforts concerning resource management in rangeland ecosystems. The difficulty to identify the boundaries of the rangeland ecosystems, the uncertainty about the movement of the herders to make best use of the heterogenous landscape, the risk of serious crop-damage and conflicts/wars, are some specific issues addressed in this case study.

At the beginning of the present study, some important reports of studies in the same area (Biokou, 1989; P.Onibon, 1990; Essouman, 1992; Oloulotan & P.Onibon, 1994; Tchègnon, 1995; P.Onibon & Okou, 1995) and some key literature on the rangeland situation in Benin (e.g., Bierschenk, 1988; De Haan, 1997) were available. Project documents were used (e.g., Hounkpodoté & Bediyé, 1995). Many reports of the project *'Promotion de l'élevage et Préparation d'Actions Intégrées dans le Zou'* (Livestock development and Diagnosis for Integrated Actions in the Zou province) were available. These studies covered several aspects of rangeland resource management: pastures, watering places for the cattle, animal health, the movement of the transhumant herders, conflicts, etc., in the Zou province. A combination of several research methods and techniques was applied in this case study. Individual (and group) interviews were used to collect data from stakeholders and other actors in government organizations and NGO. Key informants for the interviews were selected with snow-ball techniques. Participant observation was used. Group discussions were done with herders. Meetings were organized with a group of herders who discussed their constraints and opportunities for improving the situation of the rangeland in their local setting.

The present case study started with gaining an understanding of the setting of the problematic context of rangeland resource use within the *Chabe* community (§5.2). The insights gained from the local context enabled the identification of two different situations concerning rangeland management. As will be explained later, each of these situations located in the 'territory' of the *Chabe* people was used as a case study. The first deals with rangeland resource management under local arrangement (see §5.3); the second explores an innovative external intervention (see §5.4). The following issues discussed concern the problem and perception, the social learning, and ways for facilitating change. Some similar patterns or specific variations may evolve from the analysis of the two situations studied as cases. For that reason a comparative analysis was done to draw conclusions (see §5.6).

5.2   Setting the scene: rangeland management in *Chabe* community

Geographic location of the Chabe people and their socio-political organization

The *Chabe* people live in the *Sous-prefectures* of Save and Ouesse (Eastern part) along the frontier with Nigeria (see map 5.1). This geographic position has some advantages for the *Chabe* such as the development of border commerce activities. Agricultural activities became less important for them compared to other ethnic groups such as the Mahi (see next chapter). For that reason, the *Chabe* have access to land near the village near the villages, even if they have planted cashew trees because of their economic value.

The socio-political organizations of the *Chabe* people is centralized around their local kingdom. The *Oba* is the King of all the *Chabe*, the highest local authority living in Savè, the capital of the *Sous-préfecture*. All the *Chabe* villages have their local authority called the *balè*. The balè is under the authority of the *oba Chabe*. At the level of a *Chabe* village, the *balodè* is the *local* authority for the hunters and responsible for the protection of the natural resources (forest resources, game, etc.). Land is under the control of the native *Chabe* called the Agani (the land landowner). The *balè* of the village Kaboua in the *Sous-préfecture* of Savè is called *Olochoumaré* and is in charge of the enthronement of the King of the *Chabe* people.

The organization of the *Chabe* gives local authorities the prerogative of the control over natural resources (e.g., forest resources, game). The *balè* ('the father of land') is taking care of the village's land (cf. Biaou, 1996). He was responsible for the redistribution of land to the villagers for agricultural activities[1]. The *balè* 'governs' the village with the assistance of *baba balè* (the father of *balè*), the *Iya Balè* (the mother of *balè*) and other influential people in the village (cf. Biaou, 1996).

The availability of land in Save and Ouesse, and the socio-political organization of the *Chabe* people enabled the settlement of farmers and herders in their territory. Several migrant farmers borrowed land from the Agani. The transhumant herders also got the permission to settle in the same area.

This generosity for giving land to migrants enabled the creation of many villages and hamlets which consist only of migrant farmers. Especially, in the Southern part of Savè[2], most of the villages were created by migrants through this process of borrowing land from the Agani living in Savè. Planting trees is a kind of land appropriation in the *Chabe* community and the migrants are not allowed to do this.
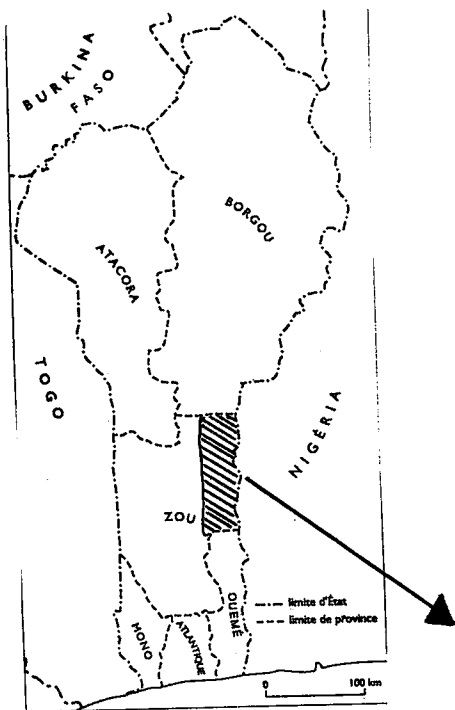
Map 5.1: Territory of Chabe people in Benin
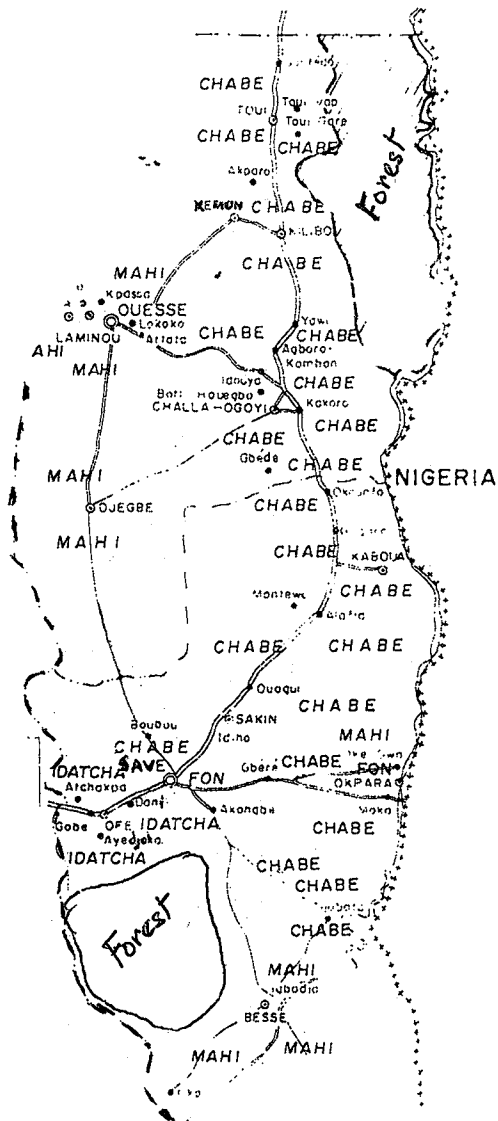
Migration to, and settlement in, the Chabe community

The *Sous-préfectures* of Savè and Ouesse attract many herders because of the presence of many rivers and the abundance of pastures. For instance, out of 185, 600 hectares of the cultivated land available, only 6% were used in 1989. Many ethnic groups (Adja, Fon, Otamari, Berba, etc.) migrated from the Southern and the Northern parts of Benin to the territory of the *Chabe* people.

Rangeland ecosystems are heterogenous in space and variable over time. Pasture availability changes drastically with the rainfall pattern. For this reason, herders had to look for places where pastures could be available for their cattle. In the driest month, the herders left the region of Ilorin in Nigeria to Benin (*transhumance*) through the *Chabe* territory in Ouesse and Save (P. Onibon, 1990). Many herders arrived also from the Northern part of Benin to this region. Grazing areas and farmlands are intertwined.

Construction of two different situations for empirical investigations

The first situation concerns the settlement of herders and migrant farmers in an area used for grazing and cultivation (see fig. 5.1). These stakeholders are using land which does not belong to them for their main activities. The role of the highest level of organization of the *Chabe* people was important for their access to land and pasture. The socio-economic and political central functions are performed by villages of the migrant farmers to which one or several hamlets of the herders are attached (cf. also Bierschenk, 1988). A hamlet is called *gaa* by the native *Chabe* although herders use the concept *Gure* in their dialect. Many hamlets are at the periphery of the villages in the *Sous-prefecture* of Savè. They consist of 'household(s)' without any spatial, socio-economic or political center.
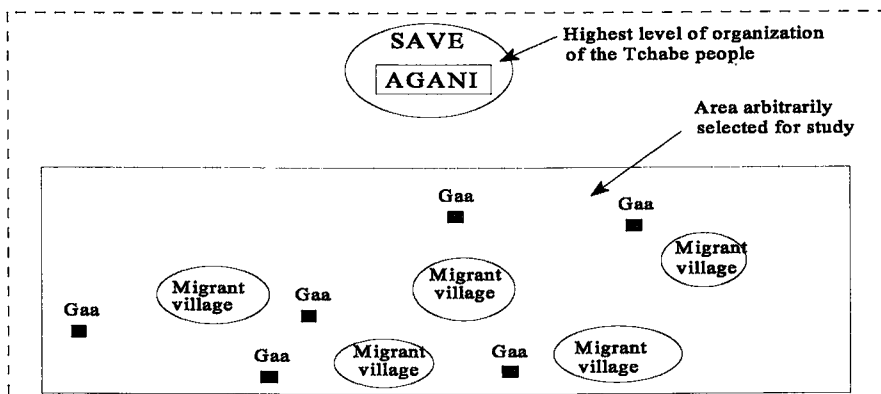
Figure 5.1:   Schematic visualization of the first situation for empirical study: the local arrangement (§5.3)

Three villages were chosen (Dani, Katakou, and Ayedjoco) in the area arbitrarily selected, and the city of Savè, the centre of the *Chabe* people's organization. Many reasons motived this choice: (i) many *gaa* of herders are surrounding these villages; (ii) the facility of having contact with the herders existed and there was an experienced interpreter who was used by the NGO CEBEDES (*Centre Béninois pour le Développement Economique et Social*) and who knew many herders and could communicate with them. The village Dani is populated by Datcha, Fon and Otamari migrants. The case of Ayedjoco is special. The villagers were employed in a recent past by a government organisation for forest management called SNAFOR (*Société National des Forêts*). This organisation collapsed and the labourers settled there to cultivate the land in the protected forest zone and create the village Ayedjoco.

The second situation concerned the local organization of the *Chabe* people at a village level. Decision-making about the settlement of the herders was done by the *balè* and the *balodè*. Both native *Chabe* and herders were using the village territory for their different activities: crop cultivation and herding (see fig. 5.2). The village Kemon was selected for studying this situation. The main reason was the presence of an innovative intervention for the support of the existing local organization that was operational in finding solutions to the barriers in rangeland resource management.
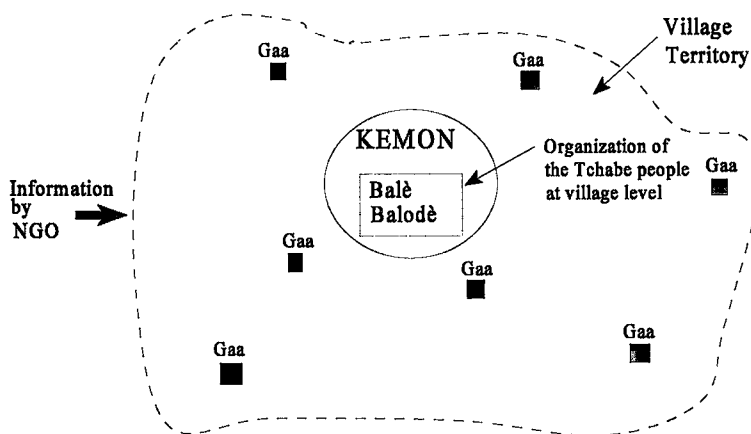
Figure 5.2:   Schematic visualization of the second situation for study: external support (§5.4)

Kemon is one of the nine *Communes* of the sous-prefecture of Ouèssè. Near Kemon live old time herders. Kemon has a vast domain that consists partly of sacred forests and woody savannah. Three important rivers in Kemon are: Kilibo, Yani and Aouwo. These conditions are (probably) one reason for herders to settle in this area. Unlike many villages in Benin, the boundary of the territory of Kemon was known by the villagers. There are local religious

barriers to the exploitation of natural resources which were are strong in Kemon. For instance, the land is mastered by a spirit called *Ninguêdjou*, and selling a piece of land is forbidden.

Having explained the two different situations of rangeland resource use within the *Chabe* community, the following will discuss the problems, and analyse the extent to which platforms are developed to overcome barriers to sustainable rangeland resource management. Section 5.3 reports on the situation in which local arrangements determine the outcome, nd section 5.4 looks at the external intervention.

5.3   Platforms for rangeland resource management under the local arrangement in Savè area

The stakeholders for the rangeland resource management in Save area

The villagers: migrant farmers
The migrants in Dani and Katakou originated from the Southern part of Zou Province (Datcha and Fon ethnic groups) and from the Atacora province, a Northern part of Benin (Betamaribè ethnic group). The Datcha people are dominant in Dani and Ayedjoco. The Fon people are dominant in Katacou where they created two hamlets that became one village in 1981. Dani became a village in 1974 and the first migrant was appointed *balè* by the *Chabe*. The migrant farmers have the duty to give a part of their agricultural product (e.g., maize, cassava) to the Agani in Savè. He became the mediator among all the migrant farmers who asked for land in Dani. Each year he collects land rent for the Agani. The Fon people in Katacou also give land rent to the Agani in Save.

The influence of the *Chabe* people on the migrant farmers is growing because land is acquiring an economic value[3]. The rule that does not allow the migrant farmers to plant trees is becoming very strict. However, the government encourage the stakeholders through campaigns for planting trees. In this ambiguity, many migrant farmers planted trees and in 1997, the *Chabe* people in Save threw them out their territory (more than 500 migrant farmers) and damaged their farms (see *Le Matin du 9 Mai 1997*).

The political authorities were not able to find solutions to this crisis. The resolution of the conflict was brought about by the King of the *Chabe* people in Savè. He became the mediator of the stakeholders in conflict with the Agani. This example shows that the Agani in Save has a voice in the rangeland issues. In all the villages which were selected, there is a local political representative, the *Chef de Village*, and also members of committees for maintaining the infrastructure of pumps for drinking water.

The herders in the Save area

The livelihood of the herders in Savè area is very complex. They arrived and settled after permission to the Agani. They migrate any time depending on many factors. P. Onibon & Adandedjan (1990) identified the following factors:

- the decreasing quality of the pasture in the area;

- difficult access to watering places for the cattle (presence of crop farms);

- the behaviour of the farmers when establishing their crop fields, the herders prefer a good atmosphere with the villagers to avoid conflicts;

- the presence of tse-tse fly in an area;

- the areas with hydromorphic soils are abandoned because they cause health problems for the cattle.

In view of the above, different *gaa* had different history. A life history approach was adopted to select the herders for the investigations (see Box 5.1).

Box 5.1: different gaa, different history and profile

(1) Gaa Amadou: recent migrant with own flock

Amadou, called El-hadj, is the eldest of the *gaa*. He had three wives and 15 children. He is living in the *gaa* with three brothers. The first had two wives and seven children, the second had one wife and two children, and the third had one wife and one child. The origin of the group was Nikki (a town in a Northeastern part of Benin). They migrated from Nikki to Nigeria (Ilorin) where they stayed for 30 years. The large number of herders in the region caused pasture and water problems for the cattle. Insecurity (theft of cattle) was also a problem in this region. They migrated from Ilorin to Benin (Savè). They settled near the village called Dani since 1994 after permission from the Agani in Savè. The *gaa* Amadou has a big flock, more than 300 cattle.

(2) Gaa Sema: recent migrant under a salary contract for keeping the cattle

Sema is a relatively young herder living with his brother near Savè. He had one wife and three children and his brother has one wife and two children. He left Bissi (a village in Savè) to another village called Gbéré (in the *Sous-préfecture* of Savè) and settled near Savè. Sema manages a small flock on the farm (settlement place) of an El-hadj in Cotonou who was his patron. He receives a salary (15,000 F CFA/month) from his patron.

(3) Gaa Tikou: recent migrant under the 'old fashioned contract' (see explanation below)

Tikou is a very young Fulani living with his father, mother, sisters, wives and brother. He is keeping a small flock of cattle which belongs to an El-hadji living in Savè. Tikou settled in a parcel which was a private property of his patron. He did not get a salary from his patron but a percentage of the calves born in the flock (an old fashioned contract).

(4) Gaa Bouba: old time herder under an old fashioned contract

Bouba has many flocks (total of 600 heads of cattle) because he is keeping the cattle on the behalf of some native *Chabe*. Since five years ago in 1996, he moved with the cattle from Gobe to Katacou because conflicts were becoming very frequent. As he stayed in Gobe for a long time, he has a son who went to school and speaks French. He has two wives, and several boys already married. They are living in mud houses, an indicator of the old time herders.

(5) Gaa Bawa: old time Fulani under a contract with the villagers of Ayedjoco

Members of *gaa* Bawa migrated from Djougou (Northern part of Benin) several years ago to the Sous prefecture of Dassa. They arrived in Ayedjoco since 1990. The *gaa* is composed of several people: four young people with one wife each, two old men, one with two wives. The *gaa* was far from the village Ayedjoco (4 kilometres) in

other to avoid conflict with farmers. Most cattle herded by Fulani belong to the villagers of Ayedjoco under a contract.

(6) Gaa Worou: old time herder with a small flock for his own

Worou left Acon (a village of Savè) because the number of herders is very large in this region. He arrived in Dani in 1996, where he lived with the villagers for three months, a period where he expected to find a place to settle. Worou was living with his brother, his own wife and the wife of his brother.

Rangeland problems as perceived by the stakeholders

The problem according to the perception of the herders

The main constraint of cattle keeping was introduced by a herder who used the following parable: '*... a Fulani has to keep the cattle on the Earth and not in the Sky*'. Herders complained about the difficulty to share the same area with the crop-farmers. Immediately perceived problems were defined as follows: the crops eaten by the cattle, corridor space was not respected by the farmers, the difficulty of joining the watering places during the rainy season, or watering place increasingly dry up during the dry season. The location of the different *gaa* and the nature of the relationship of the villages influences the way the problems are perceived by the herders.

The *gaa* Amadou and Worou are near the village Dani and the *gaa* Sema and Tikou are located between Savè and Dani. Their crucial problem was the difficulty to find water for the cattle in the dry season. There is a swampy land area in Dani which holds water in the rainy season and the herders use it as a watering place. But in the dry season it dries up and herding activities suffered. Another difficulty is the presence everywhere of crops-farms and the increasing risk of crop damage. The herders believed that the farmers did not think about the herders to reduce their suffering. During the dry season, the *gaa* Bouba went to the River Ouémé to find water for their cattle. The migrant Datcha were practising shifting cultivation toward the *gaa* Bouba. Everyday, the movement towards this watering place was problematic. Very often crop damage occurred. The *gaa* Bawa in Ayedjoco did not have problem of finding water and pastures for their cattle. The immediate perceived problem was the progression of crop-farms towards their *gaa* despite the fact that the *gaa* is far from the village Ayedjoco.

The problem according to the perception of the villagers

The problem perceived by the villagers was the serious crop damage caused by the cattle. The most critical problem was the insecurity caused by the *transhumant* Fulbe[4] (the *buzu*) who are well-equipped with guns. According to the farmers in Dani, the *buzu* are the 'savages' and they do not hesitate to shoot the people. After the passage of their cattle, the soils became hard and difficult to cultivate (see also De Haan, 1995). Early bush-fire is a common practice for the herders in Save. Many insvestigations suggested that this indigenous practice enables the nutrients which are released to re-enter the vegetation and stimulate a palatable and nutritious flush growth from perennial grasses (see also Fairhead, 1992). Early fires can help drive away

mosquitoes and harmful insects in order to protect the animals. Many farmers found that the areas where the herder practised early fires are difficult to cultivate because land clearing becomes painful.

Many farmers in the villages Dani and Katacou asked the Agani in Savè to prevent the arrival of the *buzu* in their territory. However, they refused and invited the farmers to a mutual understanding with the *buzu*. Giving permission to the *buzu* did not involve any risk for the Agani in Savè. Unlike the migrant farmers, the *buzu* did not plant trees and should not claim any property right in the future. They settlement did not have any risk for losing land by the Agani.

In Ayedjoco the farmers did not perceive the herders as the main constraint to crops cultivation. The herders were keeping their cattle. According to a stakeholder in Ayedjoco *'their bank is in the hands of the herders'*. The farmers who owned cattle have one representative called the *delegué*. According to him, the problematic situation was related to the shifting cultivation practised by some migrant farmers (see Box 5.2)

Box 5.2: The delegué of the farmers explained the problematic situation in Ayedjoco

The location of the *gaa* Bawa was identified on the basis of an agreement we made in the village. We have a contract with the herders for keeping our cattle (as this will be explained later). Now the farmers who have no cattle and are not expecting anything from the herders are not motivated to respect what we have agreed in the village. Those type of farmers are the migrant Fon and Ditamari. Unfortunately, there are some farmers who are cultivating toward the *gaa* Bawa and the cattle caused damages to the cotton farms. Conflicts emerged between them and the herders. If they do not want to cooperate, since we, the villagers agreed to settle the herders, we will be obliged to keep them out the village.

Defining the nature of the problem

The context of Savè was characterized by the absence of a useful intervention to solve the problems which were identified. For example, the *Direction de l'Elevage*, the government livestock development organization was not helping the herders in the area of study. Only the veterinary at the office the CARDER Zou had access to the herders for treating the animal diseases.

The herders have many concrete problems: water, pastures, corridor space, etc. They cannot solve them without the other stakeholders, the migrant farmers and the Agani in Save. The land degradation, crop damage and conflict which were perceived by the farmers can only be reduced if the various stakeholders found a negotiated agreement, adopted collective action, and created platforms to overcome the barriers they faced.

Can the stakeholders learn their way to overcoming barriers?

In the absence of a deliberate external support for helping the herders, they learned their way to a resolution of the problems they faced. Concrete examples revealed the way in which different *gaa* developed perspectives on solutions and learned about them, according to the specific problematic context.

The negotiation of water for the cattle in Dani and Katacou

The watering place used by the herders in Dani (*gaa* Amadou, Tikou, Sema and Worou) dried up during the dry season. The alternative solution found by the herders was to go to the River Ouémé at seven kilometres from their locations. Yet the daily movement involved many risks of crop (cassava) damage on the route. The herders (*gaa* Amadou, Sema and Tikou) found the idea that they should negotiate to use water from the villagers' pump[5] in Dani for their cattle. They discussed this with the pump committee and the agreement was that they had to pay for water and the cost would depend on the size of the flocks. The *gaa* Amadou had the large number of cattle. He bargained the cost of using the water with the village pump committee until the agreement was made that he would pay 2,000 F CFA per flock (approximately 40 cattle per flock) and per month during the dry season. Sema and Tikou did the same. The former would pay 5,000 F CFA for the whole dry season and the latter 4,000 F CFA. This arrangement worked only for one year. At the beginning of 1996, the village pump committee wanted to double the prices (because of the devaluation of the CFA currency) which they had agreed with the herders. The latter realized that the number of their cattle had increased and that the villagers might not accept to provide them again with water for their cattle. A young herder in the *gaa* Amadou decided to take the initiative to find an alternative solution to solve water problems for the cattle.

The solution found was to negotiate with the villagers in Dani and to obtain permission to dig the swampy watering place which was drying up. The villagers accepted and informed the herders that they should invite the public work services (*Service des Travaux Publiques*) to dig the area with a bulldozer. Still, they would pay a certain amount of money (gas oil, money for the driver of the worker) to realize this work. The conclusion of the *gaa* Amadou was that the solution to the problem would not be possible at their level. The need to involve other *gaa* around Dani and Save was perceived. *Gaa* Amadou discussed the initiative with them. Some important constraints were identified. The herders who were employed as labourers were not able to decide about water problems without the approval of their patrons. Furthermore the decision-making process was difficult in the coalition of six *gaa* (Amadou, Bio, Tikou, Sema, and two others) created by the young herder. The herders did not find any external support to solve this problem. The fact that they took the initiative and formed a coalition reveals the importance of collective action for solving their problem.

The importance for creating a coalition for collective action became visible as a result of the failure of the *gaa* Bouba to solve the water problem for the cattle. During the dry season, the problem of finding water was also crucial for the *gaa* Bouba. He saw in the *Sous-*

préfecture of Ouesse that, a very powerful herder (19 flocks, more than 1,300 cattle) had succeeded in obtaining a pump similar to the one used in many villages. Why he should not try the same idea? He got the information from the villager that the Health Centre in Savè should help achieve his goal. He had a contact with the 'Director' of the centre and discussed the problem. The cost of pump instalment at that period was 120,000 F CFA. A specialist was sent to the *gaa* Bouba. When he arrived, he counted the number of people living there. The conclusion was that they were too few and the pump would not be maintained after its realization. The *gaa* Bouba was disappointed and did not understand the procedure. He wanted a pump for the cattle which were not counted. The failure of Bouba revealed that the water problem was difficult to solve at the level of his *gaa* only. He would have succeeded if he had networked with the villagers in Katacou or other *gaa* in the surroundings. Forming coalition and networking might be a solution for the various problems the individual *gaa* in the Savè area were facing. Negotiated agreements with the villagers were also important.

Negotiated agreement for herding and cultivation in Ayedjoco

The inhabitants of the village Ayedjoco were migrant people of the ethnic groups Datcha, Fon and Ditamari. The Datcha people were the dominant and they migrated from the *Sous-prefectures* of Dassa-Zoumê and Glazoué which are two neighbouring *Sous-préfectures*. All the farmers in Ayedjoco were looking for fertile lands and the shifting cultivation was practised. Many Datcha people owned cattle in Ayedjoco and herders were keeping them. They created a committee chaired by a farmer called the *délégué* of the cattle owners. This idea emerged from the realization that the herders would be disturbed too much if everybody who owned cattle would be visiting them. The herders would have the feeling that the cattle owner did not trust them.

The cattle owners perceived the need to organize cultivation and herding activities in the village territory to avoid crop damages by the cattle and the serious conflicts which occurred. The committee of the cattle owners helped by the *Chef de Village* organized a meeting to discuss the problem. The decision was made to find a new area for the herders on the village territory. According to the *Chef de Village*, everybody agreed on that and the area was found.

The herders were displaced to this area which is at four kilometres from the village built-up area (the former was at 300 metres). The farmers who were already cultivating in this area left. The new situation had some negative implications on the livelihoods of the herders, for instance, selling milk and sheabutter to the villagers in Ayedjoco would be painful for the women (a long distance to walk every day). But they did not have another choice. They had to adapt themselves to the situation. However, they perceived also some advantages. They were near the River Ouémé (500 metres) and water for the cattle was not a problem. There were no crop farms in this area and conflicts could be avoided. But, this arrangement could not be maintained as explained below. Conflicts still emerged.

Conflict resolution in the local setting: some concrete examples in Ayedjoco and Katacou

Conflict resolution was perceived as a frequent occurrence in the local setting. Before the presentation of the concrete examples in Ayedjoco and Katacou, an overview of existing structures and strategies for resolving conflicts about rangeland problems will be given as a basis for understanding the examples described below.

The government created one ad hoc commission, at the level of the *Sous-prefecture*, which involved the *Sous-préfet*, the district officer for rural development (RDR = *Responsable du Développement Rural*), the Village Extension Worker (VEW), the police forces (*gendarmes*), a representative of the herders called *Chef Peulh*, and a representative of the farmers (see also P. Onibon & Okou, 1995: 75). The role of this committee was to mediate disputes between the crop-farmers and the herders. However, in the local setting, many herders preferred a settlement out of court when their cattle damaged a farm. A failure to finding a compromise let them move to the level of the *Chef de Village* or the *Maire* of the *Commune* where the conflict occurred. Many farmers also preferred the resolution of conflict at the level of the *gendarmerie* where coercive methods are used (e.g., case of Katacou explained below) without further actions by the ad hoc commission. As a consequence, many herders like El-hadj Oumon (see Box 5.3) did not trust this commission.

Box 5.3: El-Hadj Oumon, a leader of the herders in Savè, gives his perception about the government structure for conflict resolution.

We have a committee at the level of the sous-prefecture and I am a member. The persons involved are the Sous-préfet, the RDR, the *Maire*, the *Chef de village*, representatives of farmers and Fulbe. Unfortunately this committee is not functional. When a problem emerges and I go to see the administrative authorities who are in this committee, they always say that they did not have time. I would not hesitate to repeat it if all the members of the committee were here. Administrative authorities at the grass-roots level like the *Maire* and *Chef de village* are not serious. They will give you a permission to settle in a region and the same authorities will support the farmers who will kill your cattle. It is also common for the villagers to say: We give you this area for herding, but the same villagers may come and cultivate in this area. Nobody would do anything about this problem. We (herders) have to find our way to deal with the farmers. When there is a problem in a region, I will go there with local leaders (among the farmers) to negotiate.

Despite the creation of the ad hoc commission, conflicts between the farmers and the herders were increasing (P. Onibon & Okou, 1995). Of the many conflicts which occurred in the local setting, the following examples give an idea of the way the problems between herding and cultivation were dealt with, and provide some lessons that one can draw..

In Katacou, finding water for the cattle was a great problem for the *gaa* Bouba because they did not know where the crop farms were located on the routes towards the River Ouémé. One day, the flock of *gaa* Bouba caused serious damage to cowpea and groundnut farms. The owner of the farms in a hamlet of Katacou was alerted by another farmer. He did not say anything to the herder and went to the *gendarmerie* (local police) in Savè. He paid 5,000 F CFA to the *gendarmes* to investigate the situation. Thereafter Bouba was arrested. The Village Extension Worker was invited to estimate the cost of the damages. This investigation led to

an estimate of 200,000 FCFA. The herder bargained and reduced the cost to 160,000 F CFA. He was liberated after paying this amount of money to the farmer. This event is an example of the way the conflict resolution was done in Savè. This strategy did not change anything in terms of the problematic situation of the herders. The root of the problem was (among others) a lack of organization between herders and farmers for a symbiosis in the exploitation of the 'common' territory. The existing ad hoc commission for rangeland issues should act to generate new organizations of stakeholders to prevent and resolve conflicts in the local setting.

The example of Ayedjoco revealed another dimension of conflict resolution. Despite the existing negotiated agreement between the stakeholders (discussed above), some migrant-farmers did not trust the local institutions which were generated for farming and herding activities on the village territory. The *délégué* and the cattle owners warned the migrant-farmers and tried to convince them that the location of the herders was already far from the village and that they could not move again to another place. Despite the existing local effort for the realization of a synergy for preventing conflicts, cotton field were installed during the rainy season in the area allocated to the cattle. Serious crop damage was caused by the cattle. The owner of the farm went to the *gendarmerie* and the délégué of the cattle owners paid 45,750 FCFA, as the equivalent of the damage to the farmer. This example of Ayedjoco shows that, because of the existing negotiated agreement between the villagers and the herders, local organizations emerged for taking responsibility in conflict resolution. A major learning point from this example is that, the formal institutions such as the ad hoc commission did not support existing local institutions and organizations for preventing conflicts.

Learning about the development of local platforms for the resolution of rangeland problems

The integration of local economies, herding and farming enabled the *rapprochement* of the herders and the villagers for finding a negotiated agreement about how they should go about their activities based on concerted actions in Ayedjoco. Maintaining this negotiated agreement stimulated the development of a platform where the potential stakeholders became the activists for its functioning in Ayedjoco. The water problem in Dani raised the need to create a platform. But the fact that the decision-making power was not in the hands of the herders (e.g., some of whom were labourers who were keeping the cattle of the people living in town) they could not overcome the barriers they faced in Dani.

Living with the herders to learn about change: what are the implications to overcome barriers?

Participatory Learning Action Research

A herder in the *gaa* Amadou summarized the learning repertoire in herding activity as the following: '*everyday a herder has to think about how to find pastures and water and avoid problems with crop-farmers*'. This daily reflection of the Fulbe stimulates a participatory action research and learning to share the world in which the herders operated and the

interpretation and meaning they give to it. The participatory action research and learning was aimed at identifying fresh ideas and strategies from the herders for facilitating change with respect to the rangeland problems.

The participatory action research and learning started with a mapping exercise. Some principles in the document *'Pour une cartographie paysanne du terroir'* (Terroir mapping with farmers) of the ESPGRN *(Equipe sur les Systèmes de Production et Gestion des Resources Naturelles* = Team on Farming Systems and Natural Resource Management) in Mali, were used. The objective of the present exercise was to create a visual tool which presented a concrete ground for discussion, self-discovery and learning through interactive processes. This would help identify constraints and potentials on the *terroir pastoral* according to the way the herders experienced it. Another objective was to learn to identify how the herders represented the *terroir pastoral*, the meaning they gave to it, their needs, their perspectives on solution, for instance the reorganization of the herding and cultivation activities for improving the quality of pastures.

Finding the appropriate period and bringing the herders together was not an easy task, especially during the research period (dry season in February) when the idea emerged. Incentives were not available to stimulate the herders in participating in a participatory action research and learning. The alternative solution was to discuss with the herders how to find the appropriate time. As they are Moslems, the *gaa* Amadou revealed that they had planned a gathering for a prayer at their place the 10th of February 1997. They suggested that the same day should be planned opportunistically for the participatory action research and learning exercises. The proposition the herders worked and the day of their gathering, they agreed on the time the exercises were done interactively (see Box 5.4).

Box 5.4: The exercises for learning about 'pastoral terroir'

The exercise started with explanation of the materials used. A large sheet of paper was put in the centre of the circle where we were seated on a straw mat in a small house. Ten herders were in the house. I explained to the herders that this sheet of paper represents the surface where they live with their cattle and all kind of things their need for keeping their cattle, sheep, chickens, etc., and the villages which are important according to them. I explained also that the objective of what we wanted to do was to draw those things on the surface of the paper and after that we discuss.

The herders had a brief discussion among themselves and El-Hadj Amadou said: this exercise should be done by young Fulbe who went to the grazing areas and watering places with the cattle. We, old men are at home. Then five young men were chosen to do the participatory mapping exercise. The old men said that they would intervene when necessary. The young men said: 'we cannot draw ourselves what you are explaining, but we can tell you what we want and you will draw it for us on this large sheet of paper and the exercise started.

Could you put the four points of the compass on the paper? (first question that should be asked according to the ESPGRN document). My interpreter was not able to translate this question in the way that the herders might understand. As they are Moslems, I changed the question and asked them to indicate the side where the sun raises on the paper. This was the first parameter for the mapping exercise, contrary to the conventional parameter which is the North. They showed this position and called it letougal (East). They requested to draw a circle with claws around. The opposite side of letougal is called gorougal (West), the North is sobiridel and the South (towards the town Cotonou) is Horèhoudo. Second request: they asked me to draw small figures which resemble their houses in the middle of the paper. My interpreter drew rectangular figures but they refuse. We changed the paper and

drew circular houses as they wanted. Third request: they asked to draw two lines the river Ouémé (gorou) they perceived in the opposite side of letougal. Fourth request: they asked to locate the village Dani (shirè Dani) and the rainy season watering place that they called bella. Fifth request: they asked to draw some trees, shrubs and herbs on the paper which represent the pastures for the cattle. The discussion continued and some issues were figured out like conflict zones, secure zones, etc. (see fig. 5.3).

The participatory action research and learning (as discussed above) stimulated joint-learning situations, self-discoveries of their problematic conditions and the identification of their needs, and the strategies for change towards the improvement of their situation.
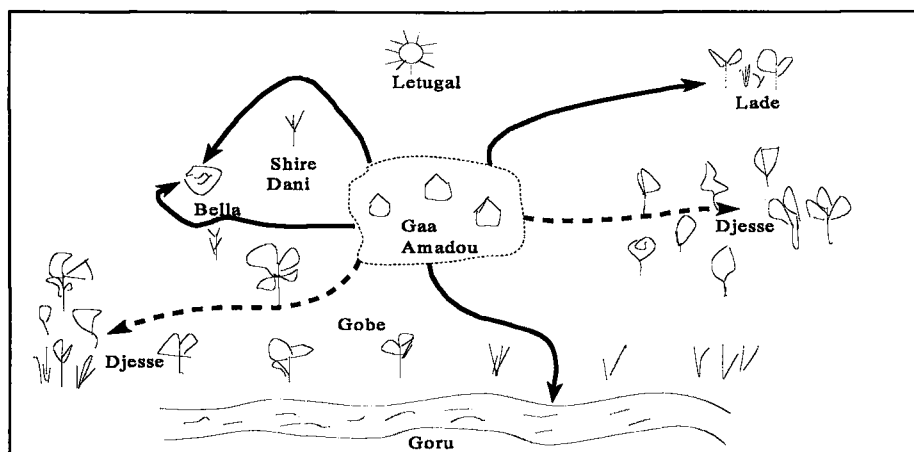
Figure 5.3:   Representation and interpretation of a *terroir pastoral* mapping by Fulbe

Participatory action research and learning stimulates joint-learning for change

The participatory action research and learning helped visualize the representation, organisation and use of the *terroir pastoral* by the herders around Dani and Savè. Specific concepts were used to make sense to the *terroir*, in relation to cattle keeping. For instance, the concept bella, gorou, djessè, ladè, letougal etc., shaped the instrumental worldview of the herders (see Box 5.5).

Box 5.5: Instrumental and utilitarian organization of the 'pastoral terroir' by the herders

bella	rainy season watering place (swampy watering place in Dani)
gorou	dry season watering place (River Ouémé)
ladè	grazing areas where conflicts did not exist
djèssè	conflict prone grazing areas (many crop-farms)
shirè	village
letougal	the side where the sun rises

In observing the map which was jointly drawn, the herders discussed learning about it. Reaching watering places were not easy in their area. They have to move carefully around the shiré Dani as shown on the map (see fig.5.3). The directions of the conflict zones are called djèssè. The areas continuously cultivated by farmers did not yield pastures of good quality. A participating Fulani said that:

'during the dry seasons, we find pastures of good quality around gorou. We move temporarily with our flocks in this area because the watering place bella dries up. However, in the rainy seasons, we return to our *gaa* and use bella. Living near gorou with the cattle during the rainy season is not good because when the hooves of the cattle are in the mud they carry diseases'.

The quality of the pasture is appreciated as they said by the behaviour of the cattle in grazing. The cattle move slowly when the quality is good. When they move very fast in grazing, the quality of the pasture is not good.

The discussions generated also an understanding about the institutional network which constituted their space for the organization of their activities. The information enabled the drawing of a Venn diagram to make visible the network of a *gaa* in the local setting (see fig. 5.4). The Béléédi (Agani) was important for the settlement in the territory of Savè. The authorities of the villages (Laamou, Djohounro) were important because they interacted with them for many problems (conflicts, water, corridor space). The mosque was the place where they met every Friday in Savè and they exchanged information. The cattle market enabled many interactions with the brokers (Tiorkoudjo) and the butchers (Paor). The only actor which was known at the CARDER representation at Savè, was the veterinary (Toufforonnaï).
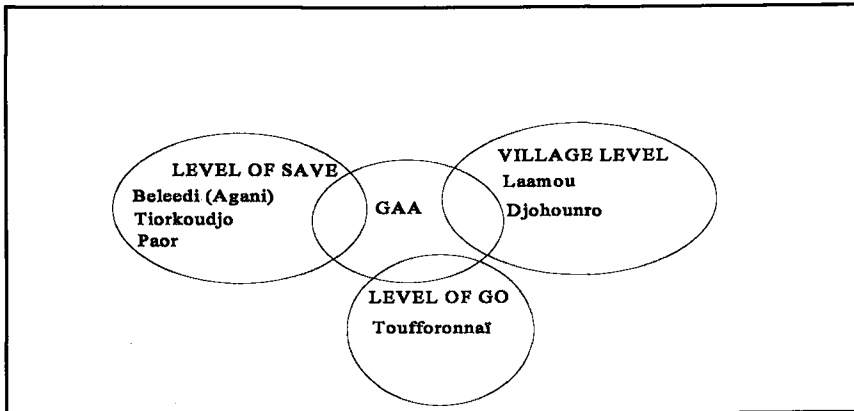
Figure 5.4: A social network of a *gaa* in the area of Savè

The needs of the participating herders

The discussion among the stakeholders raised two basic ideas about their needs: the desire to live in secure conditions and to have a school for their children.

Secure conditions concerned herding activities. According to them, the government should create watering places for herders in the same way as the villagers benefit from the construction of pumps for drinking water. The participating herders found some areas in the territory of Savè which should be very good for their herding activities (ladè, see fig. 5.3). They would prefer to settle there and avoid conflicts with the farmers. Unfortunately, a constraint was the absence of a watering place. A trade-off could also be the difficulty for their wives to sell milk to the villagers.

Despite the fact that a primary school is near the herders in Dani, they identified schooling of their children as a need. One should try to understand the reason the herders have to perceive a different school for their children. They do not stay for a long time at the same place because of the absence of secure conditions. The importance of having a grazing area that should be recognised by the authorities and would not interfere with the cultivation areas, was crucial. The herders found that the government should protect them against the villagers. To emphasize the importance of schooling, a participant to the discussion said: *'if we had been to school, you would not have come with an interpreter to discuss with us'*.

Participatory action research and learning generates ideas and strategies for change

Participatory action research and learning generate indicators and repertoires of herder knowledge and strategies that can help the professionals to appreciate the quality of the pastures, the anticipation on the health of the cattle and the monitoring of herding activities. Participatory action research and learning with the herders helped learn about their assessment of the vegetation in the physical environment around them and led to the identification of ladè which should be a good grazing area.

The herders revealed an attitude of communicative behaviour, they perceived the negotiation with the land owners and the villagers as the best way to go about their activities and to overcome barriers in rangeland resource management (water, pastures, security and peace).

Concluding remarks

This present case study shows that many problems like crop-damage by the cattle, the absence of corridor spaces and a difficult access to watering places affect the herders. Serious problems occurred like the conflicts between herders and crop-farmers. Many local initiatives emerged among the stakeholders for resolving the problem above. However, the fact that they lack a desired decision-making capacity (e.g., reorganization of the area used by the villagers and the herders) did not generate effective platform(s) at inter-villages level to overcome barriers in

the rangeland resource management. Maybe, the absence of an external intervention prevented pooling local initiatives.

The rangeland case in the Save area generated a new idea for an additional rangeland case. The study of the situation in Kemon enabled an exploration of the effect of external support of sustainable rangeland development within the *Chabe* community.

5.4   External support for developing a platform for collective rangeland resource management in Kemon

The stakeholders in rangeland resource management in Kemon

The villagers and their local organization in Kemon

Kemon is a *Chabe* village which still has a strong local organization dealing with the socioeconomic and political dimension of social life. The *balè* is the local authority, the spiritual Chief of the land, and the mediator of many disputes. The Imam, the authority of Moslems, is also an influential authority. Many farmers in Kemon are hunters and the *balodè* is their Chairman.

Being a hunter in a *Chabe* community has a cultural meaning. The hunters are perceived by the other villagers as courageous, they have occult powers that enable then to talk with 'bush spirits' (similar issue in other context is found in Almquist, 1991). The function of the *balodè* has a spiritual and mystical dimension. The organization of the hunters (see Box 5.6) is strategically important within the local institutions of the *Chabe* people. Traditionally the role assigned to the hunters was to protect the village against aggression, or attacks by other ethnic groups (tribal wars). A second function was the protection of the environment ('bush') to avoid or exclude other people from outside the village, practising hunting activities, cutting trees, or using the territory for cultivation, etc. Recently the involvement of the herders in the control of the transhumance is growing in the *Chabe* community (e.g., see Onibon & Okou, 1995).

Box 5.6: The composition of the organisation of the hunters is the following:

Balodè:	Chairman of the hunters
Atchikpa:	Vice-chairman responsible for the execution of actions
Achadjou:	Responsible for information exchange
Ahimondè:	Second responsible for information exchange
Monye:	Commissioner
Abeda:	Execution of spiritual sacrifices

The herders in the territory of Kemon

The native *Chabe* considered two groups of herders: the old times herders and the migrant herders called *buzu*. These two groups are using the territory of Kemon.

The first group consists of sedentary herders living in Kemon since several decades. Detailed studies (e.g., Biokou, 1989) provide some indicators for recognizing them. For instance, they speak the language of the native and live in mud houses covered by iron sheets. Some of them (for example the case of Bouba in Box 5.1) send their children to school.

The second group of herders is heterogenous. Detailed studies (see Onibon, 1990) distinguish four groups: the Bororo (from the Northern part of Nigeria), the Houassadji (from the same area), the Abakou (from Ilorin in Nigeria), and the Bargoudjè (from the Northern part of Benin). Among the *buzu* in the territory of Kemon recent settlers and trans-migrants can be distinguished. The recent settlers have their houses in straw and wood only. This gave the impression that they should not stay for a long period. Trans-migrants do not settle in Kemon, they stay only for 2 or three days and continue the transhumance. They arrive in Kemon only during the dry season. Many *buzu* arrived in the territory of Kemon and other surrounding villages, conflicts emerged with the villagers, and sometimes these develop into wars.

Conflicts and wars between villagers and herders: the problematic situation in Kemon area

The conflicts and wars between the villagers and the herders became a serious problem after the droughts of the 1980s. For instance, from 1983 to 1990 many people died (28 herders and 10 farmers) in the conflicts and wars that confronted the villagers and the *buzu* in the territory of the *Chabe* people. The following story refers to a conflict in Kemon.

The conflict started in 1994 in a village called Kilibo, 5 kilometres from Kemon. Four hunters in this village were perceived by the villagers in Kemon to be causing the conflict. During a hunting day which was not fruitful, they shot a cow that had lost the flock. They grilled it, hid their loot in the bush and returned to their village to look for a vehicle to transport the carcass. Just then, the Fulbe noticed that one of their cattle was missing and started looking for it. They found meat which was grilled and pursuing the search for the cow, they found its horn and hooves. These indicators convinced them that the cow they were looking for was killed by someone. They became furious, took their guns, hid themselves in the bush and were waiting the people who had caused this problem. When the hunters arrived with their vehicle to take their loot, the herders started shooting. They killed two hunters and the others run away. They returned to Kilibo and alerted the villagers that the Fulbe killed two of them. Rapidly, many hunters in Kilibo were mobilized. They took their guns and went to the bush to fight the herders. The problem became common to the *Chabe* people and all the villages surrounding Kilibo (including Kemon) were involved. A war against the herders

followed. The villagers killed systematically all the herders they found. In turn, the Fulbe also were hidden in the bush with their guns and killed systematically all the villagers, especially those who were from Kilibo. Six villagers and fourteen herders died.

The region became insecure for a certain period. In these difficult circumstances, the native *Chabe* in many villages surrounding Kilibo decided to keep out all the *buzu* from their territory. However, the villagers in Kemon did not behave accordingly as will be analysed below. Meanwhile, problem was addressed at the policy level through a military intervention of the government. Still, could the problem be solved in this way?

The problems misunderstood by the government

The government immediately provided a military intervention to halt the war between the *buzu* and the villagers. The former were perceived as mainly responsible for the problems. From the political point of view, they did not have a voice to explain the problems they were facing. Any governmental actions could only be influenced by the native *Chabe* (this also has implication for election in the context of the democratization process in Benin).

As a result, the government adopted the policy of preventing the penetration of the transhumant *buzu* into the territory of Benin, especially into conflict zones such as Zou province where crises like the one described occurred very often. The *gendarmerie* and the army were mobilized to send back the transhumant herders to their country (Nigeria, Niger).This policy is consistent with the assumption that all *buzu* arrive from other countries such as Nigeria, Niger, Burkina Faso, etc., so that they can be denied use of the territory of Benin because they cause serious conflicts.

In practice, the implementation of the government policy was difficult because the herders did not have identification cards and making a difference between Beninese herders and those who came from Niger or Nigeria was not evident. The government also did not have sufficient means to maintain the military presence as the basis of the policy. Still, conflicts between herders and the villagers were increasing in Zou Province (Onibon & Okou, 1995). The problems were misunderstood by the government. Initiatives that seek a negotiated agreement for the organization of the transhumance should be encouraged. However, a constraint is that the herders do not form a socio-political group that with a political influence. In the local setting, joint learning between villagers and herders could be difficult because the latter are looked at as 'low class' people.

Parallelling the government action, the villagers in Kemon adopted a different way of dealing with the transhumance problem in the *Chabe* community.

Social learning: the villagers' way of dealing with the problems

The actions of the local organization in Kemon during the conflicts and wars in 1994

Misunderstandings between the herders and the villagers were perceived as the root of the conflicts and wars according to the villagers in Kemon. A hunter in this village asked: why did the hunters in the village Kilibo kill the cattle of the herders? Why did the herders shoot the hunters? They should have complained and talked about the resolution of the problem instead.

The local organization of the hunters in Kemon knew the relevance of opening a debate with the herders. The *balodè* advised the villagers who felt provoked by herders' actions on their farms, should not react and return to the village to declare. Then the problem should be solved at the level of the organization of the hunters chaired by the *balodè*. Each year some sacrifices are organized for the bush with respect to the use of the environment (hunting, bush clearing for farming, grazing of the pastures, etc.). The *balè* and the *balodè* organize the ceremony. A goat, chicken, cheese or kolanuts are used. Also, the objective of the sacrifices is to call for the assistance of bush spirits to keep away eventual incidents such as conflicts and war which lead to injury or death among farmers or herders. The hunters contribute (money, in kind) for the annual ceremony.

The villagers in Kemon did not participate in the war in 1994. Rather, during this period they protected a group of 15 herders with their relatives from being caught by the *gendarmerie* sent by the government. The neighbouring villages (e.g., Kilibo) did not appreciate this action. Why did Kemon people accept herders who were killing the *Chabe* people? The local organization of Kemon did not change their position vis-a-vis the problem and chose to develop its own way of approaching the problem.

The local way of approaching the problem: If you need peace, you will not touch Yankpekpe

Yankpepke (*Tragia senegalensis*) was used by the *balodè* of Kemon as a powerful metaphor to explain the conditions for establishing a good relationship between the herders and the villagers. *Yankpepke* or say, a local plant has the following property: when mature fruits of this plant touch the human body, it itches for a long period.

In this context the metaphor *Yankpekpe* suggested that, if the herders want peace while staying in the territory of Kemon they should not create problems (not touch Yankpekpe). The *buzu* who wanted to settle in Kemon should take care of their cattle so as to avoid crop damage in the farms. The local organization of the hunters in Kemon decided to show the boundaries of the village[6] and the areas where their cattle could graze to avoid conflicts with the farmers. However, the local organization explained to the herders that they would not be responsible for any problems they caused beyond the territory of Kemon.

Why were the villagers of Kemon motivated to make peace with the herders?

The villagers of Kemon had some reasons for developing good relationships with the *buzu*. They needed to buy meat, milk and cheese from the herders. The butchers bought the cattle from the herders for the market. In Kemon, many native *Chabe* were involved in the cattle trade and made profit from it. A hunter explained that finding wild animals was difficult nowadays and herders were consequently more important. Also, burning the bush to kill a wild animal was dangerous because the 'plantation' or someone's farm could be destroyed.

The *buzu* contributed to the development of a local market. Their wives bought clothes, kitchen utensils and agricultural products. The transhumance had a positive socioeconomic impact on the development of the local economy during this period. Therefore the village welcomes the transhumants. The presence of the *buzu* also created the new jobs among unemployed young people in Kemon. These jobs were the 'moto-taxi' called *Zemidjan*. They took the *buzu* from their hamlet to the village and vice-versa.

The fact that the herders, especially the *buzu*, contributed to the development of the local economy in Kemon can be perceived as an important incentive for the villagers to establish a good relationship with them.

Can the local platform in Kemon be sustained?

From the analysis above, the stakeholders in Kemon could learn their way to overcoming barriers to rangeland resource management. However, their initiatives were not yet recognised and supported by the political authorities. This problem may carry the risk that the local solution could not be sustained, especially since their perspective deviated and even contradicted the government's actions. A case in which external support for a local solution was established may clarify this critical issue.

External supports for the local process: the implementation of *Appui-Conseil*

The objectives of the Appui-Conseil intervention

The basis for the initiatives and the actions foreseen in the framework of *Appui-Conseil* was based on the participatory processes and the support of the stakeholders to help them sustain the actions in which they already are engaged. The principal objective of the *Appui-Conseil* was to provide a methodological guide (see Box 5.7) for implementing various actions with villagers to improve rangeland resource management in the village Kemon and its territory. Concrete objectives of the *Appui-Conseil* are:

• to establish a better social relationship between the Fulbe and the farmers;
• to effectively manage land and associated resources (vegetation and water specifically);
• to promote the social and economic development of the villagers and the herders.

Box 5.7: The different steps in the Appui-Conseil

The approach of the *Appui-Conseil* is based on eight steps (cf. Hounkpodoté & Bediyé, 1995):

(1)   Information-communication: Explanation of the approach to the political authorities (the Sous-préfet of Ouèssè, the Maires of the Communes and the Chefs de Village), the CARDER organization and the local people.

(2)   Organisation of village fora: the first one is a preparatory forum with key stakeholders and the second forum involve many decision-making issues

(3)   Joint identification of actions to be supported financially

(4)   Delimitation of corridor space and grazing areas.

(5)   Study the carrying capacity of the grazing areas identified.

(6)   Training and education of the stakeholders: first, training of some stakeholders to be capable to analyse maps and aerial photographs; second, training of some stakeholders to appreciate the carrying capacity of an area.

(7)   Implementation of actions

(8)   Participatory monitoring and evaluation (*Suivi-evaluation participatif*).

Negotiation of the intervention based on the Appui-Conseil

The *Appui-Conseil* clashed with the government strategy which was based on a military intervention and the decision to send back the migrant herders to their countries. The difficulty of the government to continue with this action raised the need to find an alternative solution: the political decision in 1992 (*the Arrêté interministériel n°010/MISAT/MDR/D-CAB*) concerning the creation of the *transhumance* committees (*Comités de Transhumance*). Their role was to prepare the transhumance based on a concerted action between villagers and herders. The members of the committee, at the level of the *Sous-préfecture* of Ouesse, were: a representative of the herders, a representative of the crop farmers, the veterinary, the district officer for rural development (RDR = *Responsable de Développement Rural*), the Maire of the Communes in Ouesse, and the Sous-préfet. Still, in practice, the effectiveness of these committees was problematic and the government was relying on military intervention.

Despite the failure of existing formal frameworks for resolving conflicts between the herders and villagers, the *Appui-Conseil* was not accepted after the explanation of its content to the administrative authorities. The *Sous-préfet* stated clearly that he has received an official instruction from the *Préfet* of the Zou province and the Minister of interior to send back the *buzu* from the region. The commander of the *gendarmerie* of Ouesse had also the same impression and explained that there is already a committee at the level of the *Sous-prefecture*. The professional in charge of the *Appui-Conseil* then addressed to a higher administrative level to negotiate the plan. He discussed the problem with the director of Livestock Production in Benin (*Direction de l'Elevage*) in other to obtain his support. His main advice was that some technical arguments could be used to convince the political authorities. These were the following:

•   the optimum carrying of the region was not reached (Oloulotan & Onibon, 1990);

•   it was commonly agreed that the resolution of the *transhumance* problem should be effective with the involvement of the local people in the process;

- the people themselves should invest in regenerating the vegetation and the pastures, as a way to avoid degradation.

The continuation of the discussion with political and administrative authorities by using the technical arguments enabled to change their opinion about the government policy. Finally the commander of the *gendarmerie* recognized that, in reality, they found it difficult to solve the conflicts between the *buzu* and the farmers on the basis of military action. They were not well equipped and their number was not sufficient to control the whole area.

Also at the level of Kemon, some problems were visible. The local organization of the herders did not want the local political representatives (Maire and *Chef de Village*) to be involved in their organization if the *Appui-Conseil* were to support them. They believed that those officials were not able to find the solution to the problem of transhumance (corruption, ineffective procedures, etc.). The professionals of the PGRN team had no choice but to start with the local organization of the herders which was already strongly engaged in the issue of rangeland resource management (see Box 5.8)

Box 5.8: The professional of the PGRN explained how the Appui-Conseil was known by the stakeholders at the beginning

The hunters in Kemon were already active in the resolution of the problem of transhumance. We began to appreciate their activities. We said that we wanted to help them to become more effective. It was a good idea that they accepted also the migrant herders to settle in Kemon based on some rules. However, we said the danger was the risk of the degradation of the vegetation in the future. We wanted to think with them about the way to enrich their bush through the tree planting. What was it that supported the willingness of the villagers to collaborate in the implementation of the *Appui-Conseil*? The herders said that they wanted peace in the village.

New roles for the professionals: mediation and negotiation

Accordingly with the methodology of the *Appui-Conseil*, the organisation of village fora was carried out as planned. The facilitation of the fora revealed two roles for external intervention: mediation and negotiation. Fora discussions were used by the PGRN team to explain the problem of *transhumance* and identify some solutions: improving the local organization of the hunters, tax for tree planting in other to avoid the degradation of the vegetation. The most critical issue for the implementation of the *Appui-Conseil* was the creation of the new local organization for rangeland issues. The organization of the hunters took the initiative with the PGRN team and they did not perceive the need to involve the herders. Many ideas were generated without the herders:

- the constitution of the BLT (*Brigade Locale de Transhumance* = Local Brigade for Transhumance);
- the constitution of the CGT (*Comité de Gestion de la Transhumance* = Committee for managing the Transhumance);
- establishing a residence permit for migrant Fulbe who want to settle;

- the proposition of taxes which should be paid by the herders who use the territory of Kemon: 75 FCFA/animal for trans-migrant Fulbe who stay in the village terroir for few days, 50 FCFA/month/animal for recent settlers Fulbe, and 25 F CFA/month/animal for (dry) season settlers' Fulbe in the terroir of Kemon. This money will be used for the regeneration of the vegetation (planting trees, pastures, and shrubs).

Following the advice of the PGRN team, the participants at the forum agreed that it was necessary to negotiate these rates with the Fulbe. A few days later, another meeting was organised with the Fulbe. The objective was to inform the latter about the decision made during the village assembly. At this meeting, the farmers and the villagers could not agree on the taxes proposed by the village assembly. It is not a habit for the Fulbe to pay taxes for using pastures around villages. The Fulbe requested that the question of tax should be discussed with many of their representatives, the *Chef Peulh* and especially the leader of the *buzu* in the *Sous-préfecture* of Ouèssè. Two weeks after, the PGRN team successfully enabled the participation of all the Fulbe in a discussion forum. Two important decisions were made: (a) the integration of recent settlers Fulbe in committees for the control of *transhumance*, and (b) the harmonization of the tax rates to provide the maintenance of grazing areas in Kemon. The rate became 150 FCFA/year/animal for all the categories of Fulbe. After this compromise, the PGRN team needed to support the stakeholders to maintain the institutions which were generated, to exclude outsiders (e.g., new comers who should not follow existing rules) and to deal with free-riders in the village territory.

Learning with the stakeholders about alternative solutions to maintain negotiated agreements
The idea of '*responsabilisation*', the transfer of certain competencies, was used for sustaining negotiated agreements among the villagers in Kemon and the different categories of Fulbe. The tasks which were perceived to be the responsibility of the organization of the stakeholders under the *Appui-Conseil* framework were:

- Collaborating with the PGRN people of Ouesse for the registration of parcels in the terroir of Kemon;
- participation in the delimitation of grazing areas;
- maintain the '*registre foncier*' (a land registration document) of the village;
- taking regulatory measures in relation to the carrying capacity of the grazing areas;
- organizing regenerative action (planting trees and shrubs) in the grazing areas through a rotation system;
- controlling the exploitation of the grazing areas;
- collecting taxes from the *buzu* who are using the grazing areas;
- managing the funds that result from tax collection;
- establishing resident permits to the migrant Fulbe who want to stay in the terroir of Kemon;

- resolving conflicts between Fulbe and farmers.

These roles were jointly perceived by the stakeholders and the PGRN. They were transferred through training and non-formal education of local people. Regularly, programmes which featured rangeland issues were broadcast over the *Radio Rurale* in Ouesse. An example of training is the analysis of maps and aerial photograph by the members of the *Brigade Locale de Transhumance* (a transhumance look out post). The objective is to help stakeholders themselves to appreciate the extent to which the vegetation is degraded. Training programmes for the stakeholders involved helping them to manage funds that result from the collection of taxes, and to keep documents of land registration. Another approach to maintaining negotiated agreements was the encouragement of a common project between the villagers in Kemon and the Fulbe in order to enable the integration of their economies. A concrete example was the idea to build a dam. Villagers of Kemon and the Fulbe started a subscription to realize this common project in the hope that it may motivate the PGRN project to provide part of the investment. Some villagers in Kemon believe that the dam is only for cattle, but others said: I do not think so, we can have a garden on one side and the Fulbe can go to the other side to water their cattle.

Support institutions and the policy context

The activities of the PGRN team in the framework of the *Appui-Conseil* were carried out in a context characterized by the absence of mechanisms to decentralize power to local people (e.g., decision-making capacity, statutory power). Such decentralization could help sustain several initiatives at the grass-roots level and create a framework for a dynamic and diversified interaction with professionals. For example, the *balodè* of Kemon complained that they were organizing several meetings to resolve their problematic situation with the Fulbe but that they were not recognized by the political and administrative authorities. An alternative found by the PGRN team to sustain the negotiated agreements was to transform the local organization of hunters in Kemon and the *Brigades Locales de Transhumance* into an NGO by helping the stakeholders to obtain official permission from the Ministry of Interior.

The COGEF (*Comité de Gestion du Foncier pastoral* = Committee for the management of Pastoral Tenure) was created. At the main crossroads of Kemon, everybody can see the sign that enables one to reach the headquarters and office of the COGEF. The office is open every Wednesdays and a secretary of this day arrives for current affairs. The project people helped the COGEF to pay the cost of a secretary until the moment that the organization should be stronger financially. On the last Wednesday of every month, the steering committee of the COGEF organizes a meeting to treat current affairs at its headquarters. The project invested in the material needed for the activities of the COGEF and the functioning of the secretary: table, chairs, equipped office for the secretary, didactics tools for presentation, etc.

Concluding remarks: what are the effects of the external support?

Unlike the Save case, the rangeland development in Kemon shows that the facilitation of existing initiatives, especially through the *Appui-Conseil* framework, enabled the generation of institutions and an organization capable of enhancing a sustainable future in the local setting. The facilitation involved the *'responsabilisation'* of the stakeholders for performing certain roles, negotiation, mediation and conflict resolution to achieve negotiated agreement.

However, in the absence of an effective decentralization of power to the stakeholders, this did not yet provide an enabling policy framework for generating collective agency in the local setting. This problem presents some risks of failure in sustaining the institutions and organizations which were jointly generated by the stakeholders in Kemon and the PGRN intervention.

5.5   A comparative analysis and conclusions

Both situations studied in the *Chabe* community revealed that rangeland resource management problems are not only a question of 'carrying capacity', as it is often claimed. Some barriers such as lack of concerted action between the Fulbe and villagers, serious conflicts and wars, an absence of organizations and institutions for rangeland resource management, etc., are more critical. These issues affected the failure of rangeland resource management.

In Kemon, the development of collective decision making capacity enabled successful collective action to overcome barriers in rangeland resource management. Local stakeholders realized their mutual interdependence and developed a negotiated agreement and concerted action. Platform development was successful with external support and created the condition for decision making, monitoring, sanctions and exclusions. This joint learning generated social capital for long-enduring action if the political context provides enabling environment.

In Savè the stakeholders engaged in collective learning lacked decision-making capacity. Different interest groups did not realize their mutual interdependence as in Kemon. They did not meet and negotiate agreement or take concerted action. Many failures can be explained at this level.

Barriers to sustainably managing rangeland resources can be overcome if the different stakeholders adopt collective action, develop platforms for decision-making monitoring, sanctions and exclusions, at the level of many *gaa*, villages and regions.

Notes

1. The *balè* gave the 'usufruct' to the heads of lineages who entrusted the redistribution to other members of 'families' (different groups and sub-groups of the lineage). The individualisation of land in *Chabe* community started with the plantation of cashew trees.

2. Save is a city and this name is given also to the Sous-prefecture (district).

3. Now the trend in Savè is to sell land to migrant farmers. The decision was made by the APROSA (*Association pour la Promotion de Savè*), a political organization.

4. Herders are also called Fulbe. The singular is Fulani.

5. In Dani, the villagers created a committee for managing their pump which provides drinking water. The role of this committee was to ensure the maintenance of this pump (collect contributions for its repair).

6. Kemon is a particular villages in Benin in the sense that the villagers could easily identify the boundary, although it is a complex issue even there.

6 Scaling Up Watershed Development with Indigenous People in Two Eco-Zones of Benin

6.1 Introduction

A watershed is an area drained by a single watercourse system (White & Runge, 1994). Watersheds involve multiple and interconnected natural resources such as soil, water, vegetation (forests). Watershed development has become a worldwide agricultural development problem especially in developing countries (e.g., Doolette et al, 1990; Ninan, 1998). Many watershed development initiatives aim at improving the productivity and production potentials of the ecologically fragile and disadvantaged farming areas through the 'adoption' of soil and water conservation techniques. However, lessons from Machakos District in Kenya (cf. Tiffen & Mortimore, 1992), position the watershed development issue at the level of community mobilization.

This chapter[1] explores the conditions and the extent to which a deliberate intervention can be successful for watershed development with local people. It focuses on existing an intervention, the PGRN (*Projet de Gestion des Ressources Naturelles*) project in Benin. The PGRN is formally part of the DFRN (*Direction des Forêts et Ressources Naturelles = Directorate of Forests and Natural Resources*), the department of forest and natural resources of the Ministry of Rural Development, but has a high level of autonomy for the implementation of the project. The PGRN obtained financial support from the World Bank, the *Caisse Française de Développement* (French development fund) and the German International Development Organization, the GTZ. The project started in 1992. Hence, the project offers an opportunity to analyse various efforts toward watershed development in two sites (Mono and Zou). The donor of the Mono site was the World Bank. The professionals for the watershed development team were recruited by the staff at the headquarters of the PGRN in Cotonou. The team functioned under the control of coordinators at the headquarters. The *Caisse Française de Développement* was the donor of the Zou activities and under its influence, PGRN signed a contract with a Beninese NGO (GERAM) as a result of which GERAM (*Group d'Expertise et d'Ingenierie Rurales pour l'Auto-promotion du Monde paysan*) became the main executor of the watershed development project in Ouèssè (Zou).

Many sources of information and data were available for this case study. In the Adja region, key literatures from a multidisciplinary research programme were available (see introduction, §1.1). Many documents of the PGRN project (e.g., Djohossou, 1993; Karemangingo & Agbo, 1990), the reports on the follow-up of activities (Adjinacou *et al*, 1995, AFVP/GERAM, 1994ab) , and consultancy and advisory reports, were used as an additional sources of information. Several research methods and techniques were used for the present study. Individual (and group) interviews were used to collect data from the stakeholders and other actors, the professionals of the PGRN and the CARDER. Key

informants for interviews were selected using snow-ball techniques. Many activities of the PGRN project with respect to the watershed development were carried out during the research period and participant observation was used.

As explained above, the watershed concept is complex. The following section starts with conceptual issues from the perspective of the PGRN project, the areas of watershed development which were selected for the present study, and the regenerative practices which the project intended to use (§6.2). The main stakeholders (Adja and Mahi people) in the project areas, and their cultivation styles were analysed. This contextual analysis reveals that watershed development can be effective if individual efforts are scaled up (§6.4). Scaling up (perceived later in terms of collective action and platform development) became the critical issue for watershed development. From that point of view, two different situations (Adja and Mahi) are analysed (§6.4 and §6.5) and compared in order to draw conclusions (§6.6).

6.2   The watershed concept and issues from the perspective of the PGRN project

The watershed concept

Assuming the figure 6.1 below as a village land use area, the hydrographic units create many drainage sites for rainfall water. Such sites are indicated by arrows on figure 6.1, showing water movement from uplands to low-lands or the seasonal or the main rivers. There is a physical linkage between upland and lowlands. The water flows across the soil surface from upper catchment to lower channels. The ability of soil to permit rainfall infiltration and retain moisture tends to be associated with its ability to withstand detachment and transport. Hence, the watershed is thus a functional unit established by physical relationships where upstream areas can incite a chain of environmental impacts affecting downstream areas (White & Runge, 1994).

In the PGRN project, the term *bassin versant* is used for land areas in watersheds. A *bassin versant* involves a land area which drains rainfall water into the same river or low-land. As will be described later, the *bassin versant* is defined by referring to a river. It involves upstream, midstream, and downstream, land. A *bassin versant* can be decomposed in many micro *bassins versants* like a watershed can be decomposed in micro watersheds. The relationship soil-water-vegetation or forests involves in the *bassin versant* insures many ecological functions. For instance, the vegetation enables the conservation of soil moisture and the regulation of the hydrological cycles. *Bassins versants* are sensitive to soil erosion when the land in watersheds are not covered. In many circumstances, the degradation of land in the watersheds constitutes one of the major causes of a loss of agricultural productivity.
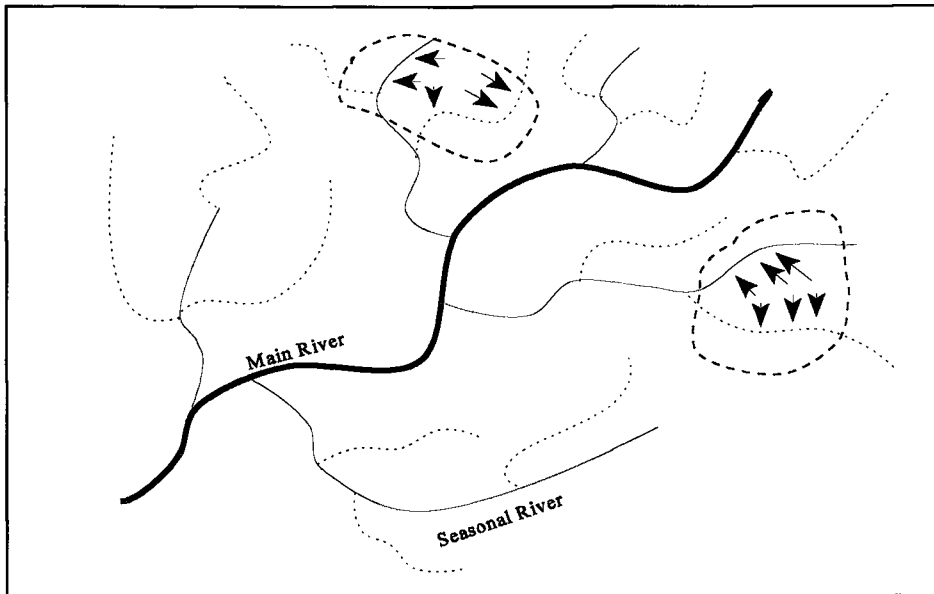
Figure 6.1:   Schematic representation of an example of hydrographic units to explain
the watershed concept according to the PGRN project

The watershed area for the PGRN intervention in Mono

The locations of the PGRN intervention for watershed development in Mono Province are in
the Sous-préfectures of Aplahoué and Klouékanmê. The watershed areas are defined in relation
to the rivers Lomon (Aplahoué) and Lanhoun (Klouékanmè). Several seasonal rivers
(tributaries of Lomon and Lanhoun) and lowlands define many micro-watersheds. The
boundaries of the watersheds are set up by the PGRN and the donors (the World Bank) in
order to estimate costs of the operations for improvement.

The *terre de barre*, red soils, dominate in the watersheds on upstream and sloping
grounds. According to the FAO soil classification (FAO/UNESCO/ISRIC, 1988 in Brouwers,
1993: 52), *terre de barre* consists mainly of nitisols (sandy to sandy-loam sols). The
downstream areas of many micro-watersheds are lowlands with heavy hydromorphic clayed
soils inundated during the rainy season. These soils are classified as vertisols with especially
montmorillonite and illite. Farmers regularly cultivate the *terre de barre* and the vertisols. The
Adja people in the Mono region distinguish *kpedji*, the upstream of watersheds and, *komê* (*ko*
= clay), the downstream of watersheds, areas are heavy clay soils. Inundated areas and
sloping ground are called respectively *shihouan* and *tohouin* (a water course).
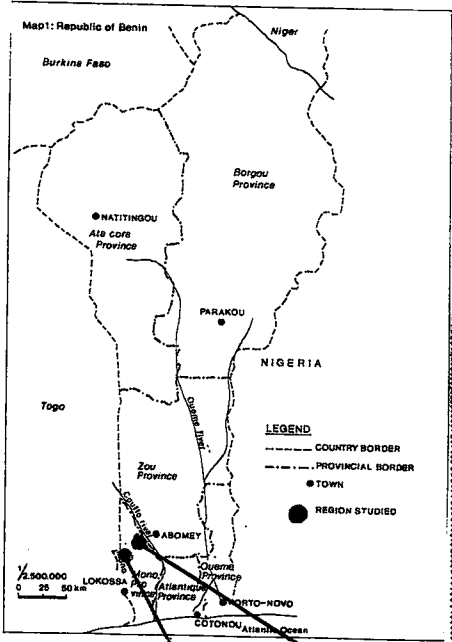
Map 6.1 Watershed area in Adja region in the
Sous-préfecture of Aplahoué and Klouekanmè
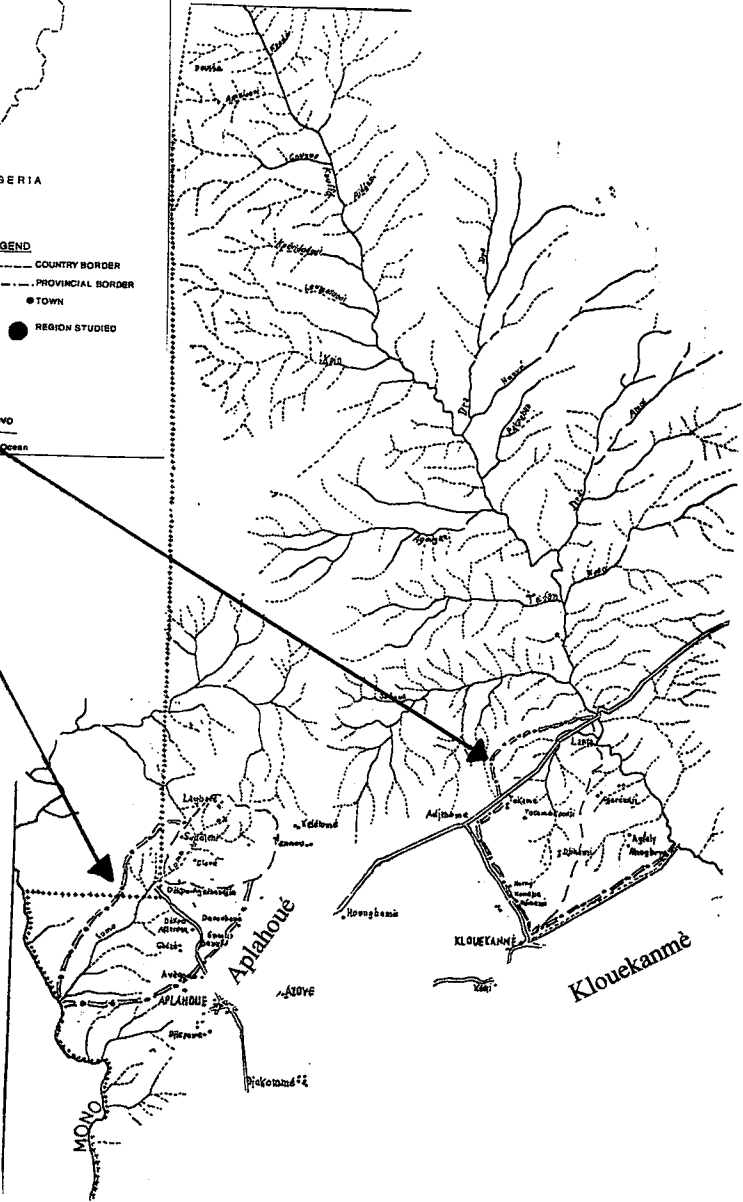
The climate of this region is sub-equatorial with two dry seasons and two rainy seasons. Rainfall is spatially and temporary highly varied. There is a long rainy season from March to July, followed by a relatively dry period in August, and a short rainy season of about two and half months starting in September. The dominant vegetation in Aplahoué and Klouékanmè is the oilpalm (*Elaeis guineensis*) which is planted by Adja farmers. In Klouékanmè, relic forests are found on the top of hills in the area.

The watershed area for the PGRN intervention in Zou

The location of the intervention Zou Province, is in the Sous-préfectures of Ouèssè. The watershed areas are defined in relation with the River Beffa (*Bassins versants de la Beffa*). Several seasonal rivers (*liga, toumi, awo, triilii, hinhloua* and *monnon*) and low-lands present many micro-watersheds. The boundaries of the watersheds are set up by the PGRN and the donors (the World Bank, *Caisse Française de Développement*) in order to estimate costs of the operations for improvements (cf. Karemangingo & Agbo, 1990; A. Onibon, 1993).

The ferruginous soils, hit by severe erosion, are dominant in the region of Ouèssè. These soils are degraded. Hydromorphic soils are found in the low-lands of watersheds or on the bank of seasonal or temporary rivers. They present a high level of fertility. Upstream areas in watersheds are called *kpodji* while *todo* are the downstream areas. Sloping ground between upstream and downstream is called *todohoiun*, the direction of watercourse. Mahi people in Ouèssè have their own classification systems. Micro-watersheds areas have specific names: *saagodji*.

The climate in the region is between the *soudanien* and subtropical types, but closer to the former. Rainfall presents an unimodal regime, a rainy season from April to October, and a dry season from November to March. Ouèssè is a savanna region. At certain areas, this savanna is woody with the presence of specific tree species such as *Adansonia digitata*, *Khaya senegalensis*, *Parkia biglobasa*, *Vitellaria paradoxa*, etc. Degraded gallery forests (called *tozoun* by Mahi people) border many seasonal rivers.

Farms, village location, lowlands, permanent and seasonal rivers, and gallery forests along rivers, are all found within the boundaries of the *bassins versants* selected in Ouèssè for the watershed development.
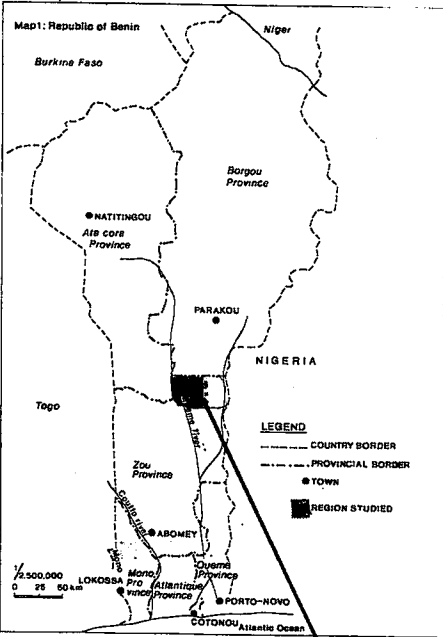
Map 6.2: Watershed area in Mahi region at the
Western part of the *Sous-préfecture* of Ouèssè
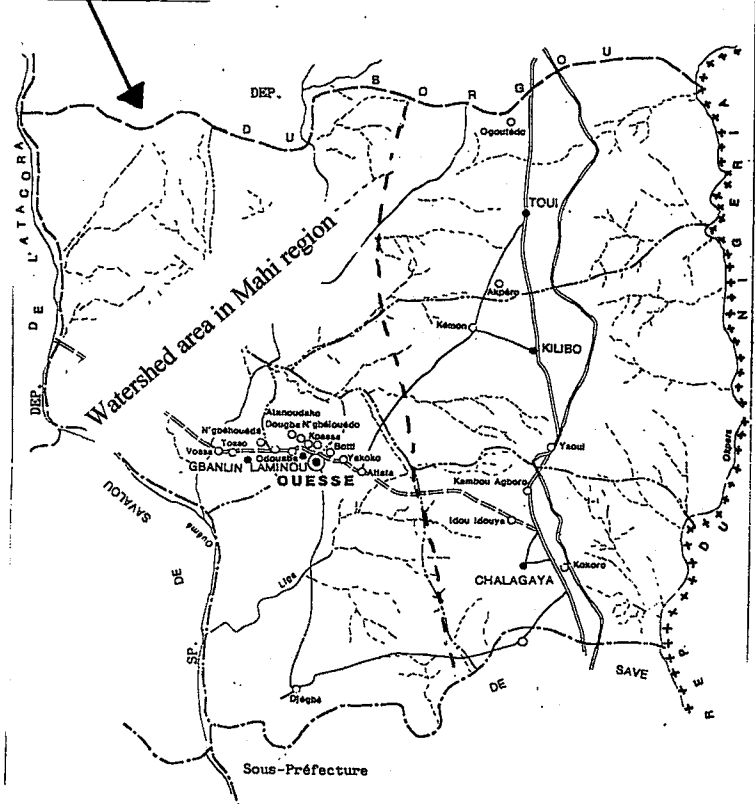
Watershed development from the perspective of the PGRN project: the *Aménagement des Bassins Versants*

The intervention objective of the PGRN is to support village communities sustainably manage watershed resources and to help them overcome serious erosion problems which cause the degradation of agricultural lands. Therefore, the *Aménagement des Bassins Versants* (ABV) is an approach to watershed development. Its rationale is based on 'voluntarism' and 'partnership' which mean that external support by the project can only start in a village, after the local people have expressed, through a letter or other form of contact, a demand for an *appui* (a kind of advice and assistance). Later, the way this strategy works for the PGRN teams in Mono and Zou will be discussed.

Technological packages were available at the beginning of the project. Contour farming is an innovation for improving the farmlands in the watersheds. This technique, according to the way it was done by the PGRN people, consists of finding the contour lines in the watershed and ploughed the furrows along them. Vetiver grasses were planted on these ridges in the contour lines. The technique was expected to halt runoff and provide a better infiltration of water. Construction of ridges along the contour lines enables the conservation of water for the growth of plants.

Other actions of the PGRN within the ABV involve tree planting and forestation. Mulching, manuring the soil and alley-cropping, experimented by a farming system research project, the RAMR[2] (*Recherches Appliquées en Milieu Réel*) in Mono Province, are integrated into the technological package. Water control techniques such as check dams and silt traps, gully control structures, grassing artificial waterway, and vegetative barriers on contour lines are used by the PGRN for the ABV.

Land surveying activities constitute an important dimension of watershed development. According to the PGRN people and experts for this project, surveying and registering the farm plots was seen as an important step in solving problems of land tenure insecurity as this will be explained below. So a team of surveyors was contracted for mapping all the agricultural plots within the watershed area set up for the ABV.

6.3   The main stakeholders: Adja and Mahi people, their cultivation style in the watersheds

Adja people and their cultivation style in the watershed

History of the Adja people

Historically the Adja people are a homogenous socio-cultural group. They migrated from Tado in Togo (Pazzi, 1979; Mondjanangni, 1977) and created several villages in the Northern part of Mono Province. This region became populated with the Adja before 1800, but several villages were created around the 19th century. Some villages took the name of their 'creator':

for example Soglonouhoué (Soglonou is a name and houé is home). The creation of villages in the Northern part of the Mono province is the outcome of historical processes, involving different primary and secondary migrations and displacements due to ethnic and classic quarrels, scarcity of lands, insecurity etc. (Mondjannagni, 1977). Three basic sub-ethnic groups are distinguished among the Adja people: the houé, the dogbo and the chikpito, but the real traits of distinctions are not well known (Den Ouden, 1990). A central authority for all the Adja people does not exist nowadays.

Cultivation style in watersheds

Adja Farmers, both men and women, have regularly adapted their farming practices to the degradation of their lands (Dangbégnon, 1995). They developed solutions according to their own local possibilities. Growing oilpalm is a form of improved fallowing in the farmers' own farming systems. The oil palm plays a crucial role at the economic, cultural and social level of the farming community (Brouwers, 1993). The farmers in this region practice intensive cultivation: inter-cropping, relay-cropping and indigenous agro-forestry based on oilpalm trees. Rotation of crops with oilpalm, and diversification of varieties, are means of intensification used by the farmers. These practices are integrated into the farming systems: thus leguminous fertilise the soil and cassava improves its structure. In the Adja region, flooding of clay soils (downstream areas in watersheds) is an important problem which presents a high risk for cultivation. Meanwhile, previous studies reveal that careful observation of biological indicators and climatological phenomena by the farmers, enables them to cultivate maize in the heavy clay soils (cf. Dangbégnon, 1990; Dangbégnon & Brouwers, 1990). The cultivation styles of the Adja farmers are 'sophisticated' (Brouwers *et al*, 1997).

Socio-structural transformations

The Adja region is one of the most populated in Benin. The population density is 240 inhabitants/km2. Socio-structural transformations are noticed in the Adja region. The differentiation in terms of the access to land and labour mobilization is becoming more complex (Daane & Perthel, 1988; Den Ouden, 1986, 1989, 1997; Biaou, 1991, Fanou, 1992). For instance, the number of share-croppers is increasing, and possibilities to access innovations differentiate the Adja farmers. Studies which were conducted in three representative villages (Zouzouvou, Touléhoudji and Gbannavè) in this area revealed that more than 60% of the stakeholders were share croppers, land borrowers and tenants (Biaou, 1991). The access to land by those stakeholders is regulated under a local arrangement. The agreements with the landowners are not formalized, and very are often based on a verbal statement, they do not present a secure situation for the land users under such contracts.

Existing socioeconomic organisations are operational at the village level[3]. Vodouhê (1996) identifies the *Kugbè* (an indigenous organization for saving), functional groups for socioeconomic activities, and the *Groupement Villageois* (GV) for agricultural tasks (mostly cotton production). Many *Association de Développement* (AD) created at different levels

(*Commune-Sous-Préfecture* and *Département*) could play this role (cf. Daane & Mongbo, 1991), but they became political entities as explained in the Lake Aheme case.

Mahi people and their cultivation style in the watershed

History of the Mahi people

The Mahi people discussed in the present case studies live in the Sous-préfecture of Ouèssè (Zou Province), which has a total area of 3,200 km2 with a population of 52,000 inhabitants. Mahi people are distributed at the Western part of the Sous-prefecture of Ouèssè.

Historically the Mahi people belong to the socio-cultural era Adja-Tado[4]. The occupation of the region Ouèssè (called also Ouèssè *Ouogoudo*[5]) by the Mahi people was a very complex process. Many small groups migrated into this region. They created different villages which have different histories (see Essouman, 1992; Adjinacou, 1993). Thus the Mahi people are heterogenous in terms of the origin and migration itinerary of each Mahi-village founder in the Western part of Ouèssè. This phenomenon had some implications that from the beginning of their settlement in this region, the Mahi people adopted different individual practices[6] with regard to the exploitation of the natural resources they found in this area (e.g., land clearing and agricultural activities).

Cultivation styles in watersheds

Mahi men and women are both involved in agricultural activities. Mahi farmers practice shifting cultivation. Space occupation follows a Mahi-rule around two basic concepts: *gbého* and *agbovê*. *Gbého* is a recent fallow or a farming area abandoned by Mahi farmers. *Agbovê* is a very old fallow which holds fertile lands. The appropriation of the *agbovê* is based on the respect of *houinnou* which means the 'front of the furrows'. The land occupation pattern of the Mahi farmers follows the direction of *houinnou*. When a Mahi farmer orients his *houinnou* in one direction, he is the owner of all the space ahead his *houinnou* until he meets with an obstacle like a river, a hill etc. The farm plots in the *agbovê* are very far from the village (sometimes 15 km). Mahi farmers construct small houses (*glécohoué*) and live there during the cultivation period. The *glécohoué* changes with the abandonment of a farming area (which is their property). This cultivation style of the Mahi people has the implication that many unoccupied areas can be found in Ouèssè. Ridging before sowing maize, groundnut, cassava, yam, etc. is a common practice for the Mahi farmers who are very hard agricultural workers. Many of them employ migrants (Fon, Adja, Berba ethnic groups) to solve labour problem in their big farms (in average 20 hectares). The migrants arrive from the Northern and the Southern part of Benin. Many of them have settled in Ouéssè and are cultivating land they borrowed from Mahi farmers (cf. Mensanh, 1995).

Socio-structural transformations

The population density in Ouèssè 21 inhabitants/km2 which is very low compared with the Adja region. The Western part of Ouèssè where the Mahi people live is a highly remote area, there is no telephone connection. The two roads connecting this area to the main road which links Benin and Niger are sometimes not accessible during the rainy season. Ouèssè is among the remote *Sous-préfectures* in which *Radio Rurale* was set up for experimentation. Mahi farmers make a lot of money from agricultural activities. Buying cars for taxi, pickups and trucks are the most important investment.

After the shift in the political system in 1990, local Chiefdoms reemerged in Ouèssè. The King of Ouèssè became the local authority of the Mahi people in the *Sous-prefecture* of Ouèssè. The King is always consulted by government professionals and politicians with respect to critical decisions or problems. Within the new context of giving more responsibilities to local people, a development association called *Union pour le Développement Economique, Social et Culturel de Ouèssè* (UDESCO) was created by the Mahi people for political, cultural and socioeconomic functions. The main objective of the association is the development of Western part of Ouéssé.

Critical issues for the watershed development

In Mono with the Adja farmers

Adja people have many solutions for their complex cultivation systems. They do not ridge, although contour farming, the most efficient way for controlling soil erosion in the PGRN technological package, require ridging. Can the Adja farmers change their way of cultivation from minimal tillage to ridging? This question is critical for watershed development in Mono. In view of the discussions above, stakeholder analysis reveals also that the majority of the Adja farmers have access to land under indirect rules. They may be not motivated to invest by using new techniques for watershed development.

In Zou with the Mahi farmers

Mahi farmers have opportunities to clear more land in the *agbovê* for their shifting cultivation practice while watershed development required a radical change. Can they invest in an agricultural parcel for watershed development and abandon their shifting cultivation in the *agbovê*? This question is critical because the expected yield after using new techniques for watershed development is less compared with the yield in the *agbovê*. Mahi farmers do not use fertilizers in the *agbovê*.

Why is scaling up the core issue for watershed development?

Within the boundary set up in the intervention areas in Mono and Zou, there are many villages, and in each village many households are cultivating the watershed areas. Physical properties of watersheds described above have the implication that downstream stakeholders need the cooperation of upstream stakeholders if success for watershed development is to be achieved. Watershed development necessarily involves coordination among individual stakeholders. Scaling up watershed development efforts from individual cultivation parcels to the whole watershed area identified for improvement becomes a core issue. Thus this process requires, on the one hand, successful collective action among individuals, groups of stakeholders or villages in the intervention areas. On the other, it requires a structural process for developing platforms of stakeholders to enable collective decision making at the level of the whole watershed identified for improvement. A concrete example of the importance of such platforms is the need for well-defined rights and duties for land holding patterns, a problem which requires collective decision making, negotiation and conflict resolution at the level of the platform.

6.4   Scaling up watershed development with Adja people

Perceptions of watershed development problems: what does it imply for scaling up process?

The problem according to the PGRN and the donors

The concrete problem identified by the PGRN project in the Adja region was the stagnation of agricultural production, the mounting pressure on land and the decreasing productive capacity of the *agro-sylvo-pastoral* ecosystems within the watersheds. So Adja farmers' cultivation practices were seen as the cause for the degradation of land in the watersheds (severe soil erosion) and the decreasing productive capacity of a*gro-sylvo-pastoral* ecosystems (Djohossou, 1993).

The promotion of soil and water conservation techniques and tree-planting was the most important goal of intervention for the World Bank. This argument is based on the way the PGRN team in the Mono site perceived the results expected by the donor. So the success in carrying out the activities was evaluated in quantitative terms. For instance, the number of linear metres of erosion control techniques (e.g., gullies, contour lines with the vetiver grasses), the surface planted with trees, and the number of farmers who used soil erosion control techniques, were very important. The efficiency of using financial resources for such immediate technical realizations was a criterion for success.

Nevertheless, the problem perceived in this manner inevitably leads to neglect of some important aspects, such as the institutions and the organizations required for sustaining these technical realizations.

The problem according to the CARDER people

As the main government centre for extension and rural development, the problems of watershed development were also important for the CARDER people. The CARDER already introduced *mucuna* (*Mucuna pruriens Var. Utilis*) and alley-cropping based on *Acacia auriculiformis*, for improving the fertility of degraded soils in Mono. These technologies were developed by the RAMR project as explained above. The CARDER people took the position to transfer them to the Adja farmers. Then why could watershed development not be their main concern? They wondered whether the PGRN project would act successfully without involvement of the CARDER's professionals stationed the intervention area.

The problem and perception according to the Adja farmers

Inundations in downstream areas are perceived to cause crop damage. Several notions are used by Adja farmers to explain runoff problems, for instance, *eshi lo gbo* (the water floods the crops in the farm), *eshi djanonta non gnigban* (in literal translation: the water 'cuts' the head of the soil). Then, runoff has two negative effects according to Adja farmers: it destroys the crops and transports the arable farming land away.

Despite such existing notions for characterizing watershed phenomena by the Adja farmers, watershed development problems are not so immediately critical for them. As explained above (see §6.3), they have silently been experiencing many solutions based on their intensive cultivation style.

So what is the nature of watershed development problems and the implications?

The watershed development problem perceived by the government was not shared by the stakeholders at the beginning of the PGRN intervention. Understanding about the problem was different according to the PGRN, the CARDER organization and the stakeholders. The latter did not realize any interdependence with respect to the problems. This situation could stand in the way of any successful collective action and generation of organizations (platforms) and institutions at the level of the watershed area.

These initial conditions for the watershed development had some implication for the intervention strategies of the PGRN team. For instance, scaling up watershed development required that the stakeholders in different villages reach a common appreciation of the problem. Below, the strategies of the PGRN on this issue and the nature of external supports for watershed development are analysed. The extent to which scaling up is being achieved is also discussed.

Making the problem 'visible': the social learning path used by the PGRN team

Learning about participatory strategies adopted by the PGRN team

PGRN people did not focus directly on the intervention objective. Their strategies were based on the assumption that, by starting with the stakeholders' immediate priorities, they would slowly develop a clear understanding of the watershed development problems. However, a policy was formulated to avoid conflicting interests between the intervention objectives and stakeholders' priorities. It consisted of reducing project financial supports of activities which were not immediately relevant for watershed development. Different levels of financial assistance were defined.

The highest level concerns requests which are fully within the general objectives of the project. For example soil and water conservation practices, soil fertility restoration, afforestation, improvement of pastures in watershed areas, etc. The second level concerns off-farm activities which generate additional income. It was assumed that the diversification of the sources of income for the stakeholders would decrease the pressure on natural resources. Moreover, it was assumed that when stakeholders increase their income, they would be able to invest in innovative practices in watershed development. The third level concerns cultural activities: promotion of folk media, functional alphabetisation and other local communication channels which can be used for sending messages or exchanging information in the context of local people with respect to watershed development. The last level concerns social or socio-economic infrastructures such as wells, maternity hospitals, schools, market places etc. The financial contribution of PGRN decreases from the first to the fourth. For instance, an afforestation activity can receive 90% financial assistance while road construction can be limited to 15%.

The different levels of financial assistance for types of activities defined political framework for negotiation during initial fora which were organized at village level with the stakeholders. These fora served also for a *diagnostic participatif* (a kind of participatory rapid appraisal). Many questions were asked to stimulate reflection at the level of the stakeholders. These fora provided also first general information to the PGRN about problems, difficulties, needs, means and resources available for the stakeholders. They informed villagers about what they should expect from the PGRN's intervention and the conditions (their own contributions) for obtaining assistance.

Initial fora can be seen as a way to stimulate at the level of the stakeholders a self-appreciation about their agricultural practices in watersheds. The opportunity to analyse critically their situation was created as for example Kpini in Box 6.1.

Box 6.1: The appreciation of the situation by Kpini after an initial forum in Tokanmê-Aliho

Here, our problems concern mostly the rain. When the rainy season is good, we have more food. When there is a severe drought, we suffer. The PGRN people arrived and said that our lands were degrading (*gnigban sissa*). However, we did not realize that. They said that the lands would be improved so that we can increase our yield

and get more money. They explained that a condition to succeed is to create committees and work together to be able to solve the problems we are facing.

An immediate effect of initial fora was that, they enabled the development of a partnership relationship between some stakeholders who request assistance to solve certain problems, and the PGRN team. The nature of activities for solving the problems covered many issues (see Box 6.2). Tree planting and animal raising, for instance, were individually requested. Financial assistance for agricultural products processing was requested by groups of women. The activities like protection of villages' mud houses against runoff, the improvement of drinking watering places, and road construction, were requested at the village level.

Box 6.2: The stakeholders requested different activities from the PGRN team
- protection of the house in the villages against runoff
- tree planting in individual plots
- regeneration of sacred forest
- roads construction or improvement
- construction of tanks to collect rainfall
- improving watering places for drinking water
- reducing the damage caused by runoff in the farms
- improving the fertility of the soil
- financial assistance for the agricultural products processing by the women
- financial assistance for animal raising

Within the list of the activities requested by the stakeholders, many of them are close to the objective of the intervention, for instance, protection of the house in the villages against runoff, tree planting in individual plots, reducing the damage caused by runoff in the farms, improving the fertility of the soil, etc. So by dealing with the stakeholders' priorities, the opportunity was offered to the PGRN team to learn to develop a common appreciation about watershed development problems among the stakeholders.

Focus on the stakeholders' priorities as the starting point of external supports

A request for a partnership aimed at an external support, can be made by any individual stakeholders, group or village. Once a request is made, agreement fora are organized. In the first agreement forum, the stakeholders concerned will present their problems and the need for their resolution. Then, meetings for discussing specific problems were planned. For instance, a forum might address combatting soil erosion, which was raised as a problem by certain stakeholders, afforestation, or infrastructure realization.

These fora concerned specific issues and types of stakeholders. The discussion theme on each forum was about the relevance of the problem at stake, solutions already experimented without success, the contribution (in terms of labour, money, etc.) of stakeholders to the cost

for resolving the problem. The discussions at the fora aim at decision-making about the contour of the process. This includes the organization required (formation of committees of the stakeholders), the structuration of the process and training needs. These strategies enabled the implementation of some concrete actions by the PGRN team, described in details for some villages (see Box 6.3).

Box 6.3: Examples of concrete activities implemented, with the stakeholders, in the villages Tokanmê-Kpodji and Dékandji

Tokanmê-Kpodji. The village is on a sloping ground. Runoff was perceived by the villagers as a problem which caused a serious damage of their mud houses. Runoff also damaged the route to the watering place used by the women. They were not able to find a solution themselves. After the initial forum organized by the PGRN team in Tokanmê-Kpodji, the villagers (especially the *Chef de Village*) called for the assistance of the PGRN. Then, they established a partnership with the PGRN team in the region. They created a committee, (*Comité de Gestion de Terroir*) and the president of the *Groupement Villageois* was chosen as the president of the *Comité de Gestion du Terroir*. After negotiation they agreed on activities to be carried out for solving the collective negative effect of the runoff in the village. The improvement involved also the protection of the route against erosion caused by the runoff. The contribution of the villagers was defined in terms of money and labour. The amount of money was 50,000 F CFA for starting the activities. The project provided a financial assistance for buying the tools (pickaxe, hammer, wheelbarrow, etc.) needed for the activities and for the support of the technical designers (consultants) of the operation. With the *Bureau Comité de Gestion du Terroir* and stakeholders, together identified the locations where the gullies and other infrastructures (e.g., vegetative barriers) should be carried out. The village suffered also from the absence of infrastructure like roads, school and health centre. Only one road enabled the villagers to reach the market places in their area. The degradation of this road caused many problems, especially the difficulty to sell agricultural products. Road improvement was a priority for the stakeholders in Tokanmê-Kpodji. They called for the assistance of the PGRN. The contribution of the villagers was estimated to be 200,000 F CFA. The GV of the village provided already 50,000 F CFA and the local music group gave 20,000 F CFA. The villagers were discussing sharing the remaining of the money needed to start the activities.

Dekandji. Dekandji is a village in the Sous-prefecture of Klouekanmey. The villagers had serious problem in that they lacked clean water during the dry season. A few farmers in the villages built small tanks to collect rainfall water from the roof of their house built with iron sheets. The farmers also perceived the degradation of their land as a crucial problem. Improving the fertility of their soil was a priority. These problems were raised during the initial forum with the PGRN. Later, the stakeholders requested assistance for the resolution of their problems. The resolution of the water problem was realized by the PGRN team. The solution found was the construction of a big tank in the centre of the village, to collect the water from many roofs with iron sheets. This idea should contribute also to the reduction of the runoff problem caused by the water from the roofs of the houses. The solution found for the degradation of the soil was the use of the dung of the cattle and droppings of the chickens for composting to obtain an organic fertilizer. The cost of a truck was 10,000 F CFA. The contribution of the project was 4,000 F CFA and the farmers paid 6,000 F CFA. According to a farmer, one truck of the organic fertilizer was enough for one hectare of a maize farm.

The strategy of the PGRN team, which consisted on starting the intervention with tackling the immediate priorities of the stakeholders, generated many socioeconomic opportunities. This should be perceived as one way of building trust, which means that the stakeholders became convinced that they could solve their major problems with the support of the intervention.

However, the request for intervention or *appui* that covered several aspects of development activities (infrastructures, activities which generate income, resource

management) called for many competences. The tasks of the PGRN team became more complex because they did not have all the competences required. Network management became a crucial activity for the watershed managers in Mono. For instance, the *Recherche-Développement* team, the RAMR project at the INRAB *(Institut National de la Recherche Agricole du Benin* = National Institute for Agricultural Research in Benin) was identified for farm technology development. Civil engineers are involved in the construction of the infrastructures.

From the stakeholders' priorities to learning processes about watershed development

Erosion control in the villages for protecting mud houses was successful. Gullies and ravines' treatment were collectively done by the stakeholders. They became convinced that problems caused by runoff can be solved also in the farms. The PGRN professionals learned from initial activities how they should go about watershed development with the stakeholders.

The approach of the PGRN team required the mobilization of the stakeholders to share responsibility. Committees for the *Gestion des Terroirs* were created *Comité de Gestion des Terroirs* at the village level. These committees overlap in many cases with existing organizations like the *Groupement Villageois* in the villages. They manage the funds with the PGRN people, for instance, the receipts of many expenses are signed by the treasurer of the *Comité de Gestion du Terroir* and a member of the PGRN team. In Tokanmê-Kpodji, two members of this committee (treasurer and president) went to Cotonou with the PGRN team to buy the tools required for digging the gullies (activities concerning the protection of the village against the erosion). The *responsabilisation* of the stakeholders was an objective of the external support. The more they succeeded in the activities which satisfied their priorities, the more they could be expected to take further responsibilities for the tasks concerning the watershed development.

Effects of the social learning path

Flexibility about the intervention in watershed development created room for dealing with the priorities of the stakeholders. The learning path yielded situations which presented concrete grounds for gradually building a common appreciation of the watershed development problems by the stakeholders (e.g., erosion control in the villages).

External support for the watershed development: can scaling up be effective?

Living with indigenous knowledge in watershed development: towards interactive processes between the PGRN team and Adja farmers

The Adja farmers in Aplahoué did not practice ridging for cultivation[7]. The contour farming technique in the technological package of the PGRN did not make sense to them. Living with the Adja farmers knowledge was the only way for the professionals to start with the watershed development in Aplahoué. A forum was organized in the village Dekpo (in Aplahoué) by the

PGRN team to identify the appropriate watershed development techniques through interactive processes.

First, contour ridging was explained to the farmers and they found it difficult because they practice minimum tillage for cultivation. Second, planting nitrogen-fixing shrubs (*Acacia auriculifiormis*; *Gliciridia sepium*) as hedgerows in the contour lines, was proposed. The strips between the hedgerows would be cultivated by the farmers. The third option which was proposed to the farmers concerned the design of ridges with stones (*cordon pierreux*), following the contour lines. The Adja farmers chose the second option, the hedgerows between crops because the collection of stones might be too time too consuming.

Incentives for the support of the watershed development

Volunteers who were willing to innovate and introduce erosion control received a high amount of money as subsidies. About 90% of the additional costs for erosion control technique (contour farming) were supported by the project. The labour costs for settling the contour lines and ridging were paid by the project. The vetiver grasses were given to the volunteers free of charges. The costs of all operations were evaluated to 90,000 F CFA per hectare, an amount of money that a farmer in this region should not invest in his land.

The provision of subsidies to the participants in the watershed development had many effects. First it enabled many stakeholders to learn about erosion control techniques (e.g., contour farming) in their farms. It helped build a good 'image' about the PGRN team in the rural area. Subsidies as so had the effect to increase gradually the number of the participants in the watershed development. However, subsidies did not overcome the crucial problem of land tenure insecurity among the stakeholders who feared that their parcels might be taken back by the land owner after having invested to improve those parcels.

The animation rurale in support of watershed development

Beyond the provision of subsidies by the PGRN to obtain immediate results, the importance of using communication strategies to stimulate voluntary behavioural change in the short term was perceived. Mass-media, especially radio broadcast, was used. The presence of the Radio Rurale set up in Lalo, the capital of a neighbourhood Sous-prefecture of the PGRN intervention area, creates an effective condition for the implementation of broadcasting programmes for the stakeholders. Particular emphasis as given to specific issues such as the importance of planting trees, the negative effect of bush fire, etc. The promotion of the PGRN message was done by explaining to the stakeholders the reason that they should participate in the activities.

Folk media, especially local singers and folklore groups were used. The *forum d'animation culturelles*, organized competition among different folklore groups with respect to watershed development. Local singers were asked to present a song which would raise interest for PGRN's activities. The groups were rewarded. Many T-shirts were given to the

members of the folklore groups with a print which reflected the main message (e.g., tree-planting).

Folk media had the effect of stimulating quick mobilization. They enabled a better construction of messages in local language by using proverbs (e.g., 'it is on the old cord one knits the new one') and local metaphors that can be learned by professionals to reiterate in their daily interaction with the stakeholders in watershed development.

Institutional support and policy context for the watershed improvement in Mono

In Mono Province, potentials existed for building an operational and dynamic institutional framework for the PGRN intervention. Many organizations were functional: the CARDER, the RAMR project, the SassaKawa Global 2000 project, the PADES-Mono and many NGOs. The absence of a clear definition of roles among these actors (cf Djohossou, 1993) did not permit a good synergy and complementarity to emerge among them. Each of them had its own working style. A tentative collaboration between the CARDER and PGRN enabled the involvement of the Village Extension Workers (VEWs) of the CARDER in the activities at the beginning of the PGRN intervention. Later, the PGRN recruited animators for tasks similar to those of the VEWs. One can arguably say that the collaboration between PGRN and CARDER did not work. Coordination of the activities between the organizations was not effective. Joint learning based on tools such as RAAKS, which could help develop new roles for the institutions for the watershed development project was not done. A workshop could have been organized so that these organizations would have arrived at a common mission statement and the *raison-d'être* for their linkages.

Another critical institutional issue concerned the land surveying activities. According to the interpretation of the coordinator of the *volet operation foncière* (cadastre section in the PGRN), land surveying activities were based on the assumption that they would provide a data base for decision makers (government) and a tool for achieving security in land tenure. However, as noticed above, although subsidies were provided, many stakeholders still feared the crucial issue of landholding insecurity. In addition to land survey and registration, the generation of powerful local institutions for mediating land tenure security would have provided an important incentive to participating stakeholders in watershed development.

The way the activities were organized by the PGRN required a policy context which would decentralize many responsibilities and the capacity for decision making to the local level. Many *Associations de Développement'* in the intervention area at the levels of the Province, *Sous-prefectures*, *Communes* and villages were created by the stakeholders. These political organizations could provide room for scaling up decision making processes with respect to the erosion control to the watershed level. Unfortunately, the mobilization of such organizations for environmental and resource management issues did not yet emerge. The *Association de Développement* offered only political promotion to the leaders who became a minister, a deputy in a parliament, *a Préfet, or a Sous-préfet*, etc.

Analysing the effectiveness of the external support

Successful collective action was effective in situations where the stakeholders perceived their interdependence, for instance, the erosion control in many Adja villages. Runoff caused a collective negative effect (destruction of mud houses) for all the villagers. Still, despite the incentive policy adopted by the PGRN, the *animation rurale* processes, and existing institutional frameworks; the scaling up of watershed development from the farms of individual participating stakeholders to the whole watershed area, has so far not yet been effective. The patterns of individual farm arrangements in the watershed under siege did not correspond to a specific village land use area. A 'village *terroir*' does not exist in the Adja region. The stakeholders in various micro-watersheds do not live in the same village where some CGTs were operational. Yet platforms for pooling a systematic treatment of micro-watersheds towards the watershed development based on inter-village structuration processes did not emerge in Mono.

6.5   Scaling up watershed development with Mahi people

Perceptions of watershed development problems: what does it imply for scaling up processes?

The problem according to the perception of the PGRN and the donor

The PGRN and the *Caisse Française de Développement* were the main actors in watershed development in Ouèssè. The problem which was particularly identified in Ouèssè concerned land degradation as a result of the cultivation methods of the Mahi farmers. The ultimate aim was to change this trend in Ouèssè. The *Caisse Française de Développement* was the donor for the implementation of the PGRN in Ouèssè. Since the beginning of the eighties, the *Caisse Française de Développement* has promoted the French approach to natural resource management called the *Gestion des Terroirs* in Sahelian countries (e.g., Burkina Faso, Mali, Senegal). A key feature of this approach is participation and the transfer of responsibilities to the local collectivities to support collective resource management. From that point of view, one can arguably state that decentralization and transfer of competences to Mahi people for mastering the evolution of property rights and tenure security was important for the *Caisse Française de Développement*.

The problem according to the perception of the GERAM team

The situation of the GERAM as a contractor of the PGRN is strategically important. A failure to carry out the project in Ouèssè could have a negative impact on the potential role and capacity of Beninese NGOs for promoting grass-root developments. The members of the GERAM team gave much weight to the anticipated problems because they would be judged by the effectiveness of their actions as front-line development professionals. As described above (see §6.3), the opportunity Mahi people have for clearing more lands, in the *agbovê*,

very far from their villages, might well affect an intervention effort to halt severe soil erosion problems through watershed development. The GERAM decided that, Mahi farmers would participate in either the watershed development activities, and improve degraded lands near their villages, or they would continue to move far to clear new lands for cultivation, an option which provide higher yields without any external input (e.g., fertilizers).

The problem according to the perception of the Mahi farmers

Watershed development problems perceived by the Mahi farmers were based on indicators and direct observation. These are the following:

- the water in the wells and rivers are drying up;
- scarcity of firewood compared with the past;
- runoff causes land degradation on the farms;
- the agricultural plots are very far from the villages (the farmers had to go far to clear fertile lands).

However, according to the same farmers, other problems, which affect seriously their daily livelihoods, are urgent. These concern labour availability, drinking water, infrastructure and a transport problem of the huge amounts of agricultural products after harvest (maize, cassava, groundnuts, and cotton). The women would prefer financial assistance for the processing of agricultural products which provide an important source of income. At least the migrant farmers consider land tenure security as crucial. They are not allowed to plant trees (e.g., cashew trees, teak, oil palm, etc...) on the parcels they are farming. Planting trees in Mahi society is a kind of land appropriation. According to the King of Ouèssè, the most important issue was: ' *to safeguard the natural patrimony and bring many wealths in the region*'.

What is the nature of watershed development problems and their implications?

Like in the Mono, the understanding of the problem and the approach to its solution were different. Some stakeholders had learned their own way of dealing with runoff problems in the farms, as Ayena did (see Box 6.4).

Because of the opportunity Mahi farmers have in the *agbovê*, they did not perceive the watershed development problems as a priority. In theses circumstances, external supports for scaling up watershed development require first that the stakeholders in different villages reach a common appreciation of the problems, adopt collective action and develop platforms for decision making. So what are the strategies of the GERAM team in Ouèssè? To what extent scaling process is being achieved?

Box 6.4: Ayena explains his solution of runoff problems

In the past, my grandfathers used to practise tillage which consisted of making ridges parallel to the *todohoiun* (runoff channels). When they did the ridges perpendicular to the *todohouin*, runoff flowed down the crops and the ridges. This phenomenon causes serious damage to the farms. Our grand fathers were rights to do their ridges in the parallel to the *todohouin*. Then the water flows in the furrows and did not easily transport the crops. An interesting thing is that the seeds of the weeds in the furrows are transported and the labour for weeding is then economised.

Making the problem 'visible': the social learning path by the GERAM team

Learning about participatory strategies adopted by the GERAM team

The GERAM team transformed the intervention for the watershed development into a learning process in Ouèssè[8]. As in Mono, the principle of 'voluntarism' and 'partnership' was used. The necessity to learn to develop a common appreciation among the stakeholders was assumed. The policy for financial subsidies according to the intervention objective and the stakeholders' priorities, was the same as in Mono.

A particular issue in Ouèssè was that the professionals adopted a 'learning model' (see fig. 6.2) for intervening (pers. com. Adjinacou). The 'learning model' was based on three different element A, B, and C (see fig. 6.2). The idea about the first element

A: appui structuration/organization
B: appui transfer of technical competencies
C: appui transfer of capacities for negotiation
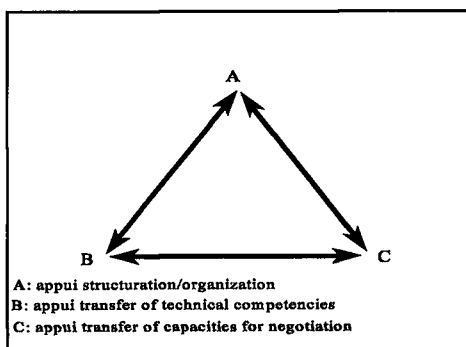
Figure 6.2: 'Learning model' used by GERAM

(A) was to start the intervention with the identification of existing official or strategic organisations like the *Groupement Villageois*, *tontine* groups (local saving groups), the village council, etc.

The stakeholders in these organizations should be opportunistically engaged in a learning process which might stimulate a reflection about their different levels of activity. The *appui* about the transfer of competence concerned the training for concrete action, the appropriation of technical skills, and non-formal education through the *animation rurale*. The appui for the development of a negotiation capacity among the stakeholders involved a joint analysis of the situation and identification of constraints and opportunities (the MARP method was used), a joint construction of plans for action called *Dossier de Financement* (DDF). The plan was based on imagery leaflets so that all the stakeholders should understand. Initial fora were organized also with the stakeholders in Ouèssè. The process stimulated many requests for assistance as in Mono (see Box 6.5).

Box 6.5: The nature of the activities perceived by the stakeholders
NRM activities

- protection of the houses in the villages
- tree planting by individual stakeholders
- reducing the damage caused by run-off in the farms (contour farming)
- regeneration of gallery forests
- bush-fire prevention
- improving the fertility of the soil

Activities which generate income

- nursery plant production
- bee-keeping in the gallery forest
- gardening/horticulture by the women's groups
- animal raising (pig, chicken)
- storing and reselling agricultural products by women's groups
- agricultural product processing by the women

Infrastructure

- well construction
- bridge construction
- road construction
- construction of house for storing inputs

Socio-cultural activities

- cultural fora
- radio programmes

Focus on the stakeholders' needs as the starting point of the intervention

At the beginning of the intervention by the GERAM team, the actions were localized at the village level. The appui ranged from the level of individual stakeholders to a whole village which was the higher level of implementation of activities. Probably this choice was based on the administrative division in Benin which considers the village as the lowest level. The support requested by the stakeholders from GERAM showed the importance of other livelihood activities beyond the watershed development (see Box 6.5). From a strategic point of view, this approach was aimed at building trust in the effectiveness of the core issue: the watershed development. The quantification of the demands (see table 6.1) of the stakeholders for the *appui* of the GERAM shows the importance of activities beyond watershed development.

Table 6.1: Quantification of the nature of the appui requested by the stakeholders in Ouèssè

Domain of activities	Nature of the demands made by the stakeholders in %			Total
	individual level	group level	village community level	
NRM activities	23 (40%)	32 (37%)	16 (28%)	71 (36%)
AGI*	20 (34%)	51 (59%)	1 (2%)	72 (36%)
Infrastructures	10 (17%)	4 (4%)	29 (52%)	43 (21%)
SCA**	5 (9%)	-	10 (18%)	15 (7%)
Total	58 (100%)	87 (100%)	56 (100%)	201 (100%)

Source: Annual report of the GERAM team (see Adjinacou *et al*, 1995)

* Activities which generate income

** Socio-cultural activities

From the stakeholders' priorities to learning processes about watershed development

Like the situation in the Mono site, the attempts of the GERAM team to deal with the immediate needs of the stakeholders led to situations which enabled stakeholders to learn about watershed development. The idea was to work closely with the stakeholders on various issues (amelioration of village built-up area, tree-planting, etc.), whereby they would discover the importance of using watershed control techniques brought by the GERAM team.

The erosion control in the village Gbanlin (see Box 6.6) has influenced the perception of the stakeholders about the solution of the watershed development problem. Kossi experienced erosion control in his courtyard and was satisfied (see photo 1). He argued that 'the knowledge he acquired from the PGRN will be used by the future generations of his family'. Kossi discovered the 'secret for controlling the erosion effect' (in his terminology). In photo 2, he is showing the direction of the runoff and the principle of controlling a water course. The lines which were drawn suggested the need to design a barrier to halt the transport of land by the runoff. The explanation provided by Kossi displays a radical shift in his perspective from ridging parallel to the runoff course to ridging in perpendicular to it. Many stakeholders like Kossi in Ouèssè learned solutions for controlling erosion. Afterwards they became volunteers to practice the ideas of the GERAM team in their farms.

Box 6.6: A concrete example of successful collective action in Gbanlin

As an illustration, a concrete case from the village Gbanlin will be presented. The phenomenon of erosion was a major problem in the agglomeration in Gbanlin. An important network of ravines had emerged in the village. One of them was called *Wamankpa* ('we did everything without success'), i.e., the villagers were trying to fill in this ravine with wastes without any success (cf. AFVP/GERAM, 1994a). According to the *Chef de Village*, Gbanlin is on a sloping ground of a micro-watershed and the runoff of rains took away the houses. The villagers called for the *appui* of the PGRN and decided to apply its methods for controlling the erosion in the village. According to the villagers, if these innovations were successful, they would do the same in their farms. The activities were jointly planned with the stakeholders. Many techniques for controlling the erosion (bench terracing,

check dams, waterways, vegetative barriers, micro-dams) were explained and designed for the stakeholders: The cost of the operation was 3,166,200 F CFA. The contribution of the stakeholders was 100,000 F CFA (financially) and 1,514,500 F CFA in terms of labour.

The activities of the GERAM for solving the erosion problem started by the creation of two organizations at the village level (cf Adjinacou *et al*, 1995: 47). The first one concerned the Village Assembly (*Assemblée Villageoise de Concertation*) with 40 representatives who were chosen by the villagers themselves. The members of this organization discussed periodically the evolution of the activities which were implemented with the GERAM team. The second was the Temporary Committee for the organization and the follow-up of activities (e.g., forestation, beekeeping). The members (total 7) were the contact persons of the GERAM team. This committee is being trained by the GERAM to transform it into CGT. This strategy is different from the one in the Mono which directly created a *Comité de Gestion de Terroir* for the watershed development activities.   Existing local organizations such as the Village Development Committee (*Comité de Développement du Village*) and the Village Consultative Council (*Conseil Consultatif du Village*) were used. The former consisted of seven local leaders. Their role was to maintain cohesion in the village through resolution of conflicts (e.g., landholding disputes). The latter consisted of six members, the *Chef de Village* and five *Conseillers* (advisers) who were the official political and administrative representatives at the village level. The functional committees (see fig. 6.3) can be perceived as different platforms for implementing various activities at the village or group level. However, these platforms can only be effective for watershed development if they enable a systematic treatment of at least a micro watershed.

LEVEL OF THE STRUCTURATION	FUNCTIONAL COMMITTES
VILLAGE LEVEL	Village Development Committee Village Consultative Council Village Assembly for Concertations Organization and Follow-up Committee
GROUP LEVEL	Committees for GT activities Committees for infrastructures Committees for economic activities Committee for the socio-cultural activities etc.

Figure 6.3:   Structuration processes according to the GERAM in Ouèssè

Photo 6.1: Kossi shows his success to control erosion in his courtyard

Photo 6.2: Kossi is sharing his learning point

Effects of the social learning path

Like the situation in Mono, flexibility within the GERAM approach to watershed development offered many socioeconomic opportunities for the stakeholders. The activities of the stakeholders became diversified and dynamic. New socioeconomic groups such as nurserymen, beekeepers, horticulturalists emerged. Grass-roots development processes created learning groups of stakeholders and learning communities. By doing so, they could exercise certain power and negotiation capacity in Ouèssè. For instance, stakeholders have appreciated their involvement in the negotiation and approval of a joint design of activities for funding (pers. com., Adjinacou).

The fact that the *appui* of the stakeholders covers resource management activities (see Box 6.5) was an opportunity for making problems visible. The learning enabled a better appreciation of the watershed development problems

External support for watershed development: can scaling up be effective?

Incentives for the support of watershed development

After the successful erosion control in the village Gbanlin, the stakeholders were convinced that the PGRN team could help them improve their way of cultivation in the watershed. This situation provided an incentive for them. Many farmers became volunteers and they were willing to experience erosion control techniques in their farms, as it was successful in the village Gbanlin. Subsidies were also given to them. The labour cost for setting contour lines and ridging were paid by the project. For example in Gbanlin, the amount of money used for subsidizing the treatment of 24 hectares of land improvement in a watershed was 276,000 F CFA. The cost for improving one hectare was 37,000 F CFA on the average and the contribution of the participating stakeholders was 11,500 F CFA.

The fact that the local land tenure arrangements forbid migrant farmers from planting trees did not make the subsidies an effective incentive for them. However, they were mostly using degraded lands in the watersheds. They were not allowed to practise shifting cultivation in the *agbovê* like the native Mahi.

The animation rurale for the support of watershed development

Radio-Rurale set up in Ouèssè was successful. Mahi people have discovered it as a powerful means of communication. For instance, the announcement of burial ceremonies was done through the *Radio Rurale* and everybody in the region was quickly informed. This media was used by the GERAM team for the *animation rurale* which was aimed at watershed development (see Box 6.7).

Box 6.7: Examples of broadcasting messages through the Radio Rurale in Ouèssè

•   Amelioration of soil fertility with the Mucuna

•   The importance of erosion control in the agglomeration

- The importance of contour farming
- Land clearing and its consequence in the Sous-prefecture of Ouèssè
- Opportunities for tree planting in the Sous-prefecture of Ouèssè
- Farmers themselves analysed problems related to excessive land clearing and realized the opportunity for of forestation in the *Sous-prefecture* of Ouèssè. Local songs were used during the analysis by the stakeholders.

Many cultural fora *(forum culturels)*, songs, and the use of slides to show different methods of erosion control techniques were organized in Ouèssè by the GERAM team. Stakeholders' consciousness raising through the *folklore local* (events which enabled participants to draw some lessons on a specific issue) was periodically organized. Imagery was used to support discussion with the stakeholders during negotiations.

Animation rurale involved training towards skills development and training of local trainees. The first practice enabled the emergence of new local 'professionals' (e.g., nurserymen, beekeepers in gallery forests). Through the second practice, the GERAM team transferred some technical competencies to stakeholders pooling many watershed development activities (e.g., setting contour lines, forestation techniques, maintenance techniques).

Institutions and policy context for the watershed improvement

Competencies struggle problems, among potential organizations as were observed in Mono, were also present in Ouèssè. Here, the GERAM team, the CARDER representation in Ouèssè, the R&D team of the INRAB did not function synergically for the support of watershed development. The problem could be a weakness of the official institutional framework for the PGRN activities in Benin. Maybe, those organizations lack learning tools to realize their problems of coordination. It was not surprising that an annual report of the GERAM team stated that the contributions of the R&D team to the watershed development in Ouèssè were below expectation (Adjinacou *et al*, 1995).

Property rights institutions for tenure were very weak (not formalized). Many land disputes were observed (cf. AFVP/GERAM, 1994b). They were mediated by the *notables* (local leaders and 'chiefs' of lineage called *hennugan*). Recently, the UDESCO has started the resolution of land conflicts which could not be done at the village level. As in the Mono, land surveying activities by the PGRN did not yet solve (or reduce) this problem.

Unlike the Mono case, existing local organizations (e.g., King of Ouèssè, UDESCO) operated already at the level of the whole community of the Mahi people in the *Sous-préfecture* of Ouèssè. This condition might be favourable for scaling up watershed development in Ouèssè. Still, how much power did the existing organizations have for making crucial joint-decision with the GERAM team? Decentralization of certain power (e.g., statutory power) from the government administrative bodies to the local people was not effective. The policy context did not yet offer enabling conditions for active learning about watershed development in the communities in Ouèssè.

Emerging issues and effectiveness of the external support for watershed development

Ecological crises in the farms of participating stakeholders

Many farmers adopted contour farming introduced by the GERAM in Ouèssè. Contour lines were set, and ridges done following the contour lines. *Vetiver* grass and cashew trees were planted on the main contour lines. The farmers realized the effectiveness of the innovation for water conservation and the significant reduction of runoff problems they had faced in their farms.

However new problems emerged. Farmers who practised contour ridging did not have time to prune the *vetiver* which became very dense and constituted a niche for rats and snakes. The rats destroyed the maize stored in the farm and the snakes killed their chickens reared also on the farm. They removed the *vetiver* from their farms but still kept the contour ridges. They suggested the replacement of *vetiver* by *Cajanus cajan*, and others suggested *ananas* and this raised a debate among PGRN people about the efficacy of the farmers' suggestions. They wanted a plant which would provide food (example of the *Cajanus cajan*) or additional source of income (ananas). The ecological service of the *vetiver* in controlling soil erosion was misunderstood the farmers.

Analysing the effectiveness of external support

Despite the *vetiver* problem, horizontal diffusion (replication) of contour farming was noticed in Ouèssè among non-participating farmers[9], who learned contour farming through observation. Among the villagers in the region of Ouèssè, a shared understanding emerged that runoff could be controlled with ridges perpendicular to it (runoff) as Kossi had explained (see photo 6.2). The success of erosion control in Gbanlin showed that effective collective action took place when stakeholders shared a common problem and were mutually dependent on each other.

The GERAM team learned from the intervention process that the engagement of the Mahi farmers in watershed development was growing. However, the team realized that they did not succeed to mobilize collective action for the complete treatment of micro-watersheds. Contour farming was practised on many different places in the watershed. When a farmer at a downstream location volunteered to adopt contour farming, those who were upstream were convinced to do the same and all the cost of the operation was supported by the GERAM. Negotiation depending on the situation was done in this way by GERAM.

During a periodical meeting between the GERAM team and watershed development committees from different Mahi-villages in Ouèssè, to monitor and access the progress of the activities, participating farmers realized the importance of creating a higher level organization (cf. Adjinacou *et al*, 1995). They perceived that isolated action by small groups in different villages would not realize the potential importance of these activities. They used the metaphor *SEDOKU* ('*Our common wealth from Nature*') to qualify the natural resources. Then, they expressed the need to have a structure for concerted action (*cadre de concertation*) to manage

those resources. After this meeting, the GERAM team initiated a scaling up process for watershed development.

Towards a scaling up process for the creation of the UIGREN/SEDOKU for the watershed development

The inter-villages organization that needed to be created was called *SEDOKU*, the metaphor of the Mahi people, and UIGREN *(Union Inter-villageoise pour la Gestion des Ressources Naturelles* = Inter-village Union for Natural Resource Management). An independent consultant was commissioned by the GERAM team for organizing the process. Different steps were followed (for more details see Tinondé, 1997). Different categories of stakeholders, coalitions, professional groups, local authorities[10], professional organizations[11], representatives of migrants[12], organisations for watershed development[13] generated by the GERAM, political organization and bodies[14], were consulted to know their appreciation of this initiative. The GERAM team was the mediator in this process. The mediation is based on solving problems like misunderstanding between strategic groups (e.g., local formal administration versus UDESCO) and coalitions (natives versus migrants) which affected the scaling up process.

A general assembly was organized with representatives of various groups. The roles of the UIGREN/SEDOKU were perceived first as a local negotiation body and a higher decision making entity for covenants, new norms and regulations for collective natural resource management. The organization will take an active part in the identification of concrete resource management projects for the region of the Mahi people in Ouèssè. A key role also addressed here concerns the participation in the monitoring and control of the implementation of resource management projects.

A structural organisation at three levels (the whole region inhabited by Mahi people, the Commune level, and the village level) was created (see figure 6.4). At the Mahi region level, the *Assemblée Genérale* (AG) was the decision making structure. A monitoring committee and a decision support commission were created to support an executive secretary at this level. Look-out posts were created at Communes and villages levels (*Vigie Communale, Vigie Villageoise*). According to the GERAM team, the functioning of this structure should not be simple. So they would learn with the leaders to gradually transfer many competencies to them.

The present study observed only the scaling process (not the functioning), which coincided with the period of the investigation. However, the functioning of such structure may be interesting for further research. Especially, the facilitation of such organization for collective decision making , monitoring, joint learning, and so forth., might be revealing.
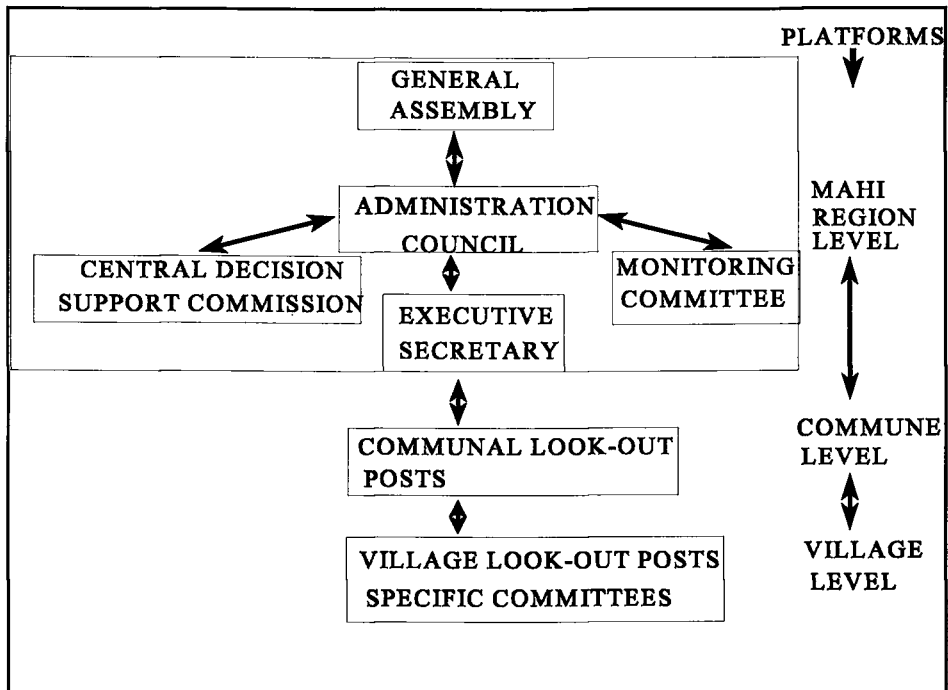
Figure 6.4:   Emerging platforms for watershed development activities in Ouèssè

6.6   A comparative analysis and conclusions

The present case study of watershed development problems were perceived at the policy level. However, the two situations studied showed that a joint learning path involving intervening party and stakeholders enables a move towards a common appreciation of these problems. Existing cultural practices have some implications for the way one should go about the solutions and innovations in watershed development. For instance, in Aplahoué, the Adja farmers' way of farming imposed an interactive learning for identifying appropriate erosion control techniques.

In both Adja and Mahi regions, institutional frameworks and policy contexts are crucial issues for the watershed development. A concrete example was the absence of a consistent property right institutions which created a barrier for many stakeholders.

The most critical question which emerges from the present case study is why the scaling up process started successfully in Ouèssè and not in Mono (Aplahoué and Klouékanmey).

In Ouèssè, existing organizations (e.g., functional committees for watershed development, UDESCO, King of Ouèssè) at the level of the Mahi region were already active

and they were a driving factor for the scaling up process. Nevertheless, the initiative of the GERAM team which enabled operational committees from different villages to meet and discuss was determinant for collectively perceived interdependence (SEDOKU metaphor) for resource management. This condition also triggered the process of scaling up process the creation of a higher platform such as the UIGREN/SEDOKU. Then a condition for sustainable resource management at the level of the whole watershed was created. Such a situation was not yet realized in Adja region due to the failure to start the generation of organizations at a higher level of social aggregation for sustainably managing emerging watershed development problems.

Notes

1. This chapter makes use of:

Dangbegnon, C. (forthcoming). Rural Development in the Western part of the Sous-Prefecture of OUESSE, Benin. In: Hoefsloot, L. (Ed.) Land use planning and negotiating platforms. (To be published by Dutch Ministry of Foreign Affairs and Cooperation).

Dangbégnon, C. 1996. Watershed management with indigenous people in Benin. Paper presented at the International Workshop: "Using Communication to Make Environmentally Sustainable Development Happen". November 1-2, 1996 Burlingame, California (USA).

2. RAMR is a *Recherche-Développement* project established in the Mono Province since 1986 (for more information see Koudokpon, 1992). Many innovations were developed by RAMR. Mucuna (Mucuna pruriens, var.Utilis) and Acacia auriculiformis (alley-cropping) were experimented and used successfully for improving the fertility of the soil. These innovations were available for the PGRN project.

3. Different levels of organization almost only existed for cotton production. The *Groupement Villageois* (GV) functions at the village level. At the higher level, we found the union of producers at the commune level is called UCP (Union Communale des Producteurs), the union of producers at district level is called USPP (Union Sous-Préfectorale des Producteurs), and the union of producers at province level is called UDP (Union Départementale des Producteurs).

4. Like the Adja people in Mono, the Mahi people have a historical background within the socio-cultural era Adja-Tado, which is common to many ethnic groups like Adja, Fon, Goun, Sahouè, Ayizo, etc.

5. There are many villages called Ouèssè in Benin. Ouèssè Ouogoudo means 'Ouèssè behind the River Ouémé' when one refers to the location of the Mahi people in the Sous-préfecture of Savalou. Ouèssè is a city, capital of the Sous-préfecture of Ouèssè. Ouèssè is also the name given to the Sous-préfecture of Ouèssè which involve 9 Communes and many villages.

6. Here, individual practices reflect the way of using natural resources by different small groups that are, each, extended families called 'hennu' living together in the area in which they practice agricultural activities.

7. However, in the Sous-préfecture of Klouékanmey, the proximity of the Fon people in Zou influenced the cultivation style of the Adja farmers in this region. They practise minimal tillage and ridge also like the Fon people do. For that reason the PGRN team could introduce contour ridging. So the situation in the Sous-préfecture of

Klouékanmey is not the same compared to the one in Aplahoué.

8. The GERAM team in Ouèssè and the PGRN team in Mono used the same perspective within the PGRN project. However, the GERAM team had more autonomy in the implementation of their activities compared with the PGRN team in Mono.

9. The investigations of this issue was done by two Beninese consultants during my field research. I had the opportunity to assist in the analysis of the information they collected.

10. *Dah* (Chief of lineage called *hennugan*), *Notables* (influential people in village communities).

11. Farmers' organisation called USPP (*Union Sous-Préfectorale des Producteurs*); forest resources' users (*Exploitants forestiers*).

12. Migrant farmers from the Northern part of Benin, migrant Fon; migrant Adja, Old time Fulbe; Recent settler Fulbe.

13. Beekeepers, nurserymen, folklore group, and Radio Rurale committee.

14. *Maires* of the *Communes*, the *Chefs de Villages*, UDESCO, and Youth Association.

7   Collective Action and Resource-Flow Management for Improving Soil Fertility by a Women's Group in Djeffa, Benin

7.1   Introduction

In many situations, the appreciation of women's position reveals their marginalization with respect to access to external supports. Power relations between men and women tend to be the focal point in many analyses. Recently this problem became a political concern and has stimulated the emergence of new 'paradigms' which emphasize gender issue in development (e.g., Moore, 1988; Rogers, 1980; Schrijvers, 1986). The present study is based on the assumption that the division of labour between women and men, and gender sensitive knowledge and responsibilities are relevant for respect to resource management (especially resource-flow management). These issues are some aspects of socioeconomic development of women. One should analyse the context and content of existing initiatives of women in order to help them enhance their performance. Many efforts for helping the women are limited to specific domains, for instance, agricultural product processing, credit, village water supply, etc. The support of the women's groups for integrated resource management was a neglected dimension of intervention practice in Benin.

This chapter deals with the initiative of a women's group in Djeffa which developed several activities for improving soil stability and fertility within horticultural development. Different methods and techniques were used to carry out this study. Individual interviews with the members of the group were carried out. Group interviews were organized the day (every Thursday) the women worked together. The involvement in the activities of the women enabled participant observation and an in-depth analysis of the group's dynamic, the motivation of the members and how they overcame various problems that occurred. Participatory methods were used to explore new opportunities for the women and the way the performance of their activities could be enhanced with respect to group maintenance. The additional sources of information used for this case study concerned the documents of the group and small-scale project reports about the activities which were written by the NGOs working with women.

This chapter starts with the history of the formation of the woman's group in Djeffa (§7.2) with an emphasis on the context and the content. Then resource-flow management is analysed from the perspective of the women. At the time when the group was created (in 1988), the CARDER and very few emerging NGOs were available for helping the group. In 1990, the democratization era started in Benin and many NGOs entered the development scene. The women's group could call on many external supports for their activities from various sources. This situation enabled me to study this group from a historical approach at two different periods: before and during the democratization era in Benin (§7.4 and §7.5).

This case study draws specific conclusions (§7.6) about the facilitation of successful collective action for improving soil stability and fertility by a group.

7.2   Formation of the women's group in Djeffa: context and content

The context of the women's group formation in Djeffa

Djeffa is a coastal village is in the Southern part of the Ouémé Province in Benin. From the administrative side, Djeffa is a village of the *Commune Rurale* of Ekpè in the *Sous-Préfecture* of Sèmè-Kpodji. The dominant ethnic group in Djeffa is the Xla people. The population of this village is 4,264 inhabitants (INSAE, 1993). Djeffa is an area in Benin where the density of the population is high (beyond the 240 inhabitants/km2 noticed in the Adja region in chapter 6).

The agro-ecological context in which the Djeffa women are living is very complex. As in all coastal regions in Benin, the dominant natural vegetation in Djeffa is the coconut tree (*Cocos nucifera*). A research station on coconut trees, the *Station de Recherche sur le Cocotier* (SRC) is set up in the *Sous-Préfecture* of Sèmè-kpodji near Djeffa. The soils of Djeffa area are described by Schelhaas (1978: 22). As a coastal village, the soil in Djeffa is very sandy, very poor in organic matter, and has a very low water holding capacity. The poor fertility of the soil was a serious constraint for practising agriculture in Djeffa. Crops do not grow well on the sandy soils in Djeffa without a treatment with organic matter to improve their stability and fertility. The climate on the Djeffa is sub-equatorial with two dry seasons and two rainy seasons like the situation in the Adja region.

Socioeconomic activities are diversified in the village. Small scale commerce like selling sugar, soap, fish, and agricultural products (e.g., maize, *gari*[1], coconut oil, etc.), is dynamic. Djeffa has many swampy areas which are inundated during the rainy season. The local people use them for sugar cane cultivation. Vegetables are produced during the dry seasons. Tomato, maize and cassava are cultivated during the rainy season.

Socio-structural transformation and continuous differentiation are ongoing processes in the region of Djeffa[2]. A coconut tree has great economic importance in the region as is oilpalm for the Adja people in the Mono. Some parts of the land in Djeffa are bought by rich people from urban areas (for instance Cotonou and Porto-Novo) for the plantation of coconut trees. A great differentiation in the landholding for agricultural or horticultural activities emerged in Djeffa. Borrowing, sharecropping, and renting, are the most common ways to have access to land for the people in Djeffa. Food insecurity is a problem in this village, and very often malnutrition of the children occurs.

The content of the work of the women's group in Djeffa

In face of the complex context described above, seven women in Djeffa found a way to cope with their chaotic situation. At the beginning they engaged in a *tontine*, a local saving organisation, which had multiple purposes: assistance for burial ceremonies, mobilization of funds for economic activities (small scale business), etc. The *tontine* was based on rotating savings which enabled investments in commercial activities (maize storage and reselling, small scale commerce of imported products, processing activities etc.). The *tontine* is a common practice in Benin, for instance, the *Kugbê*, a saving organization for burial ceremonies was studied by Vodouhê (1996) in the Southwestern par of Benin.

During the time the *tontine* was operational, a villager from Djeffa, who spent several years in Nigeria, learned of organizations of some women groups which functioned very much like a cooperative. Those women together sold oilpalm, fish, cassava, *gari* and several imported products. Back in Djeffa, he felt the need to advise the women's *tontine* group so that they should organize themselves like the Nigerian women he had observed. The women's group in Djeffa evolved in this way as it was explained by Beatrice (see Box 7.1).

Box 7.1: Beatrice explains how the idea of creating a group emerged

One of our brothers had been in Nigeria several for several years. When he came back, he advised us that it should be nice that we work together. At this period, we agreed with him and explained to other women that we could create a group together and do more than what we do individually. We explained the idea to many women and about 60 inhabitants of Djeffa (45 women and 15 men) joined the movement. Then the *Association des Femmes de Djeffa*, the women's group, was created in 1988. Some women said at that period: if we work together, we will get more money through small business and keep our *tota* (household), get more food for the children through horticultural activities (called *jardin* by the women) The goal as explained by the women was to help in the amelioration of the well-being of its members in terms of economic and household needs.

Later, the fact that a few men were involved should be understood as one way to seek complementarity between women and men which enabled the development of several activities by the group. The group was ruled by a bureau chaired by a woman (see Box 7.2). The task of the bureau was to organize the members of the group to increase its performance to produce organic matter and improve the stability and the fertility of the soil. Solidarity exists within the group for helping the members during the burial ceremonies. A member of the group who lost a relative received support from his fellows. The members of the group assisted also in the ceremonies and its behaviour gives a sign of prestige based on the importance of a social relationship and a network.

Box 7.2: The composition of bureau of the women's group in Djeffa

- President (a woman)
- Vice-president (a woman)
- Secretary (a woman)
- Assistant secretary (a man)

- Treasurer (a woman)
- Assistant treasurer (a man)
- Organiser (a man)
- Adviser (an old woman)
- Responsible for propaganda (a woman)

7.3   Resource-Flow management from the perspective of the women's group

The principle of resource-flow management

The principle of the resource-flow management from the perspective of the women is based on an optimal use of the local agricultural products for processing, using by-products to produce organic manure for improving the stability and the fertility of the soil (see fig. 7.1). Resource-flow management is based on three basic interrelated economic activities: coconut fruit processing, pig raising and horticulture.

The first activity is the processing of kernels of coconut fruits into oil. Coconut fruits are bought from the *Station de Recherches sur le Cocotier* by the women for processing. The *Station de Recherches sur le Cocotier* has a big plantation of coconut trees near Djeffa. The kernels of the fruits are extracted and crushed in the mill. Large quantity of water is added to the pasty substance obtained from milling. Then, the mixture is filtered and the bran is separated from the liquid which is boiled to obtain the oil. The bunches of the coconut fruit and the nutshells are sold (they are used for fire). The bran that remains at the oil extraction (called *dja* by the women), the by-product of processing, is used in a second activity: pig raising. Feed for pigs in an important constraint in Djeffa. Increasing the scale of kernel processing into oil can provide more bran which is used to feed pigs. In this manner, a strong link between the first and the second activity is developed. The pigs are raised on a bedding consisting of grasses specially collected. The mixture of the pigs' excreta, urine and the bedding ferments to produce an important quantity of organic manure for horticultural activities. In this way, the group produces vegetables. Figure 7.1 reveals the synergy within the agroecosystem generated by the women's group. From a natural resource which is available in the area, the women produce an important quantity of organic manure to improve the fertility of the soil.
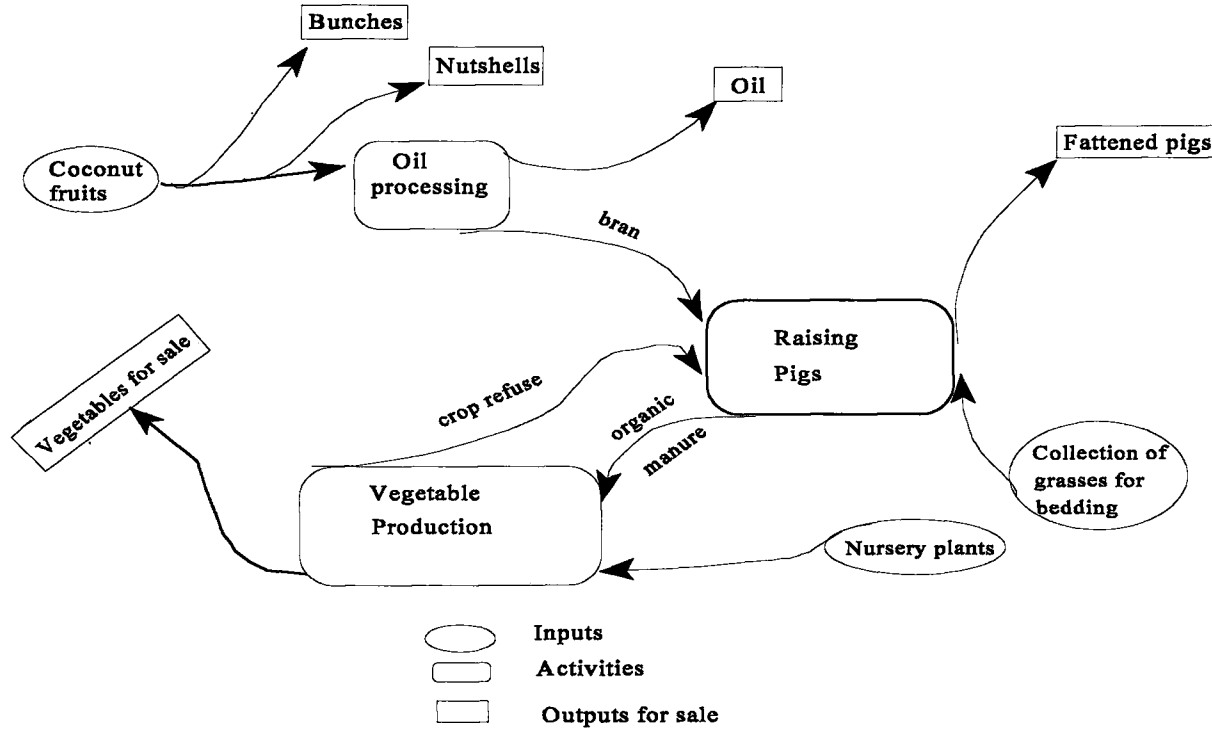
Figure 7.1:   Resource-flow management by the women's group in Djeffa

Photo 7.1: Organic manure collected from the sites for horticulture

Photo 7.2: The women work together to produce vegetables

The women's way of interpreting the importance of nutrients and implications for soil management

The production of organic manure through a combination of different activities provided nutrients to the soil. This practice of regenerating the soil by using organic manure was internalized by the women's group. Some concepts were developed to explain the 'movement' of nutrients in the soil. When the soil is used, their speech of *vivinontromè* which means that the nutrients are released from the soil, when organic manure called *gbo* is added to the soil, their speech of *vivinonbièmè*, which means nutrients enters the soil.

Vivi (which appears in both *vivinontromè* and *vivinonbiomè*) means something 'sweet' which gives 'force' to the soil. It was used by the women to designate the nutrients. The suffixes *nontromè* and *nonbiomè* explain the movement of the nutrients in the soil-plant relationship. They became convinced they 'they must bring something' to the soil, if they expected a good result to occur. The women's group in Djeffa learned experientially about the importance of nutrients in the soil for the growth of the plants.

The importance of nutrients in the women's perception can be deduced from their continuous practice of resource-flow management to grow healthy vegetables without use of chemical fertilizers. From the ecological point of view, the principle is based on exploiting complementarity and synergy in resource-flows by combining different activities to obtain the nutrients. The soil in Djeffa is very sandy. Organic manure produced by the women was appropriate to improve the structure of the soil. In this condition, one can say that organic manure ensured two ecological services: improving the structure and the fertility of the soil.

7.4   Collective action and resource-flow management by the women's group before the democratization era

The problem and perception with respect to resource-flow management

The problem as perceived by the women's group
A crucial problem faced by the women's group at the beginning of their initiative was the lack of funds for buying a large quantity of coconut fruits for processing. The activities are interrelated and the possibility to get some funds for the development of the first activity was a determinant to increase the scale of pig raising and then to obtain sufficient organic manure for horticulture. The only way for the women at that period to start this activity was to use the funds obtained from their own contributions (*tontine*). Nevertheless, according to the president of the group, the mobilization of the funds was difficult. The members wanted to keep the financial contribution to the activities as low as possible.

The initial idea of the women was that, in working together, they could improve food shortage in their households by producing vegetables. But according to the members of the group, the collective work was difficult because the activities were not well done as a result of unequal contribution in sharing the work. Two days (Wednesday and Thursday) a week were allocated for the collective work. However, many women arrived very late at the working place, the headquarters of the group. Another problem was that all the activities were not equally attractive and it was easier to get participation in some tasks than in others.

Gandudu, *Ahodudu* and *Houhouihouan* are three basic concepts which were used by the women to explain some of the problems they faced. *Gandudu* means leadership and the fact that many members wanted to lead the group did not help increase its performance. *Ahodudu* refers to members who chose deliberately not to reimburse the money they got from the group. *Houhouihouan* is the jealousy problem vis-a-vis the members of the bureau, the leaders of the group.

Collective action and Resource-Flow management: defining the problem

All the activities involved in the resource-flow management need money and labour for their execution. In concrete terms, processing kernels into oil requires money for buying the coconut fruits, the material for processing (pot, bowls), an infrastructure (a small factory); and labour is needed for the implementation of this activity. Pig raising also requires investment for buying the piglets. Labour includes the construction of the pig sties, the daily feeding of the pig, and the collection of grass for bedding. Horticulture was one activity which did not require money. The contribution of the members for this activity was based only on their labour for the preparation of the nurseries, and seedbeds, the collection of the compost from the pig sty, the transplanting the plants, daily watering, harvesting and selling.

Ensuring the provision of labour is most difficult. Not doing one's share is profitable for an individual member since she can still benefit as a member of the group. The women's perception of the problems that arose in the project (see above) shows that many members of the group were unwilling to contribute much effort to the activities. However, improving soil structure and fertility are highly related to a voluntary contribution of labour and money by the stakeholders to produce organic manure through the other activities. The problem can be redefined as how the group copes with this situation so as to sustain the activities.

The performance of the activities is related to the functioning of the group itself. Such functioning can be realized if the stakeholders participate in the discussion at the level of the group and contribute in terms of money to the functioning of the *Bureau* which represented the group. Other contributions to functioning of the group might be related to the control of the funds at the level of the group, collective support for the definition and enforcement of sanctions and rules of the group.

In view of the above, all the activities in resource-flow management would be difficult to women to carry out individually. The investigation of Schelhaas (1978: 22-3) draws a similar conclusion for the region of Sèmè-kpodji (including Djeffa). Collective action to pool resource-

flow management for improving soil structure and fertility as a basis for horticultural activity was a novel solution.

How did the women's group learn towards successful collective action for resource-flow management?

This question addresses the know-how of the women and the way they organized their activities to stimulate an effective contribution of the members. Some men are members of the group, and as will be explained, this was a strategic decision by the women (e.g., solving labour problems). A second aspect of the women learning concerns the definition of rules and sanctions and their enforcement.

Organization for the activities between women and men

The division of tasks was perceived as an important issue for the performance of the group. The women were convinced that they could not do some tasks involved if some men were not members of the group. Some tasks which were not done culturally by women are left to the male members. The complementarity between men and women is visible in the organization of the activities by the bureau of the women's group (see Table 7.1).

Table 7.1: The division of tasks in the Women's group in Djeffa

Basic Activities in the Women's Group	Gender related division of tasks in the Women's Group	
	Women	Men
Coconut processing	processing the kernel of coconuts into oil selling the oil produced	separate the kernel from the nutshell
Pig raising and production of organic manure	feeding the pigs collection of grass for bedding	construction of the sties
Horticulture	taking care of the nurseries (watering) transport the organic matter into the garden transplanting the plants watering the plants in the garden selling the products	fencing the garden preparing plant nurseries for the garden seedbed preparation harvesting the products

The tasks of the women were continuous through time. Every day the women were responsible for doing something (e.g., feeding the pigs, watering the plants). The tasks of the men were intermittent and happened at a certain phase of the execution of one activity, for instance sty

construction for pig raising and seedbed preparation for the horticulture activity. Instead of using wage labour for the tasks the women were not able to do, they accepted men as members of the group was a solution.

Rules, sanctions and access to shares in the group

The members of the group have their individual activities and affairs. They agreed to do collective work on Wednesdays and Thursdays. Wednesdays are devoted to the activities in the farms when the group is cultivating tomato, sugar cane, pepper, cassava, maize, okra and vegetables. It happens, very often in the rainy season, that all the members go to the farm for land clearing, sowing, weeding or harvesting. When the group has to do several activities together, for instance, pig feeding, cassava processing into *gari*, watering the plants in the garden (horticultural activities), some subgroups are formed to do various works together. A member is chosen to be responsible for the activity devoted to the subgroup. At the end of the work, there is a check of a member's presence in a notebook. When a member arrives and works, the sign (+) is ticked off to his or her name. For permission or an absence because of illness, the sign (p) is ticked off on his or her name. When a member is very late for an activity, he/her will not lose the day when it is possible to do an amount of work equivalent to the work already done by the others. Otherwise, the day does not count. For absence without a convincing reason, the sign o is used. For each activity, the number of working days is known and the contribution in working days of each member. These results give the basis for the distribution of the benefit in the group. The absence to any activity is sanctioned by an equivalent loss of the shares.

Every Thursday, the members meet at the headquarters of the group in Djeffa. It is an occasion for the members to discuss several issues: organization of the work during a week and distribution of the tasks, information on correspondence with the group (letters are translated for the members who can not speak and read French) and monitoring of presence at the activities. The money for the weekly *tontine* is collected on Thursdays and the subscribers sign a savings bank-book (250 FCFA/month for the women and 500 FCFA for the men). This money is used for collective activities in the group for which there is no credit. As explained earlier, when the group started, all investments (buying coconuts and processing into oil, small investments for pig raising) came from own savings. When a woman would like to join the group, this issue is discussed in the Thursday meeting. A member of the group is not free to involve a new member without the agreement of the others (see Box 7.3).

Box 7.3: Beatrice, the eldest of the women, explains the procedure to accept a new member in a group

Working in a group is not an easy task. You must know each other first. When a man or a woman comes to us and would like to join the group. We have to decide in a meeting. If anybody knows that the candidate created any trouble in other groups, we would not accept the request. However, if everybody is convinced that the candidate is serious, we can accept temporarily and see his or her *walo* (behaviour, way of doing) during a certain period (minimum three months) before a final decision. When a woman is in our group, we can accept her husband. All the women do not have their husband in the group and all the men do not have their wives in the group.

The members were discouraged when immediate benefits were not forthcoming. Many members tried to avoid making sacrifices after the creation of the group. This problem was a reason for some people to leave the group (see Box 7.4).

Box 7.4: Beatrice explains why some members were not motivated and left the group

We did very difficult work, for instance, we decided to repair the street which leads to our meeting and work place after the creation of the group. The street was very sandy and going there with motorbikes and cars was difficult. We collected loamy sand 2 km from to our place. Some members found the work very hard and they did not perceive the 'immediate benefit' and left the group. Maybe the people left because we did very difficult work. Some of them got credits through the group and did not pay back and we punished them (*esinxoé*). Some women left because they had the ambition of *gandoudou* (to rule the group, leadership) but they did not succeed because they were not elected. Those women created other groups to realize their ambition but they have failed and their groups disappeared. After that they came back to renew their membership with us and we refused. I could not know that we should be in the stage we are today. Since so many people could see that we are progressing (many visitors to the groups with cars and motorbikes), several groups have emerged in the village Djeffa to imitate us. Now you could count more than 15 groups in Djeffa. However, other members were confident that in the future the group should be profitable for everybody if they were very courageous to continue. The number of memberships decreased from 60 at the beginning to 40 (25 women and 15 men). After this hard work any visitor could arrive at our headquarters with their car or motorbike.

Effects of learning processes within the women's group

At the early stage of the formation of their group, the women started monitoring the participation in the collective activities. Sanctions were installed to deal with free-riders. The fact that many women and men were excluded (*esinxoé*) could be a sign of the effectiveness of these sanctioning structures. Dynamics observed at the level of the women had the effect to maintain the group and engage in successful collective action. However, as will be analysed, external supports contributed to these dynamics for ongoing resource-flow management activities.

External supports for the women's group in Djeffa

The government extension organization: the CARDER-Ouémé

The women's group in Djeffa emerged at a period when there was not really an existing framework for the support of local initiatives (Dangbégnon, 1994). For instance, the extension work of the CARDER was characterized by a top-down approach. The CARDER organization was the official structure for rural development in Benin within the 'Marxist political regime'. The Village Extension Worker (VEW) assisted the women's group in the framework of its conventional activities. As described by Tossou (1995: 55), the CARDERs focused on the organisation of local groups, input supply, the provision of credit facilities to farmers' groups, and on-farm testing of technologies (e.g., new varieties). At that period, the CARDER-Ouémé was using the Training and Visit (T&V) system (for more details on the content of the T&V system: see Benor *et al*, 1984). The women's group in Djeffa was opportunistically targeted

as a contact group by the CARDER-Ouémé people. The projet *foyer amélioré* was introduced by the CARDER in Djeffa through this group. The group received advice about how to organize a group to perform effectively, and this task is called *animation coopérative* by the VEW. The group could also get assistance in agricultural product processing (coconut fruit processing into oil), and access information on new ways of farming as explained by Assiba in Box 7.5.

Box 7.5: Assiba appreciates the support of the CARDER to the group

When we created our organization, the CARDER people arrived and helped us. We learned how to cultivate vegetables to have a good yield. Every two weeks the *Glegan* (Village Extension Worker) visits us. He brought a herb (Mucuna, a soil cover leguminous plant) which helped destroy the hard weeds (*Imperata cylindrica* called sè) in the farms.

The women's group was chosen, opportunistically, as a contact group for extension activities by the VEW. The VEW visited this group twice a month. The *foyer amélioré* (a device for economic use of firewood) was introduced in Djeffa through the women's group. This opportunity was perceived as a privilege and a reason for maintaining one's affiliation to the group. The stakeholders were also proud to be regularly visited by the VEW because the other villagers who were not organized in groups did not attract CARDER staff.

The support of CARDER did not have a direct link with the resource-flow management activities. However, training of local barefoot promoters for the *foyer amélioré* might have presented an incentive to maintain the group for a similar further opportunity.

The actions of the NGO CIRAPIP at the initial stage of the women's group

CIRAPIP (*Centre d'Information et de Recherches pour l'Auto-Promotion à l'Initiative Paysanne* = Research and Information Centre for the Auto-Promotion of Peasants' Initiatives) is one of the NGOs created in 1984 during the Marxist regime[3] (cf. also Vodouhê, 1996: 119). This NGO established contact with the women at the beginning of the creation of their group. *Animation rurale* was carried out with the objective to reinforce the organization of the group. An animator made regular visits to Djeffa. The stakeholders learned how to increase participation in a group by establishing rules and norms within a group.

The fact that the majority of the stakeholders in the group was illiterate was a bottleneck in their participation in many activities outside the group. This problem was perceived by the CIRAPIP. So they carried out an alphabetisation programme. The aim was to enable the *responsabilisation* of the stakeholders, increase the accountability, and ensure a good functioning of the group.

CIRAPIP developed a social assistance programme called PCN (*Programme Communautaire de Nutrition* = Community Nutrition Programme) with the women. This opportunity was appreciated very much by the women's group. Through this programme, two women of the group were trained, they are called *Agents Communutaire Nutritionel* (Community Agents for Nutrition). Their task was the *suivi nutritionel*, which means the

control of the way the children are fed in relation to their heath. They weigh the children in Djeffa, control their growth, provide a *conseil* (advice) for the women about the nutritional state of their children and how to improve it.

The most important issue in the support of the CIRAPIP was providing the members with food which was negotiated with the EEC (European Economic Community) representation in Benin. They received maize, rice, oil and milk from the CIRAPIP for collective activities. This opportunity was motivating for the members and they appreciated the extent to which the maintenance of the group benefitted (see Box 7.6).

Box 7.6: Assiba assesses the importance of the CIRAPIP for the maintenance of the group

We have suffered for the progress of our group. Many people left but we continue with endurance to work together. I will not remember what the CIRAPIP did for the consolidation and the organization of the group. We got more food from CIRAPIP. Because of this opportunity, the women who left early the group had tried several times to join us again and benefit but they failed. They created their own group, hopefully to obtain food but they did not succeed.

Institutional framework and the policy context for the external supports

The role of the NGOs in helping the local organization did not exist at that period within the government institutional framework for rural development. Nor did rules exist for the functioning of local organizations like the women's group in Djeffa. Existing structures were the *Groupement Révolutionnaire à Vocation Coopérative* and *Groupement Villageois* under the control of government organizations such as the CARDER. The existing government organizations could not provide the women's group sufficient opportunities to satisfy their various needs and support the activities in which they were already engaging.

The policy context was characterized by a monopoly of the government organizations for the support of local organizations. One of the consequences was that, blanketing actions and strategies (e.g., a 'commodity approach', focusing on cotton production) were adopted and the diversity existing ecological and socioeconomic conditions of stakeholders in various locations of Benin are neglected. The policy context did not provide enabling conditions under the blanket national policy of the 'Marxist regime' based on the centralization of decision-making power.

Can successful collective be maintained for an ongoing resource-flow management within the women group in Djeffa?

Before the democratization, the women's group started with many members. Some members left because of leadership problems or an absence of immediate profit. However, the learning processes of the group itself was crucial for maintaining the group and collective action. Monitoring of activities reduced space for free-riders. A sanctioning structure was established which provided an environment in which the members had the assurance that the rules were

followed by everybody. The CIRAPIP provided external support for maintaining successful collective action which benefited ongoing resource-flow management activities.

7.5   Collective action and resource-flow management during the democratization era

Changing context and new dynamics

At the end of 1989, the failure of the Marxist regime in face of a severe economic crisis in Benin led to a shift in the national political system[4]. Later the Beninese adopted a liberal regime and a multiparty system in the *Conférence Nationale*[5]. As will be noticed, these changes implied a new dynamics in rural development and opportunities at the local setting. The monopoly of the CARDER organization in rural development activities in Benin has changed. Associations are allowed and there is a mechanism for their official recognition. The new political environment enables the emergence of many NGOs for the promotion of rural development.

Within this new context, the women's group in Djeffa started looking for opportunities to enhance the resource-flow management activities. In 1991, the group joined a networking movement for the development of *Agriculture Durable* (sustainable agriculture) in Benin[6]. In January 1992 the women's group in Djeffa participated in the creation of a network called REDAD (*Réseau de Développement d'Agriculture Durable* = Network for Sustainable Agriculture Development). The group became a founding member of REDAD. This network aims at promoting sustainable agriculture in Benin with local organization like the women group in Djeffa. It involves NGOs with activities related to sustainable agriculture, and individuals in research institutions and agricultural development agencies in Benin.

The objectives of the REDAD were the following:

* to create a linkage between local organizations/associations with NGOs and professionals in research and development activities to strengthen local capacities in practising sustainable agriculture;

* to exchange information and experiences related to sustainable agriculture (through joint field visits, newsletters, on-farm trial visits etc.);

* to create a contact between local organizations/associations and international development organizations and donors in the way that they should active in the negotiation of their 'own development'.

The NGOs were also interested in local organizations like the women's group in Djeffa which already had some successful initiatives. For instance, resource-flow management by the women's group in Djeffa was a 'model' at the beginning of the REDAD. Parallelling this network movement, the group multiplied their contact with many NGOs and this is an indication of its dynamics[7].

Revisiting the perspective on resource-flow management

The women's group is continuously looking for ways to sustain their integrated system based on resource-flow management. According to the women, coconut fruits became very expensive and making a profit is difficult. Especially, when the coconuts are purchased far from Djeffa, transportation costs are very high. So oil processing was done when coconut fruits could be purchased around Djeffa to avoid transportation costs. As an alternative, the women introduced cassava processing which has a direct role in their resource management principle. The peels of cassava and the bran obtained after processing cassava, are used to feed the pigs (see fig. 7.2). The constraint in cassava processing is the absence of a grating machine. Manual grating to process it into *gari* is time-consuming. They bought cassava or coconut fruits and sometimes additional organic fertilizer (as Assiba explains in Box 7.7.).

Box 7.7: Assiba explains the problem caused by a scarcity of coconut fruits

We got money from the 'reseau' (REDAD) for pig raising. We bought 22 pigs to fatten. The scarcity of coconut fruits for processing has caused a lack of waste for feeding the pigs. We bought additional waste of a brewery to feed the pigs. We did not make profit on this activity. We cannot stop pig raising because we need the organic manure for horticulture.

The problems and perceptions

The problem as perceived by the women

After working together for some years, the women appreciated the progress of the group. They referred to economic problems and their well-being (*Ninonmê-miton*). Three basic criteria were identified: economic performance, promoting individual members of the group, and maintaining the group for collectively managed resource-flow.

The first criterion, the economic performance, is an emergent issue within the group. How can the women organize their activities to make profit? This question became a particular problem for the women. As will be shown later, they obtained many credits and they perceived that the more efficient they are, the more many external supports will trust them.

During the author's discussion with the women's group, the president requested a training for them so that they would be more efficient.

The desire of the individual members of the group was to make a difference in the village Djeffa. According to them, it is very important that the other villagers would have a positive 'image' on them because they belonged to a group. They would feel ashamed if other villagers did not perceive any change in their livelihoods. This would mean that the group was not doing very well.

Maintaining the group became equivalent to keeping up their various activities. The members became more conscious that individually they would not be able to capture all the opportunities they had as a group.
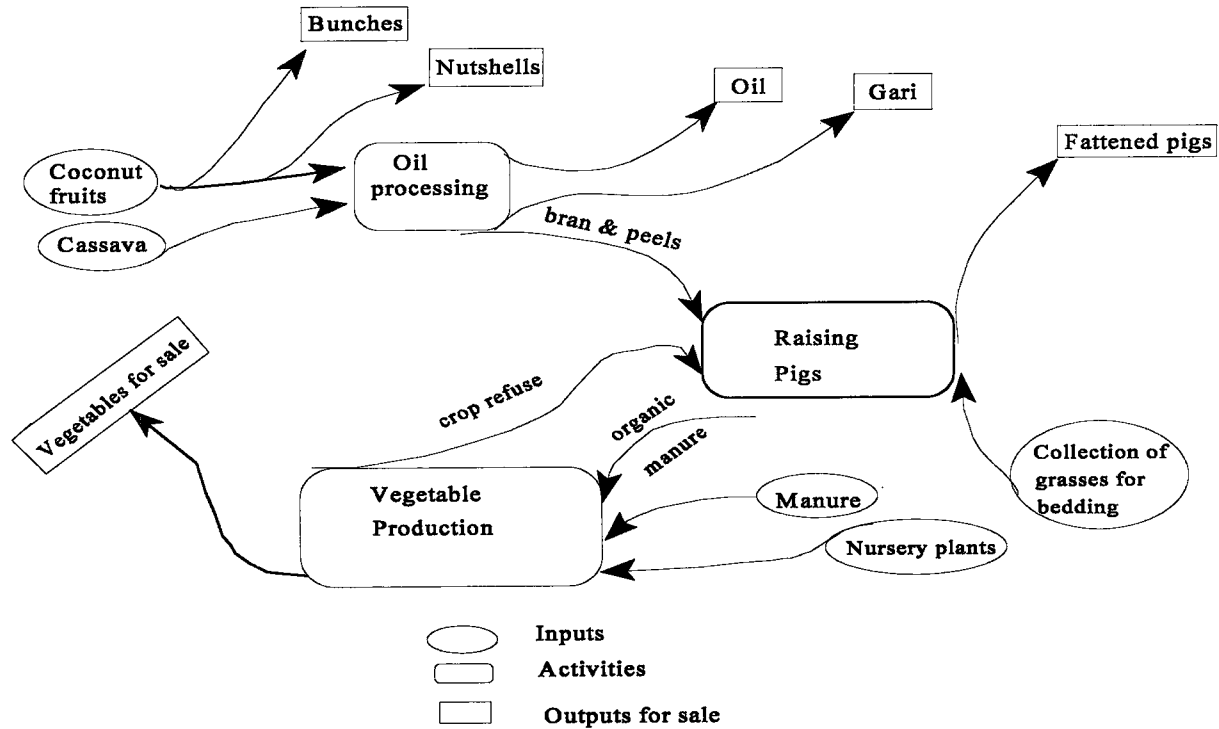
Figure 7.2:   Resource-flow management revisited

The problem as perceived at the level of REDAD

REDAD is more interested in the resource-flow management activities. This practice was a 'convincing model' of *agriculture durable* at an early stage of this network. Maintaining and improving such practices are a crucial problem within the REDAD. However, the participation of the women's group (and other groups) in REDAD's meeting was a way to arrive at agreement about a collective resource-flow management in Djeffa. Membership fees from the women's group, other contributions for the realization of activities (within REDAD), and members' suggestions and feedbacks are required for maintaining also REDAD. If the local organizations which are members of REDAD did not contribute, this network probably could not perform. However, good functioning at the level of REDAD has implications for the performance of the local organizations which are members, especially the women's group in Djeffa (provision of opportunities, ensuring the follow-up of activities, etc.). Members of REDAD knew that this network would not have a *raison-d'être* for *agriculture durable* without dynamic local organizations such as the women's group in Djeffa

Defining the nature of the problem

The provisioning problems described earlier (see §7.4) are still seen as a critical issue by the group members. The problem has become more important as the women's group became involved in more activities as will be analysed later. More individual contributions (e.g., labour, mutual monitoring) are required to make profit. Nevertheless, mobilizing a voluntary collective action remains a living problem in resource-flow management.

The fact that the women's group is a founding member of REDAD implies the facilitation of successful collective action by activists from this network is also related to the provisioning problem at the REDAD level. All the components of the REDAD must provide more for a good functioning of REDAD. Voluntary collective action is also required at a higher level than the women's group in Djeffa.

Joint learning between REDAD and the women's group for enhancing resource-flow management activities

The structure and organization of REDAD

REDAD involves a coalition of farmers' organizations, NGOs, and individuals who are researchers, development professionals or consultants. Recently the number of the farmers' organizations which are involved in the REDAD's activities reached 200. About 50 NGOs and 100 individuals participate in this network.

The structure of REDAD is presented in fig. 7.3. The General Assembly is an annual meeting which involve all the members of REDAD[8]. The role of the meeting is to approve the planning of activities for REDAD, the acceptance of new members, the election of the members of the Administrative Council (every three years), and the re-adaptation of

institutions for the functioning of REDAD. This council involves a president, a general secretary, a treasurer, two representatives of the farmers' organizations, one representative for the coalition of the NGOs, and one representative for the coalition of individuals. The role of the council is to monitor activities, and support decision making about the execution of activities by the Executive Directorate.
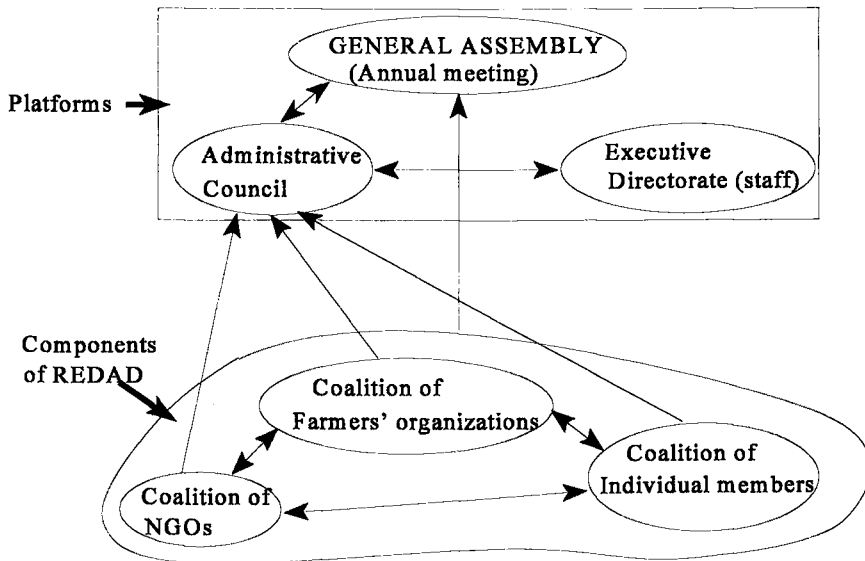
Figure 7.3:   The structure and organization of REDAD

Although REDAD is composed of different coalitions, a 'meeting point' of their different interests emerged. Farmers' organisations are motivated to get money for their activities even if there are no constraints which need funding. Individual members of REDAD are motivated to give intermittent assistance and get perdiem. NGOs are motivated to provide technical assistance and to manage funds. Nevertheless, many lack a clear perspective on how to organize collective learning with farmers' organisations. All these interests are visible at the level of General Assembly, the Administrative Council, and the Executive Directorate which function as the platforms of REDAD. Activities on which these platforms agreed resulted from negotiation and collective decision making (as will be explained later).

Learning about constraints and opportunities for enhancing resource-flow management

A growing interest emerged in Participatory Technology Development (PTD) with the local organisations involved in REDAD for the development of *agriculture durable*. This idea was perceived since the beginning of the networking activities. Visits by professionals who are members of the REDAD, to the local organizations started. The women's group in Djeffa received particular attention because their existing initiative that attracted professionals. During first contacts[9] with the women's group, group discussion yielded many problems that called for assistance within the REDAD.

The constraints of the women in resource-flow management concerned a lack of funds for buying more coconut fruits to increase oil production. Implicitly this would increase the number of pigs they could raise. Land insecurity for their horticultural activities was also perceived. They had borrowed land and this presented some problems with respect to investments such as the construction of wells. However, the women are motivated to develop their activities. They sent a document to the headquarters of REDAD with the following requests for support: tools for horticulture, construction of cement pig sties, increasing the level of pig raising activities, assistance for a project in aquaculture, and the construction of a shed for processing activities. Meanwhile, the immediate interest of REDAD was in the women's horticultural activities based on organic manure. Therefore, it was decided to engage in preference ranking with the women.

Being a member of REDAD, I was in a position to plan and implement this exercise with the women's group in 1995. It started by group interviews and the following existing activities were identified: (1) *tontine*, (2) horticulture, (3) pig raising, (4) coconut processing, (5) maize marketing and (6) cassava processing. After that, we agreed on icons to visualise the activities. I drew the icons, showed them to the members and they made sense to them before we started the exercise. I drew a paired-wise ranking matrix on a large sheet of paper located in the midst of the participants. I placed the icons on the Y-axis of the matrix and explained that the same icons would be placed also on the X-axis. We decided that some signs instead of icons should be used in the X-axis to save time. The next step was how to proceed. We divided each cell into two sub-cells and identify the 'jargon' that should help to move in cells and sub-cells. The Y-axis was called *odo* (lower level) and the X-axis *aga* (upper level). In each cell, the position at *aga* is the corresponding X-axis and the position at *odo* for Y-axis. To fill the matrix, all the participants have maize grains. For each combination of two activities, they could follow the rule of *aga* and *odo* to fill the cells. The maize grains are replaced by dots with pen to avoid disorder. Each cell represents a comparison (in terms of votes expressed by placing a maize seed) between the activities (see table 7.2 and photo 7.3).

Table 7.2: Result of matrix ranking with the women' group

	tontine	pig	horticulture	coconut processing	maize	cassava processing
tontine						
pig	8 3					
horticulture	6 5	6 5				
coconut processing	5 6	6 5	6 5			
maize	3 8	2 9	3 8	2 9		
cassava processing	6 5	6 5	4 7	2 9	10 1	

Each cell represents a comparison (in terms of votes expressed by placing a maize seed) between two activities.
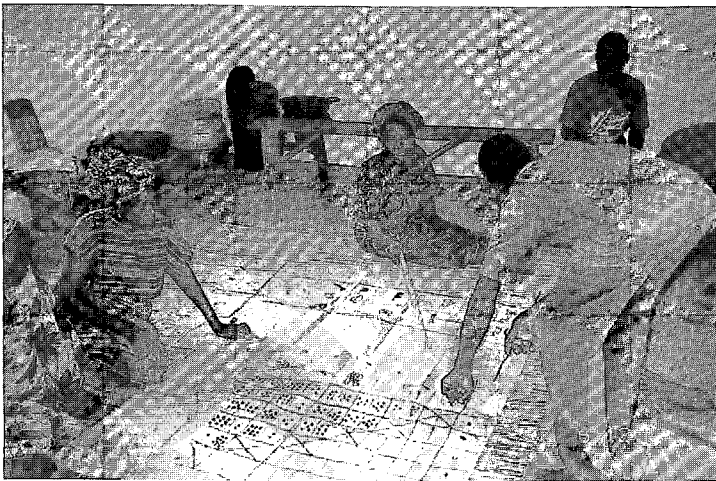
Photo 7.3: Ranking exercise with the women

The high score for maize marketing can be explained by the fact that this activity could mobilize an important amount of money and therefore attracted more members of the group, especially the women. *Tontine* provided credit opportunities and contributed to the maintenance of the group as a woman said: 'if you are not a member of the group, you will not benefit'. Cassava processing into *gari* was appreciated because each member could get her share for home consumption and the remaining was sold. Pig raising and horticulture are two closely related activities, the first provided organic manure for the second. The lower score of coconut processing activity can be explained by the decrease of profit and the difficulty to get the coconut fruits. Our immediate learning point after the exercise was that the *Tontine* contributed greatly to the development of individual affairs, and this could explain the endurance to maintain the group.

These results constituted background information for REDAD for making decisions about possibilities for external support of the women's group.

REDAD as a platform for decision making about the support of resource-flow management

The promotion of *agriculture durable* requires financial resources to carry out some activities with the farmers' organizations. The idea of the *micro-projet* (small-scale project) was developed within REDAD. Farmers' organizations would be allocated some funds (maximum 500,000 FCFA) for the development of specific activities related to agriculture durable. The idea was approved by the donor ICCO (Duteh Church Organization) and REDAD could obtain within its triennial programme (1995-1998) funds for 30 *micro-projets* (cf REDAD, 1995). The fact that the number of the farmers' organizations has increased tremendously[10] made allocating some funds to the farmer's organization within REDAD a complex political decision because all of them wanted financial assistance.

The women's group was among the first farmers' organization in REDAD. The age criterion gave an advantage to this group. After a discussion in a commission created jointly by the Executive directorate and the Administrative council, the decision was made to finance pig raising activity for the women's group so that a large quantity of organic manure would be produced for horticulture. The *micro-projet* of the women was selected and the group was provided with 500,000 FCFA, in the form of loan that the group had to reimburse.

Financial support of REDAD for resource-flow management activities: learning about social processes at the level of the women's group and REDAD

When the women got the funds, they did not exactly follow the plan of the *micro-projet* designed with them. They built some cement pig sties for the pigs. They bought 22 piglets to be fattened. The remaining money was used to rotate among the members as individual credit. Pig raising activity was not successful, the period coincided with a scarcity of coconut fruits and cassava. According to the women, they bought feed and realize that the cost was becoming important while they did not do any calculation[11]. However, the loan allowed the women to realize other projects, for example maize marketing (explained below), which allowed them

to reimburse the credit after a period of hesitation. The women's group wanted to have the assurance that other farmers' organizations which got the same credit were also going to reimburse.

The NGOs in REDAD sought to become managers of the funds of the *micro-projet*. None of the farmers' organizations such as the women's group in Djeffa, accept this. This in turn decreased the motivation of the NGOs to assist them. NGOs did not learn with the farmers' organization to strengthen their capacity in *agriculture durable* as planned by REDAD. The Executive Directorate did not succeed in mobilizing existing competencies among the individual members to ensure good coordination.

Analysing the effectiveness of REDAD's financial support: what are the implications for the facilitation of successful collective action for resource flow management?

The support of REDAD should be more than providing financial assistance and controlling funds claimed by NGOs within REDAD. The NGOs did not perceive any incentive to play a new role for the support of the women's group for instance monitoring the increase of the performance of the women's group. Also, there is a great diversity in the professional competencies of the individuals within REDAD (biodynamic horticulture, integration of livestock production with horticulture, green manure management, alley-cropping, etc.) which could be conducive to sustainable agricultural development.

Moreover, coordination at the level of REDAD did not yet emerge. This role should be taken seriously for enhancing synergy between individual members and NGOs towards a voluntary collective action within REDAD. For instance, bringing out the newsletter *NOUVELLES du REDAD* is difficult because everybody is interested in activities which are immediately remunerated.

Despite the problems encountered by the women's group, successful collective action is maintained. Maybe this can be explained by the various other opportunities from external support.

Various other opportunities from external support: what are the effects on the women's group?

Non-formal education through learning and exchange of experiences within REDAD

The women's group benefited from many activities of REDAD. They participated to a field visit to learn about the realization of the RAMR project. Thus they discovered how *mucuna (Mucuna pruriens var. utilis)* is used to improve the fertility of the soil and to control a hard weed (*Imperata cylindrica*). Alley-cropping systems designed with *Gliricidia sepium* and *Acacia auriculiformis* were also learnt. The group participated in a field discussion at the *Centre agro-pastoral* of Sê (in Mono Province), where the participants got the opportunity to learn how goat and sheep production can be linked to bio-dynamic horticulture.

Field visits organised by REDAD stimulated exchange of experience and generated collective learning among the participants. This activity helped to establish direct contact among stakeholders within REDAD. Many contacts were developed by the women's group in the context of REDAD.

The farmers' organizations very much appreciated exchange of experience, especially the trip to Burkina Faso to meet other local organizations. Despite a contribution (10,000 FCFA) requested from the participants, the selection of candidates was always difficult. For instance in April 1997, two women travelled from the Northern part of Zou Province to bring their contribution to the headquarters of REDAD and register for the trip to Burkina Faso. The selection of participant within the women's group in Djeffa was difficult. A meeting was organized by the group to decide. Two men in the group were very interested to go to Burkina. The president of the group also was interested but her husband died at that period and she could not go. After a discussion, other women could not go. The decision was made that they should designate one person and the men should do the same. They decided to go to the headquarters of REDAD to negotiate two participants for the group instead of the one fixed by the Executive Directorate. During the visit, the members of the group explained to me the problem and called for my assistance in the negotiation at REDAD headquarters. They sent 20,000 FCFA to prove that they could pay for two participants. I went to the Executive Director of REDAD. However, he told that having two participants for one group was not possible because it was difficulty enough to provide one place for each group which wanted to come. Finally the president of the group designated a man for the trip to Burkina Faso.

Training opportunities for the women's group

Many members of the women's group were trained. Two members were trained in the NGO *Songhai* for the identification and implementation of integrated activities. *Songhai* is a well known NGO for combining aquaculture, animal production (pig, goat, sheep, chicken) and crop production in an integrated production system.

Four members (two women and two men) were sent to Lomé by the *Centre Béninois pour Développement Economique et Social* (CEBEDES), for training in compost making organized by the *ssociation pour l'Autopromotion des Jeunes sans Emploi et des Groupement Agricoles au Togo* (AGEGAT), a Togolese NGO. After this training, some representatives of this NGO arrived in Djeffa to see how the group applied what they had learned. The president of the group (woman) was trained in leadership by the *Association des Personnes Rénovatrices des Technologies Traditionelles* (APRETECTRA). APRETECTRA and SONGHAI are members of REDAD. The training opportunities were the result of networking within REDAD. With the help of the CARDER-Ouémé, the group had a contact with the *Centre de Traitement des Ordure Ménagères*(CTOM), a NGO in Tohouè, a village around 10 kilometres from Djeffa. Two members of the groups were trained during two weeks in composting techniques, especially in aerobic conditions (i.e., with oxygen), the methods learned in Togo is anaerobic conditions (i.e., without oxygen). The General Directorate of CARDER-Ouémé

has organized a Training session in aquaculture (the technique called *Hwedo*, explained in the Lake Aheme case.

Strengthening the tontine activity of the women's group

CEBEDES introduced a new form of credit for the women's group to strengthen their tontine activity. The members of the group called it *Dupko* ('you eat and it remains'). The loan obtained from CEBEDES was 200,000 FCFA with 1% interest/month (the group also gets back 1% interest/month). This money rotated among the members of the group. CEBEDES introduced a saving booklet for each member. Every Thursday, each member of the group gave an amount of money which is recorded. Depending on the importance of the saving a member had made, he or she could request a loan from the money provided by CEBEDES for individual activities. The savings recorded in the booklet was a guarantee and an indicator of the money a member could get as a credit. At the end of the year, each member got back his or her total amount of money recorded in the booklet. This could be used as a capital to start a personal business. The women appreciated very much this activity and requested more money for credit. The problem which emerged was that the credit allocation caused internal friction and the money requested exceeded savings recorded in the booklet. New rules were adopted and the beneficiary presented other guarantees. For instance a member of the group received a loan which exceeded the money recorded in her booklet. She presented one pig, one goat and her radio as a guarantee.

Credit opportunities by linking the women's group to a government project

The women's group was involved in a government project on food security (PILSA: Projet d'Intervention Locale pour la Sécurité Alimentaire) by CIRAPIP NGO. Credit was obtained for maize marketing. The women bought maize during harvesting period and resold it when the price was higher. The group got 330,720 FCFA for this activity and the CIRAPIP observed their capacity to manage the funds. The result was successful and CIRAPIP supported them for the second time with 500,000 FCFA and later with 800,000 FCFA. The support of PILSA/CIRAPIP enabled the construction of a storage house for the maize selling activity. The contribution of the group was 20% (10% for labour and 10% as financial contribution) of the total cost of the storage house (400,000 FCFA).

The women found this activity very fruitful and they make profit after paying back PILSA. The group could reimburse credit obtained from REDAD with this activity. In the group, some members would like to redistribute the profit (option 1) while others preferred to invest this money in maize production (option 2). I joined fortuitously the discussion. During the discussion the men were for option 1 and the majority of the women for option 2. According to the adepts of option 1, a redistribution of an amount of the benefit should be motivating. The adepts of option 2 demonstrated that if they reinvested the benefit the maize production, they would have mobilized much money for their own to continue the maize activity. Option 2 got most votes and was adopted. The members of the group discussed among themselves to reach an agreement.

New dynamics and changing practices by CARDER's extension worker for the support of the women's group

Discussion above shows how the women's group is involved in a large network which created many opportunities. Critical incidents in working with the women reveal how these dynamics have stimulated changing practices by a CARDER's extension worker (see Box 7.8).

Box 7.8: A new way of working by a Village Extension Worker with the women's group in Djeffa

On Thursday, I was talking with the women's group in Djeffa. The Village Extension Worker of CARDER Ouémé arrived for his regular Training&Visit. I encouraged him to carry out his activity (I wanted to know the content of his activity with the women that day). He planned to teach the women how to use a biological pesticide, the seeds of *Azadirachta, indica* to treat the vegetables. He explained the whole process and demonstrated it immediately to the women's group. They treated their vegetables with the solution prepared with the Village Extension Worker (see photo 7.4). At the end of this activity, the Village Extension Worker asked the following question to the women: what do you want me to teach you the next visit? A woman said that her goats had an infection on their skin. He replied and said that: I know how to treat these diseases. The other women also agreed that this issue would be the topic for their next session with the Village Extension Worker.

Photo 7.4: The extension worker is showing how to use a bio-pesticide

This Village Extension Worker based his activities on the demands of the women's group. The latter would not have paid much attention to his visit if the extension activities did not match their needs. The Village Extension Worker observed that (as he explained to me) the competition with many NGOs required a change on their own practice, and working on specific interests of the target groups.

Analysing the effects of various external supports on the women's group

The diversity of external supports created an environment in which the members of the group did not have incentives to leave the group. Many opportunities such exchange of experience, training, credit, marketing, etc., were offered. Beyond the collective benefit from external supports, credit obtained for the rotating saving and loan scheme enabled individuals to develop their own activities which were also very important for the members of the group. Therefore successful collective action was also maintained for resource-flow management.

7.6   Conclusions

The present case study demonstrates that resource-flow management can be effective for improving soil fertility in Djeffa if successful collective action can be maintained. Factors that affect successful collective action are related to the nature of the group itself, the context and the existing opportunities

With respect to the group, the capacity for generating institutions such as collective decision-making, monitoring, and sanctioning are critical factors for maintaining successful collective action.

With respect to the context, the present case study shows that a shift in the political system of the country has implications for making grass-root development processes more dynamic.

The more the context enables the development of pluriform initiatives (e.g., the emergence of NGOs in Benin), the higher is the access to opportunities provided by external support for local organizations such as the women's group in Djeffa. In these circumstances, the members a group can only maintain their public goods to sustain these opportunities. In this manner, the conditions are established for continued ecological practices such as resource-flow management which require successful collective action.

Notes

1. *Gari* is a product obtained from processing cassava

2. Within my training for the degree of Ingenieur Agronmone at the FSA/UNB, I did my stage on regional planning in the *Sous-Préfecture* of Sèmè-kpodji (including Djeffa) in 1988. This gave me the possibility to understand the major opportunities and socio-structural problems in this region.

3. During this period, the Marxist regime forbade development initiatives outside the government structures such as the GRVC (*Groupement Révolutionnaire à Vocation Coopérative*).

4. In December 1989, the central committee of the unique political party in Benin rejected Marxism-Leninism which was the only political option since 1975.

5. In February 1990, different representatives of the nation in Benin met to discuss about a new political option. This event is called *Conférence Nationale*.

6. I was also involved in this movement as one of the main initiators of the networking process for the development of the *Agriculture Durable* in Benin.

7. Before the democratization, the women's group had only contact with CARDER and CIRAPIP. During the democratisation the group has contact with CARDER, CIRAPIP, REDAD, CEBEDES, APRETECTRA, CTOM, , USPP, AGEGAT, NGO Songhai, etc. (see glossary for explanation).

8. With the growing number of the members of REDAD, the General Assemblies are costly. There is actually a debate for the choice of representatives at the level of Sous-Préfecture for the General Assembly.

9. I was the General-Secretary of REDAD. This position enabled me to be involved in these activities.

10. In 1992, only 4 farmers' organizations were involved in REDAD's activities. The activities of REDAD attracted many local organizations. Their number is growing very fast.

11. During the present case study, the women requested training to be able to follow-up their expenses to monitor whether they are making profit or not.

8 Regenerating the Maro Forest in Burkina Faso: The Evolution of Platforms for Resource Management[1]

E.S. Nederlof & C. Dangbégnon

8.1 Introduction

More and more of the world's forest resources disappear due to human interventions. The quantity of trees decreases at an incredible speed and former forests are left as deserts. This alarming forest situation is what this chapter is about. In 1980, 52% of Burkina Faso territory was natural forest (a Common Pool Resource) that degraded due to droughts, bush fires, agriculture, illegal woodcutting, and overgrazing (DREEF, 1996). From the natural forests of Burkina Faso, 25 % (3,8 million hectares) are protected and officially considered state property. An increasing problem is the uncontrolled wood cut in these forests to satisfy the ever-rising demand of fuel wood in large parts of the country. This case study deals with a classified forest in the south west of Burkina Faso, the Maro forest.

Our first acquaintance with the Maro forest was facilitated by PNGT members - more about this project in 8.6 -, who let us visit and fall in love with this beautiful place. To get a first impression of the history of the forest, existing documents were consulted. These documents include not only official project documents (e.g. Equipe Mobile Pluridisciplinaire du Houet, 1993, 1995a, 1995b, 1996, 1997; Equipe Technique Forestière, 1996), but also reports of studies (e.g., Drabo, 1985; Kaboré, 1995; Sanou, 1995; Sidibe, 1992, 1996; Zoungrana, 1996).

In a second stage two of the twenty-one villages surrounding the Maro forest were studied. The first criterion to select these villages was the existence of forest activities by the villagers. There are several reasons why Kadomba was chosen; an important one is that the PNGT describes Kadomba as an example village and many of their activities are executed here. It gives us the opportunity to study a successful case of collective action. Practical advantages motivated this choice. Bekuy is quite a different village than Kadomba, because it failed in a lot of activities that required collective action (individual goals were properly reached) from the viewpoint of the PNGT members. This village might teach us about the conditions that should be fulfilled to come to collective action. During a stay in these villages semi-structured and non-structured interviews were held with the different stakeholders. Group interviews were an instrument to obtain insight in the problems and foreseen solutions within a village community, individual interviews were held to gain more precise information. Participant observation and direct observation were an equally available source of information.

In addition to the villagers, we spoke to other stakeholders; members of the PNGT, the Forest Agency/ministries and the *groupement* for donkey cart holders and lorry drivers.

In the first paragraph (8.2) of this chapter the Maro forest ecosystem will be described and the stakeholders identified. Even though most of the information concerns the present, a historical

approach is adopted to emphasise the evolution of the learning processes, the facilitation of change, the practices, and the platforms for resource management at four different periods. These periods concern the forest under local arrangement (8.3), in colonial times (8.4), under the IDA project (8.5) and under the PNGT (8.6). Conclusions will be drawn about the functioning of the platforms created and the possibilities for improving them.

8.2   The Maro Forest Ecosystem and Stakeholders

The Maro forest ecosystem

The Maro forest is located in the south-western province Tuy, formerly Houet[2] (see Map 8.1). The major city in this region is Bobo- Dioulasso, which is the second city of Burkina Faso and an important trade centre.

The Maro forest has a surface of 56 227 ha. according to *Le Service National des Sols* which determined this in 1979 (UGF, 1992). The forest is situated along the Bobo-Dioulasso-Dédougou road, at about 75 kilometres north-west from Bobo- Dioulasso between the latitudes 11 20' and 11 45'N and the longitudes 3 45' and 4 W (EMP, 1996b). The Maro forest is limited on the north by the Bobo-Dioulasso- Dédougou and Sara-Houndé road, on the south by the river Oueré and part of the Kassoho- Bondokuy road. On the west the Maro forest is limited by the Oueré river and the Laissa river and on the east by the river the Tuy and the Darankuy river.

The forest is located in five departments; Bekuy, Béréba, Houndé, Léna and Satiri. In these departments we find twenty-one villages in the surroundings of the forest, one of them is Maro, after which the forest is named. The total population is estimated at 26 099 inhabitants in 1985, which will be 40 178 inhabitants in 1996, assuming an annual growth rate of 4 % (EMP, 1996). The population in the surroundings of the classified forest are mainly Bwaba, Bobofing, Mossi and Fulbe, amongst them are Protestants, Catholics, Muslims and Animists. The main activities undertaken are agriculture (the major crops are maize, sorghum and cotton) and cattle breeding. The number of transhumant cattle is larger than the number of settled cattle (EMP, 1995a). A total of 13 770 animals of which 9 613 cows, donkeys and horses and 4 157 sheep and goats are herded in the forest, according to a census held in 1992. Other activities are apiculture and crafts. Every village has some holy places in the forest, be it rivers, hills or trees. At these places sacrifices to the Gods are made and no human being has the right to use these places in another way. The fauna of the classified forest varies from elephant to monkey, even though some species such as the lion became extinct.

Map 8.1

Burkina and the location of the classified forest of Maro.

BURKINA FASO
LAND USE AND FORESTRY RESOURCES (OCTOBER - DECEMBER 1987)
OCCUPATION DU SOL ET DES RESSOURCES FORESTIERES (OCTOBRE -DECEMBRE 1987)
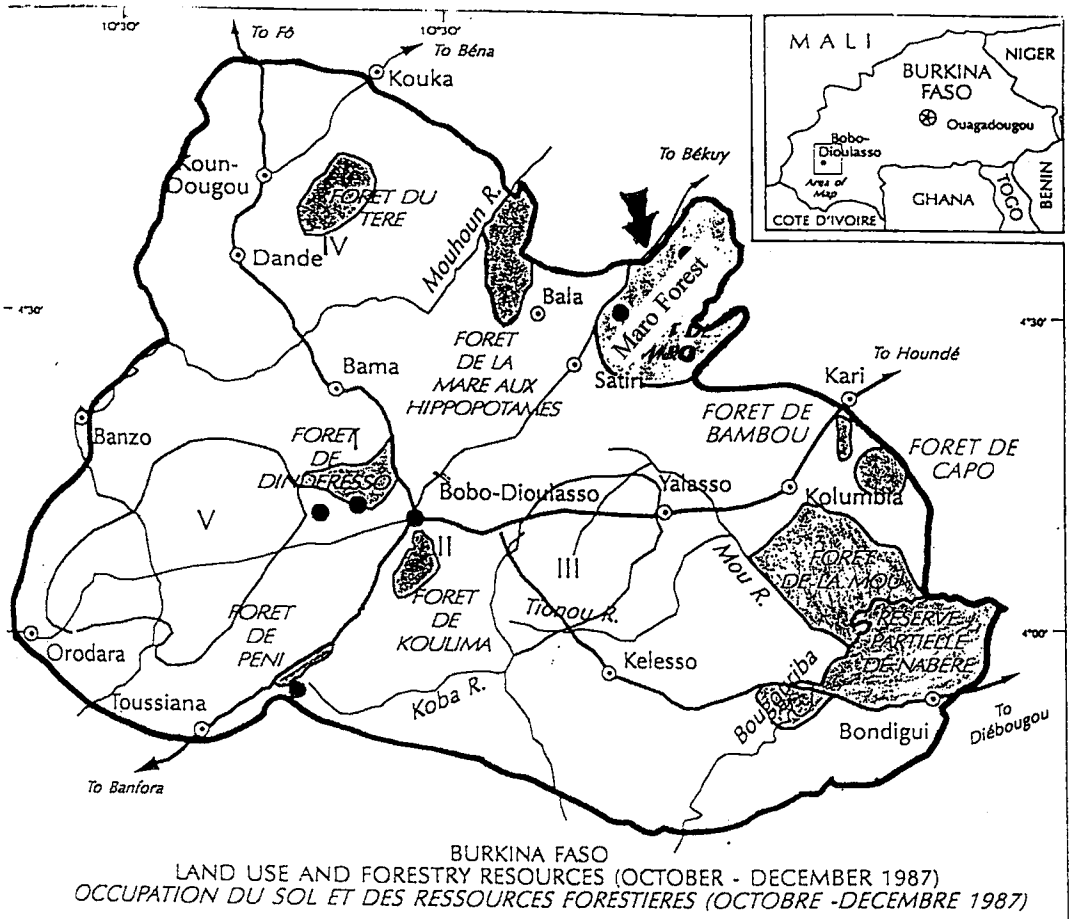
The stakeholders of the Maro forest

We can not talk about the Maro forest without mentioning the inhabitants of the surrounding villages. Their lives are linked to the forest in every way. In religion, food, medicines, etc. the forest is very present and they obviously have their stake. There are as many stakes as people but we can subdivide the population in several -more or less- homogeneous subgroups. At village level, the population can be divided in migrants, cattle breeders and natives, who can be subdivided in women, older men and young men. These stakeholders must act collectively if they are to manage the Maro forest in a sustainable manner. That is, they have to agree on objectives and accept to 'take less' from the forest and give more to public goods needed to sustain it.

These stakeholders are present in every stage of history, but every period also has its own stakeholders and actors, who will be discussed in the following corresponding sections.

8.3   The Maro Forest under local arrangement

Before the 1940s, the Maro forest belonged to the local population. To understand this ownership we first have to understand the general land tenure system of the local inhabitants. Land is divided over several families in this part of Burkina Faso[3]. When the French arrived, one family had to represent the colonial administration and a chief family was appointed[4]. This family was also given the responsibility over land tenure. Nowadays, this family is always informed by the other families when the latter want to give land to newcomers, which means that the former somehow kept their colonial power. In all, traditionally the Maro forest belonged to some big families who divided the right to use it to other family units.

However, a distinction should be made between (i) land allocated for farming, including land that has fallow, and (ii) the 'bush', i.e., unallocated land that can be used by everybody who falls under the jurisdiction of the original settler or his descendants. The bush (i.e., the larger part of Maro forest in pre-colonial times was a common pool resource which was used for hunting, gathering of wood, cattle grazing and gathering of various forest products such as roofing material, medicines, fruits, etc. Not much is known about the original rule of access, but these must have been well-developed if one takes into consideration the special role of hunters, the value given to the bush meal, etc. It is said, however that, that due to pressure of use, serious degradation of the forest had already started before the second World War.

8.4   The Maro Forest under colonial rules

During the colonial period and particularly in the 1930s until the 1950s, the Forest Department of the Government of Burkina Faso started a policy to classify certain forests by the *Decret* of July 4, 1935. This *Decret* reflects the intention of the colonial government to prevent rampant deforestation (Sibide, 1992). This instruction results from the *action forestière en Afrique Occidentale Française* defined in February 1933 (see Box 8.1).

Box 8.1: Instructions of the Gouverneur Général of the AOF

J'ai envisagé comme moyen efficace d'empêcher une trop grande déforestation du pays, de créer un vaste domaine forestier classé, dégagé de l'inconsistance des terres boisées, vacantes et sans maîtres, bien constitué en droit, définitivement assis en superficie et spécialement protégé. C'est vers la constitution, la conservation et l'amélioration de ce domaine que doivent tendre nos efforts tandis que temporairement, nous laisserons dans ce domaine non classé les indigènes exercer librement leurs usages.

The main purposes of this centralisation (see also De Zeeuw, 1995) were to hinder further farming in the forest and to have some forests under state control.

The colonial power classified the forest of Maro on January 17, 1940 under *arreté N 116/SF/5* (Zampaligre, 1995) and a new stakeholder, the Colonial Government, started participating. After this date, the forest of Maro became state property and belonged to the *Bande du Haut Comoé* (Kaboré, 1995: 4).

Box 8.2: A wood-cutter from Kadomba explains

At this time some people from the state came to the villages and spoke to the chief and his advisers. The officers said they wanted to buy a piece of our land. Because they offered us 300 FCFA and a rifle we accepted. When we realized what we had done, it was too late; we were not able to pay back any more.

This classification meant that the population was prohibited from undertaking any activity except gathering dead wood, fruits, nuts and medicinal plants. In the beginning 'no one' undertook any illegal activity, but at a certain moment some villagers, who had no traditional rights to use the forest, decided to cultivate in it because fertile land outside the forest was no longer available and fresh land was required to cultivate commercial crops like cotton. This example was quickly followed by other villagers. At this time, the plots were hidden deeply in the forest.

The status of classified forest authorized state-appointed Forest Agents to protect the land and control misuse. These Forest Agents belonged to the Forest Agency created by the colonial authorities. This institution was however not recognized (as was the traditional one, when the big families organised the management of the forest) by the direct stakeholders and their rules were not respected (the classified forest was meant to bet left untouched but was used even more than before). The newly formed public property completely obliterated the old common property rules but did not provide a viable alternative.

Box 8.3: An inhabitant of Kadomba explains the actions of the forest agents

In 1960 the Forest Agents came to take three of our villagers to prison because they cultivated in the forest. After this people became more careful; some left the forest and others went even further into the forest to hide their plots better' (pers. com. an inhabitant of Kadomba).

During the classification, some enclaves[5] were left and some others were created later on demand of the local population concerned. Some villages asked to open an enclave for them as well because they were in need of land. To realize this, they were required to have fifteen witnesses testifying that none of the villagers engaged in illegal activities in the forest. However, according to the local population, people were afraid to testify and, as a consequence, the enclaves could not be realized (p.c villagers).

This situation, in which the only legal activities were the gathering of dead wood, plants and fruits, lasted until 30 December 1980, when a forest project financed by the International Development Agency (IDA) arrived.

Because the forest legally became public property, the population did not feel responsible for it any more. Forests initially were common goods, used and owned by the local population. During the colonial period the government made them public goods by classifying them. The state considers the forest as its property and it is managed by state representatives; the Forest Agency. The local population continued, however, to exploit the forest and even those who initially had not the right to use the forest entered it. The local population considered the forest as an open access good, with all the tragedy that results from such a definition (Hardin, 1970). That the state was not able to control the forests is often explained by the overestimation of its own capacity; the state did not have sufficient means to control and manage its property. The state intended to fight deforestation, but in fact promoted it with its policy. The former, rather effective, local form of management was destroyed in favour of a not affective government one. Jodha (1996: 205) makes the same remark when stating "state interventions have disrupted the community management of common pool resources, transforming them to de facto open access resources, with all the resource degradation and other associated consequences". This is exactly what happened for the Maro forest.

8.5   The Maro Forest Management under IDA project

Because people continued to cultivate and cut illegally in the state owned forests, solutions were sought to prevent the forest from further degradation. As a result of the drought in 1973-1974 (Nana, 1990), new policies to protect the forest against deforestation emerged. Parts of the natural vegetation were substituted for industrial plantations during the 1970s. The IDA project is one of these activities. The goals of the project were to assure the future rural population sufficient fuel wood, to assure the fuel wood provision for urban regions by creating an industrial plantation, and to improve the productivity of the natural forest (Zampaligre, 1995).

The species planted were exotic species; *Eucalyptus* and *Gmelina* as well as local species such as Khaya senegalensis, Anogeissus lerocarpus, Tamarindus indica etc. *Eucalyptus* is mainly used for the production of fuel and timber wood, Gmelina is mainly used for the production of lumber wood (Sidibe, 1992).

Directly linked to the plantation, another element of the project was the nursery garden (Drabo, 1985) which was in use until 1986 (Sidibe, 1992).

The plantation was an industrial one and the local population got 1000 FCFA a day to work in it. As a consequence of the industrial character of the plantation, the local population did not consider it as their property, not in the last place because revenues of woodcut did not directly flow into the village. During this period those who worked in the forest learned techniques to cut wood properly.

The IDA forest project was programmed for at most fifty years with a renewal of funding by the World Bank every five years (Drabo, 1985: 3) and was financed as well by the state of Burkina (Bounnkougou, 1984). However, the project did not last this long.

The World Bank financed the IDA project from 1981 to 1986. From 1987 to 1989, the project received a *Don Norvégien* (Ouédraogo, 1990). The World Bank stopped its finance because the project did not reach its aims, which might be because the project did not take account of the local population and their participation in it. It was realised that industrial plantations, based on destruction of a natural vegetation to the advantage of a man-made one, was not the desired solution (DGEF, 1991). After 31 December 1989, the project managed to exist from reserves for some time (Nana, 1990) but it soon had to stop. During all this time the local population kept entering what was left of the natural forest to cultivate crops.

After the IDA project, the Maro forest consists of two types of forest, the natural forest and the industrial plantation. The project only intervened in the plantation and the situation of the natural forest did not change.

When the tragedy of the commons threatened, the IDA project started its commercial plantations. Through these industrial plantations, the IDA project aimed to privatise part of the Maro forest. It became a private property. The population worked in the plantations and considered them as a private property of the project. For the natural forest, however, nothing changed and the local population still treated it as an open access resource. It is important to realise that we have to deal with two resources; the industrial plantation and the natural forest. As a result of introducing plantations, trees acquired an economic () value. This made management even more complex because other actors (consumers, middlemen) started participating.

8.6   The Maro Forest Management under the PNGT

In the eighties, the state more or less 'opened' the forests to the surrounding villages, so that the population can use and protect the forest at the same time (Hagberg, 1992). To fight against the deforestation and diminution of the natural resources, the state took some measures:

- promoting replantation on large scale by the local population;
- providing information about improved stoves from 1982s onwards;
- introducing *La réorganisation Foncière* which made all land state property and is written up in the RAF[6]
- settling rules about exploitation and commercialization of wood (Pare, 1989).

As a result of the RAF, a *Domaine Foncier Nationale* (DFN) was created made up of all land situated in the national territory of Burkina Faso. So the whole Burkina territory falls in the DFN and is therefore public (state) property. The RAF was adapted in 1991. This new version discriminates between land *aménagé* and not *aménagé*; and all land which is not *aménagé* is state-owned property. All forest resources remained thus state property. The RAF is not adapted to the local realities (de Zeeuw, 1995), because no account is taken of the existing local land tenure systems, and is free for interpretation because it is written in French instead of local languages. The local population has an other conception of the property regime and the RAF is therefore not always respected.

All forest, fauna and water resources fall under the national forest policy, which has as main points:

- the conservation of bio-diversity;
- appreciation of forest, wildlife and water resources for economic development and improvement of likelihoods;
- employment and income generation for the population;
- participation of the local population and transferring them to the responsibility over forest resources by means of decentralisation.

The RAF and the environmental and forest policies led to the Forest Code, which provides more specific rules. Toulmin (1991: 27) describes the forest codes in the Sahel as consisting of 'lists of restrictions or prohibitions on forest use, with permits issued by the Forest Agency for certain allowable activities. Even trees on farms are subject to such restrictions and farmers must pay a permit before cutting a tree they themselves planted'. Although Burkina farmers do not have to pay for a permit to cut their own tree, they should inform the Forest Agency so that advice can be given on the way it will be cut (so that it will grow again). Major changes after the adaptations in 1997 are the more participative approach and the permission of private ownership. For example, where forest were all state owned property managed by the Forest Agency, nowadays the possibility exists to sign a contract in which the Forest

Agency gives the responsibility over part of the forest to an individual or group of individuals (Code Forester, article 38).

Policy has embraced decentralisation because of the failure of centralisation. According to de Zeeuw (1995), the state has overestimated its capacities. Decentralisation[7] foresees handing over of certain competencies to local communities. Since 1985, decentralisation is implemented (Coulibaly, 1993) and its rules were encoded in five laws in May 1993. Since November 1993, an organisation, the *Commission Nationale de la Décentralisation* (CND) has existed, which is charged with the elaboration of a more precise text (Ouatarra, 1997).

With this new political approach some new actors started participating, who will be discussed here. The agency which is charged with the forest management in Burkina Faso is the Forest Agency consisting of several levels. On national level, there is the *Ministère de l'Environnement et de l'Eau* (MEE), which is divided in ten regional *Directions Régionale de l'Environnement et des Eaux et Forêts* (*DREEF*'s). The representative of the *DREEF* at the provincial level is the *Service Provincial de l'Environnement et des Eaux et Forêts* (SPEEF). This SPEEF is in its turn divided over districts, which are represented by a Forest Agent (see figure 8.1).
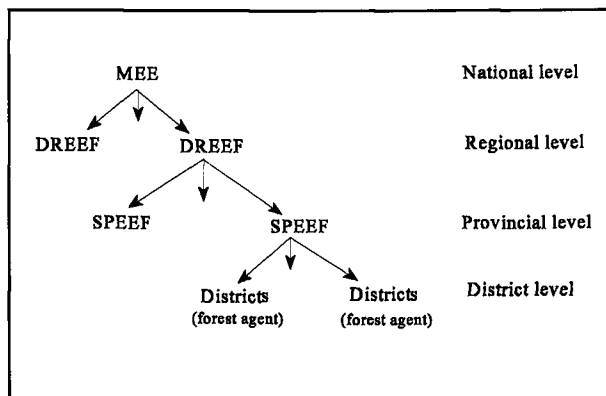
Figure 8.1:   Organization of the Forest Agency

The *DREEF* is charged with the coordination and application of forestry policies. The *Service Provincial de l Environnement et des Eaux et Forets*, SPEEF, the representative of the *DREEF* on provincial level has the following tasks:

•   mobilizing, training and organizing the population;

•   supporting the Forest Agents;

•   collecting field data;

•   implementing the forest rules (*DREEF*, 1995).

This provincial agency is in its turn divided () districts. At this level the *Zones d'Encadrement Forestier* are located. Its goals are to contribute to the maintenance of the ecological equilibrium, the conservation of bio-diversity, and the rationalization of the utilization of the natural resources within the framework of a successful *Gestion de Terroir*. In Bekuy -one of the border villages of the Maro forest- we find such a *Zone d'Encadrement Forestier* represented by a Forest Agent. Traditionally villagers are very frightened of these agents, but their image increasingly changes and trust in these agents begins to increase. Wiersum & Lekanne (1995) give a detailed description on the pluriform position of these Forest Agents. Nowadays their role is to ensure that no illegal activities are undertaken and to make people aware of the problems and ways to solve them.

An institution working in the Maro forest is the PNGT. The PNGT depends on the MEE (see above), the *Ministère de l'Agriculture et des Ressources Animales* (MARA) *and the Ministère de l'Economie, des Finances et du Plan* (MEFP).

The PNGT has its own organization structure. At the national level we find the *Unité de Gestion Opérationelle* (UGO), based in Ouagadougou, which coordinates the work of the PNGT. At the provincial level, the PNGT can be divided in the *Unité de Gestion Forestière* (UGF), which depends on the MEE, and the *Unité Provinciale de Gestion Opérationnelle* (UPGO), depending on the MARA. These two agencies together form the *Equipe Mobile Pluridisciplinaire* (EMP). This team is assisted by the *Equipe Technique Forestière* (ETF) (see figure 2).
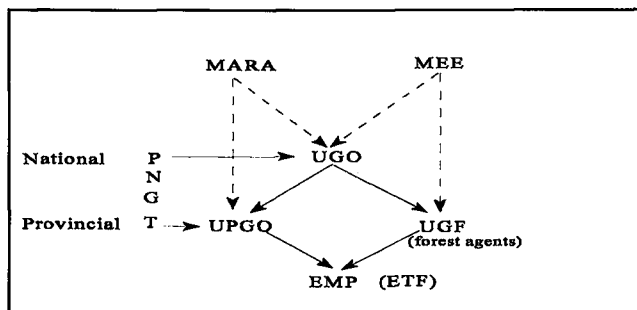
Figure 8.2:   The organization of the PNGT

The UGF comprises *Groupements de Gestion Forestière* (GGFs). These GGFs are charged with the management of the plantation. More precisely, these GGFs have the responsibility over a parcel of the plantation. Several parcels form a *Unité d'Aménagement* (UA) which is managed by an association (grouping of several GGFs). These associations do not have another function than to formulate a management plan. The aim was to give this association responsibility for the management of the natural forest, but this does not seem to work. A federation of associations is intended for the management of the whole forest, but this has so far not been realized.

These GGFs are created for the management of the plantation and the commercialisation of wood. In this process, the SPEEF has the role to guide the commercialisation and the PNGT to facilitate the relations among the different actors involved. To keep matters simple, we shall not distinguish between UGO, UPGO or UGF, but we will continue to speek about the PNGT.

Other actors who are important in the commercialisation process are the traders and consumers. In every stage, the commercialisation process is guided in every stage by the environmental agency and facilitated by the PNGT. The traders can be divided in three groups; (1) the lorry drivers who collect the wood in the villages and buy it from the villagers, (2) the donkey cart holders who collect the wood in the villages or, when it is far away, buy it from the lorry drivers who collected the wood for them, (3) the vendors who buy the wood from the lorry drivers. The donkey cart holders and sellers sell the wood to the consumers. The different traders are organised in two groups; the *Groupement des Exploitants de Bois et Charbon de Bois* (GEBC) for the donkey cart holers and the *Groupement des Transporteurs Exploitants de Bois de chauffe et de Charbon* (GTEBC) for the lorry drivers. The sellers can belong to both. Consumers are not organised however.

Until 1993, the major problem was the pressure of farmers and herdsmen on the classified forest. To solve this problem, the PNGT tried to explain to the local population why they should leave the forest, created the *Groupement de Gestion Forestière* (GGF), and arranged for the exploitation and commercialization of wood. At that time all plots in the Maro forest were cultivated with cotton[8] a major threat to all forests. The achievement of the PNGT until now is that the 665 farmers who still cultivated in the forest left, so that it is not used for cultivation any more. Fourteen GGFs have been created and a lot of wood is sold (UGF, 1995).

The PNGT uses a *gestion des terroirs* approach, which is born in the context of the degradation of natural resources and the inability of previous approaches to solve this problem. It was realized that interventions without the motivation and participation of the stakeholders do not solve problems. An approach that takes the population into account was needed. The concept *gestion de terroir* was formulated in the context of the land reform (RAF) decided upon by the Burkinabé revolution (Lekanne, 1995: 4) and the process of decentralization.

In general, the PNGT intends to stop and turn around the degradation of natural resources. Among other objectives, the PNGT aims at a greater and firmer awareness of the village people, leading to better control systems for local communities to collectively manage their own natural environment (see as well UGO, 1997).

This awareness contains two messages. The first is to make the village aware of the problem of over-exploitation and degradation, and the need for sustainable management. The second is to promote and develop a local basis for solving common problems in land use management. The rural community as an entity has to take democratic responsibility for better management of the renewable natural resources in its territory, with technical and financial assistance provided by the Government (Lekanne, 1995).

The PNGT works on *gestion des terroirs* in Gnagna, Kouritenga and Kénédougou. In the province of Houet and Bougouriba, it works on the *gestion de terroir* in combination with the *gestion de forêts*. The choice for these provinces is mainly based on ecological criteria. Gnagna is on the border with the Sahel (the North of Burkina Faso), Kouritenga and Kénédougou have a high demographic pressure, and Houet and Bougouriba have many migrants (Lekanne, 1995: 6).

As mentioned, the PNGT created the GGFs to give the responsibility for the plantation to the local population; the industrial plantation was replaced by a participation project. Nowadays the forest is called a classified one, but in spite of this name (which suggests that no activity is undertaken in it) legal activities, such as wood cut, are carried out by the local population.

The PNGT in Houet is involved in the management of the Maro forest. The main aim of the *aménagement* of the Maro forest is to come to a *co-gestion* between the state and the population using the forest and to contribute to an improvement of the living conditions of the people. This means that the state officially stays owner but the population has the users' right. This right is, however, restricted by state rules. The specific goals of this co-management are:

*   to improve and manage the forest resources in a sustainable way;
*   to contribute to the resolution of farmer-herdsmen conflicts;
*   to make communities aware of the way the forest should be protected and exploited;
*   to maintain bio-diversity;
*   to conserve historical and cultural places (EMP, 1996a).

During discussions with the local population, the PNGT explained that the management of the forest is their responsibility even if the forest is officially state owned.

8.7   Co-management in practice for regenerating the Maro Forest

The first contact between the PNGT and the local population consisted of four stages:

1) informing the local administration about the project and asking for collaboration of partner agencies;

2) discussing the goals of the project with the village authorities.
When the PNGT arrived, they asked the chief and other village leaders wether they were interested in the project.
According to a local inhabitant: 'because the chief agreed all the others had to follow this advice'.

3) Participative diagnosis with the village by the use of the *Méthode Active (Accélérée) de Recherche Participative* (MARP)[9]. This diagnosis consists of two stages. In the first stage, the

PNGT prepares the field visit, seeks contact with relevant actors and does a literature research. The second phase is a learning process or *prise de conscience* of the whole local population and the PNGT about their environment and the possible actions to be taken.

Tools used during this stage by the PNGT[10] are maps, diagrams of exchange, seasonal calendars, work calendars, Venn diagrams, photos and maps, reports, interviews, soil classifications, etc. These participative approaches allow an interaction between the PNGT and the local population and emphasises the importance of local knowledge. The *diagnostic participatif* took at about five days per village.

For the sake of the diagnostic participatif, the PNGT members divided the village in three groups; the young, men and women. For these five days, everybody was invited, so that everybody had the opportunity to understand the decision making, but not every group was evenly represented (for example migrants were under-represented).

During five days all these groups worked separately, with a member of the PNGT, on the same questions from seven till twelve and from fifteen till seventeen hours (see Box 8.4).

Box 8.4: Information from a villager in Kadomba

They asked about the history of our forest and what we do with the forest now, from where we got the land, the relations we have with other inhabitants and with neighbouring villages, they wanted to know the boundaries of our village... With these answers the PNGT understood the problems we have and we sought solutions together.

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4) Last meetings when GGFs were created and office members elected.

Simultaneously with the proposition to co-manage the former industrial plantations, the PNGT "asked" the villagers to leave their plots in the forest. The villagers were aware of the fact that the PNGT cooperated with the Forest Agency and thus had the power to force them to leave the forest or even put them in jail, so they left.

The PNGT's aim was, however, to make people aware why they should stop farming in the forest. It organised, during the four years that it had intervened in the region, several journeys to other provinces and regions to make people aware of the degradation and deforestation processes whichs threaten their country (see Box 8.5).

Box 8.5: Learning experience in Kadomba

The PNGT brought me to Gorom Gorom and what I saw there was a desert. When they told me that their grandparents had a forest -like ours- but that it has disappeared due to over exploitation, bush fires etc., I understood why the PNGT has come to our village and told us to leave the forest [the plots they cultivated] and I will explain what I saw to all the others, because the people of Gorom Gorom can not even cultivate anymore on the ground they have!

The last stage was the creation of the GGF in all the interested surrounding villages. These *groupements* are divided over three associations; the first association is the one of Bekuy in which the *groupements* of Sara, Lamba and Bekuy are united. There are two associations in Satiri; the first comprises Dorossiamenso and Kadomba; the second Ramatoulaye and Nefrelaye. The others are not organized in an association[11]. It is on the basis of the diagrams made during the *diagnostic participatif* that the connections and relations between the different villages were established, and that associations were formed (Kaboré, 1994). It is with these associations that the work in the plantation is executed according to a *plan d'aménagement'*. These associations are, however, at present only used for the sake of organizing the work division (by the environmental agency and PNGT) and not (yet) for the organisation of collective action.

Each association has a Unité d'Aménagement (UA) which is divided in six parcels, which is, in turn, redivided over the *groupements* constituting the associations. There are no rules to redivide the parcels over the GGFs but account is taken of the size of the different *groupements* (UGF, 1994). The *groupements* which are not divided in associations focus on the commercialisation of dead wood.

The wood cutting period in the plantation takes place from about the first of January until the 31st March (Sanou, 1995) and concerns two exotic tree species; Eucalyptus and Gmelina. Two types of wood are cut in the plantations of Maro: fuel wood in the form of cords and fagots, and service wood in the form of trunks classified in two groups: diameter of 7 to 15cm, and 16 to 20cm, at a length varying from 3 to 9 meters (UGF, 1995: 1).

The money earned from wood cutting is divided among the wood-cutter, the forest tax (fonds d'aménagement) and the working capital (fonds de roulement). This money will be handed over by the PNGT. Each year, meetings among the environmental agency, the PNGT, representatives from Houet and Bougouriba, GEBC, GTEBC and the GGFs of Houet and Bougouriba are held, during which prices are settled. These prices are thus negotiated among the different actors involved. The environmental agency has, however, the last word and therefore the final decision making power.

After the cutting period, we can see the wood piled up in cords placed at the borders of the plantation. Between April and August, lorry drivers from Bobo-Dioulasso come to collect the wood to transport it to town, first Gmelina and, when this is finished, Eucalyptus. Woodcutters sell their wood to the lorrydrivers, but the money will be handed over by the PNGT and environmental agency members when all wood is collected. A voucher system is used to register all transactions. The lorry drivers resell the wood to the sellers, who sell it to the consumers.

As explained, each village which was willing to participate in organized woodcutting formed a *groupement* with the aid of the PNGT. The office holders of the GGF are a president, a secretary, a treasurer and an instructor. The instructor was trained by the PNGT to master all the techniques concerning commercialization, hammering, cutting and making cords. The instructor is expected to communicate the knowledge to the other GGF members

(Kaboré, 1994). These instructors were chosen and accepted by the assembly. The instructor is responsible for the total cut by the members, for the daily and final evaluation of the production, and for the techniques members use to cut wood (UGF, 1994: 26).

Members are free to participate. Those who thought it would be profitable signed up for the first year. Every new year, an increased number of people realised that wood cutting is profitable and signed up to participate. Money is not the only motive for people to participate in the GGF. Wood cutting takes place during the dry season in which no activities are normally undertaken.

Not everyone who desires so is allowed to cut the wood. The condition for participation is that one participates in maintanance of the parcels.

To protect the plantations against bush fires, firebreaks need to be cleaned each year so that fire can not jump over them. There is no reason for a fire to start in the middle of a parcel. Therefore one knows that fires which do start in a parcel are lit. Although this does not happen very often, stories about this sort of crime do circulate. This cleaning of fire breaks takes place in October and November. The local population complains however that these firebreaks are not cleaned well enough, due to a lack of equipment.

At the moment wood cutting will start, all members of the GGF are assembled by the office bearers. Each year a parcel is chosen in accordance with the management plan and the office bearer points out a line to each person (so parcels are divided across persons and not across families) to indicate where one should cut. When one has finished a line, one can ask another one at the office. The maximal number of lines a person is allowed to cut, is determined in advance. Normally the area which can be cut is larger than all the members together are able to cut, so there is not really a problem if one wants to do more than one is allowed to. But in the case of scarcity, people can give a line of wood to each other (for example, when someone can not finish his line or when the other is in real need of money).

A serious problem for the local population is the heaviness and danger of the work. Several villages do not have a hospital or medical centre and this is considered as one of the main shortcomings. The first year the PNGT provided a small pharmacy, but during the following years the villages had to take charge of this themselves.

The trunks have to be cut in parts of one meter. Wood should be transported to the roadside and put in "cords". For women it is often difficult to transport the wood to the road because it is very heavy and they do not have access to equipment as donkey carts. These "cords" will stay here for at about three months to dry, before trade can take place. It is a problem for the local population that wood is only collected in June or even August when work on the plots has already started. When the lorry arrives every wood-cutter has to be there when he wants to be paid, this hinders him to go freely to his field.

These general principles are established by the environmental agency and PNGT, but further internal rules for the functioning of the *groupement* are settled by the members themselves.

Such internal rules for the functioning of the *groupement* are ()assembly of the villages. When one of the office holders does not execute his work properly, he can be summoned by the assembly. This assembly consists of the village authorities, the GGF office holders and all the others concerned. In the case of Kadomba, where a *Comitée Villageoise de Gestion des Terroirs* (CVGT) has been formed, these CVGT members are included.

In the case of an offence, not only office holders, but also GGF members, will be convoked for the assembly. For example, when a villager wants to have bamboo he should ask a special permission from the Forest Agency. There are also certain types of wood which people need for constructions that can only be found in the forest. To cut this, permission should be asked of the Forest Agency as well. When somebody cuts wood without permission (for himself or for commercial reasons), he will be asked to appear before the assembly.

Traditionally there are some holy places, which people are forbidden to exploit, if one does so anyway, the person will appear before an assembly consisting mainly of elders, but the members mentioned before are free to participate too. There are, for example, holy trees which should not be chopped because they house a God. There are also some holy rivers where one is not only allowed to fish but also to cultivate or chop wood in the immediate surroundings. Nowadays some riversides are declared protected in collaboration between the local population and the PNGT. As a consequence, there are even more rivers now whithin a margin of 100 meters of which one is forbidden to chop or cultivate. The PNGT helped by making the paint to mark the trees available to the participants. In the case of an offense in a holy place, sacrifices should be paid to the elders who will sacrifice these to the Gods. In the case of a delict concerning a protected riverside, the offender has to pay a sum of money which the treasurer will put in the cashbox of the working capital (*fond de roulement*). When the offender does not obey the verdict of this committee, the help of the Forest Agents will be asked.

When a bush fire has taken place, the perpetrator is called for the same committee as discussed in the case of illegal cutting. A considerable amount of money has to be paid to the village in cash. In case of a very large fire, the perpetrator will be handed over to the Forest Agents.

One source of income for the working capital is thus explained; fines are paid for the breaking of a law as settled by the GGF. Another source is part of the revenues for wood cutting. Villages are free to decide how to use this money.

It can be used for loans with and interest of ten percent (case of Kadomba), to buy millet, pay school fees, buy medicines, etc. When someone can not pay back in time, the office holders ask him to give a 'guarantee'. This varies from a cow, to a bike or a radio, according to the debt. This guarantee will be taken in the case that the person does not pay back. The moment loans are to be paid back depends on the period cotton revenues are be paid.

The people who work for the GGF are paid from the money that staus in the fund. Their transport costs and FCFA 1000 for one day of work will be remunerated. In Bekuy, the money is also used to pay the workers of the GGF and for the benefit of the village. The use of this money has, however, caused serious problems in the GGF and even led to a change of the committee. There was no sufficient internal control and communication, and no method to sanction the culprits (due to cultural perceptions with respect elders and natives of the village). Members who are hurt as a consequence of cutting wood, are assisted by the GGF (case of Bekuy) and even hospital bills are paid out of the *fonds de roulement*.

For the cleaning of the firebreaks the villages set their own rules as well; in Kadomba for example, each member has to clean about fifty meters, which is allotted by the officials. The work is executed for one day per week until the whole unit is completed. This might take about six days in all. Each member should participate. In the case of illness or another valid reason, one should inform the executed committee that one is hindered. Participation in this cleaning is a condition for participation in the wood cut. When you have not participated, it is not possible to sign up, except when you pay 1200 FCFA on the day you sign up for every day you did not clean (see Box: 6).

Box 8.6: The instructor of Kadomba gives an example

The first year three people paid 1200 FCFA for every day the others cleaned and they did not participate in cleaning. But one quickly realized that it is too much money and nowadays [almost] everyone helps. Even those who are not sure to cut, but think about it, will help to be absolutely safe.

New habitants can participate but, in the case of Bekuy, they have to pay the price of three "cords" to the group's cashbox.

In Kadomba, regular surveillance is carried out in the forest to see if no illegal activities are undertaken. This means that someone moves around the forest to check all the bush. These surveillances are held alternately by the members of the comittee of *gestion des terroirs* and by other volunteers. Every three or four days another person guards. However, Kadomba is the only village with organized monitoring.

All the members of the GGF participate in replanting a collective work that is not paid. This activity is organized at the national level, and each village replants at the same moment. Campaigns are held to make people aware of the reasons to replant. In the Maro forest the seedlings are provided by the PNGT.

Women said that a lot changed for them now that they participate in the harvesting ofwood. In the first place, they are busier because they have an additional task. But -more importantly- women have much more money to spend which makes them less dependent on their husbands. This is confirmed by a study executed in 1996 by Zoungrana. In earlier times women often helped in cotton production, but it was the husband who received most of the benefits (see Box 8.7).

Box 8.7: DRARA animateur explained the situation of the women

After having sold the cotton, the husband often tells his wife that there had been lot of problems and that he has earned nothing. Maybe he would give her no more than 5000 FCFA for all the work she did and the woman could not but accept.

Men are generally satisfied with the wood cut as well because it provides them with some extra money in a period when they normally have no work. The problem is the moment the lorry should be loaded, which coincides with the time that work starts on the fields. The wood has to dry for at about three months. Wood is however collected even later because the lorries have to go into every village. It is the PNGT which tells the village at what time the lorry will come and it is as well the PNGT who gives the plan to the lorry drivers. Where Kadomba villagers were able to explain to us why the lorry drivers could not come early, Bekuy villagers (in a group interview) said only that it was 'PNGT's fault'. What changed is that young men often moved to Ivory Coast or Ouagadougou during the dry period to earn some extra money. Now that revenues can be gained in their own village these youths will stay and are therefore available for other activities.

Migrants seem to be fully integrated in the GGF, and migrant members are generally satisfied with the wood cutting. The fact that the GGF in Kadomba functions very well, while the one in Bekuy has a lot of problems might be explained by the fact that the GGF of Bekuy has many migrant members, while in Kadomba, they are almost all natives. Migrants allegedly, are interested in the revenues wood can give but not in the management of the forest, which is an investment in the future, according to a PNGT member.

As mentioned earlier, wood cutting is an individual activity, which means that the one who cuts is the one who receives the money. Revenues, and decision making power, were formerly controlled by the family head. Nowadays, this power has been divided across individual members of the family.

The traders are organised in two *groupements*; the *Groupement des Exploitants de Bois et de Charbon de bois* (GEBC), the donkey carts and the *Groupement des Transporteurs Exploitants de Bois de Chauffe et de Charbon* (GTEBC), the lorry drivers. The vendors can join the GEBC or GTEBC according to their preference.

An organisation of wood transporters had existed since the revolution in 1983. Because the members realised the advantages of working in a group, the organisation continued even after the revolutionary regime, under the name *Union des Exploitants de Bois et Charbon de bois* (UNEBOC). At the time its main aim was, according to a member, to "fight against the Forest Agency". Due to different and contradicting interests between donkey cart holders and lorry drivers, lack of confidence, financial and individual problems between office members, the UNEBOC separated into the two different *groupements*, the GTEBC and the GEBC on 7 June 1994. These *groupements* function as an intermediary between respectively the lorry drivers or donkey cart holders and the Forest Agency.

The GEBC is legally recognised since 1995. Because not all former UNEBOC members did agree on the separation, some members were not ready to sign up in the new GEBC, which posed starter problems. The Forest Agency did however force donkey cart holders to become members of the GEBC if they wanted to transport wood with their donkey carts.

Members of this group can buy a permit to cut wood from the Forest Agency. Members have to pay a contribution to be considered a member of the *groupement*. This is, however, not always done, which seriously hinders the *groupement*'s work. The Forest Agency also began giving cut permits to those who are not *groupement* members and this is an even more serious problem for the functioning of these groups.

The real problem is therefore the lack of cooperation between the *groupement*s and the Forest Agency. According to a member of the GTEBC, this might be due to changes in the internal organisation of the Forest Agency. "not every person follows the same policy".

Due to the different states and values of lorries, members also have different interests. Therefore conflicts exist even among members "richer lorry drivers are no longer ready to contribute for poorer ones", according to an office member.

Formerly, sellers had to buy a card from the *groupement* to show to consumers that the Forest Agency alowed them to sell. But nowadays, the Forest Agency gives them a permit without the sellers going to the *groupements*, which made it impossible to distinguish between legal and illegal sellers.

A more general problem for traders is the illegal woodcut in the natural forests. This means not only a loss of income for the *groupements*, but it also provokes unfair competition. Wood is illegally cut, mainly by donkey cart holders and villagers who sell it to lorry drivers. But because the lorry has to follow the main road this is difficult. Villagers may do this due to lack of cash, because the benefits from the wood cut from the plantation come only several months after wood has been cut! Lorry drivers can practise fraud by taking more "cords" than allowed in their lorry.

When the plantation wood is transported, all other wood is prohibited. But even then, natural wood enters from everywhere as both GEBC and GEBTC members explained. Both agree that it is easier for a donkey cart than for a lorry to smuggle natural wood. Since plantation wood is much less appreciated (mainly Gmelina, than 'natural' wood, people often do not want to buy the former), vendors can not even sell it and other illegal wood is preferred.

In the plantation therefore (almost) no illegal activities are undertaken, but in the natural forests the motivation is different. A villager of Kadomba explained us: "of course they do not illegally chop in their plantation, it is their own property, but the forest is state owned property. They want to take from it whatever they can". We should mention here that people never said that they themselves cut wood illegally, but after some insisting they do agree that

other villages might do this.But what the villager explained to us might be the core of the problem; people feel responsible now for the plantations, but not for the natural forests.

According to the *groupements,* the Forest Agency exerts less and less controls (the Forest Agency confirmed this [pers. com. Forest Agent] and explained it by a lack of financial means). On the question why the *groupements* do not control themselves, a GTEBC office holder answered:

'You are right that we should control ourselves, but I do not want a problem between my brother and me, I can not go to the Forest Agency to tell them that my brother cheats!'

Another member explained that members do not have cofidence in the Forest Agency anymore and are therefore not motivated to maintain on its behalf.

Internal organisational problems (among UNEBOC members themselves) reduced the common interest and increased the tendency to undertake illegal activities. Also the Forest Agency takes the *groupements* less seriously and even gives permits without the knowledge of the *groupements*, thereby undermining the local control system.

The disappearing trust among members of the *groupements* and between them and the Forest Agency, results in increased fraud.

The *groupement* can exclude a member for some months and will inform the Forest Agency about it. But this is all power the *groupements* have. GTEBC officers told us about people who stop illegal wood traders on the road and tell them to pay, threatening them to go to the Forest Agency, or even saying they are of the Forest Agency. This happened because Forest Agents took the habit of stopping people without wearing uniforms. Other corrupt practices are also said to be on the increase.

Consumers are not organised and therefore more difficult to integrate. Because they are not organised, the PNGT defends them when this is necessary during meetings with all the other actors involved. Consumers prefer natural wood over Eucalyptus. Gmelina does not burn very well and gives no charcoal after burning. It is therefore sometimes even rejected. The criteria for good wood are the time it burns, the way it burns and the charcoal it gives.

8.8   Analyzing the evolution of platforms and conclusions

The Maro forest initially was a common property resource; the ownership (and decision making power) was in the hands of some big families who divided rights across the local population. Ensminger (1996) claims that in Africa use rights are often assigned at the household level, while transfer rights are assigned at a higher level. At that time, the community had the power to refuse access to outsiders, prevent encroachment by its own members, establish restrictions on cutting trees etc.(see Jodha, 1996).

The state, however, classified the Maro forest and made it into public property resource: the forest is state owned and is managed by its representative; the Forest Agency.

The population began exploiting it as if it were an open access resource, with all the risks of exhaustion. By trying to halt deforestation, the state actually stimulated it.

When the tragedy of the commons treatened, the IDA project opened commercial plantations to privatise the forest make it private property. The population worked in the plantations and considered them as a private property of the project. For the natural forest, however, nothing changed and the local population still treated it as an open access recource. We are dealing with two resources; the industrial plantation and the natural forest.

From the local rules to the IDA project, platforms for forest resource use are sensitive to ownership concerning the forest.

Nowadays, the Government tries to make people aware of the need to sustainably manage the forest themselves, but without giving official ownership away (the forest is owned by the state but managed by the population). But there is a tendency to move from a public property to a common property. As explained, the four types of property rights (private, state, open access and common) are idealtypes. The state now tries to ensure that the forest is managed by defined local groups (the GGFs). On the other hand, the state does not want to give the ownership of the forest away, and the forest stays a public good. The property regime can therefore not be described in one of the four idealtypes, but is a mix. The state gave the PNGT the task to facilitate this co-management.

The population now considers the plantations in the forest as theirs and is willing to invest in it. The plantations are seen as this mixed type of state and common property resource. The local population considers the natural forest, however, as an open access property good, and illegally cuts wood in it.

The learning process involved in the move towards co-management started with the *diagnostic participatif*, which stimulated the local population to think about the problems they faced, and led to search for collective solutions to problem situations. In this learning process, both PNGT members as well as direct local stakeholders learn about the situation and the possible solutions. This *diagnostic participatif* can be seen as a temporal platform. The question is wether all stakeholders took part in this diagnostic so that all had the opportunity to participate in the decisions on how to undertake collective action. The village chief (a native) was asked to invite people to the meetings. The non-integration of herdsmen, and to a lesser degree migrants, in the community might well have led to the under-representation of these groups in the diagnostic, even if they formally had an equal chance to participate in decision making.

It is during the diagnostic participatif that the local population accepted to change the property regime of the forest from a public to a more common one. In the first place, everybody who still cultivated in the forest had to leave. The PNGT tried to make people aware of why to leave the forest plots, but even though people said to understand the motives, it was by threat of force that they left the forest (the PNGT warned that people would not not leave the forest would be forced by the Forest Agents).

To compensate this loss of plots, the PNGT proposed to give local people the management of the plantation, which was formerly owned by a project. The PNGT also proposed to facilitate their relations with the state agencies which guide the commercialisation of plantation wood. The local population was convinced that the plantation would provide them with revenues and they accepted. The negotiation thus resulted in co-management between the local population and the state. It is interesting to examine how co-management works in practice.

As a result of the *diagnostic participatif,* a local platform for decision making has been created; the GGF which manages and controls the cutting of wood in the plantation. The wood is now cut according to a plan made up by the PNGT. The GGF in itself represents a process of collective social learning. I also created the executive committee which has the decision making power. This executive committee is formed through a democratic election, for which everybody was eligible. Some people were proposed by other villagers or people proposed themselves. Everybody could raise his hand to indicate who should be elected in a process that was facilitated by the PNGT. Everybody who became a member of the GGF is allowed to participate in the exploitation of the "common good". By entering the *groupement,* the rules with respect "taking less" and "giving more" are accepted by the new member. Before signing up in the *groupement,* the member had to participate in cleaning the firebreaks, which is registered by the executive committee. There are associations (made up of several GGFs) which function at the terroir level, but these are more theoretical constructs by the PNGT, since they do not have a clear function. A platform at the interterroir level is still completely missing.

These organisations are the basis for the co-management between the state and the local population, facilitated by the PNGT. Of interest are the strength and weaknesses of this co-management.

A first achievement of the co-management arrangement is that individuals have the possibility to benefit by earning money from wood cutting. In addition to the money, decisionmaking power is distributed across several members of the family (men and women), instead of being monipolized by the family head (as in the case of cotton). A first condition according to Breemer et al (1995) in the success of collective action is that the local people should reap significant benefits from changes in local resource use. This condition is fulfilled. It is an additional benefit because the activity takes place in the dry season when normally no activities are undertaken, and wood cutting does therefore not compete with other income generating activities.

A second achievement is that rules to prevent free riding are successfully implemented. Participation in the cleaning of firebreaks is a prerequisite to be allowed to participate in wood cutting. Consequently, free riding by wood cutters without maintaining the forest, is out of the question. When people do not help in cleaning the firebreaks, they have to pay an amount for each work day. Since this payment is disproportionately high, people respect the rule to clean. In this case, people thus have strong rules and means to sanction and monitor free riding.

Another achievement is that watches are organised so that wood, which is posed at the roadsides, cannot be stolen. Everybody has his turn in preventing such theft and is willing to participate because it is one's own wood which can be stolen.

A fourth achievement is that a conflict resolution mechanism has been created. When a conflict arises, an assembly will judge and eventually punish the culprits. There already was such a system for violating traditional rules (for example with respect to holy rivers and trees), but it was adapted for the implementation of new rules.

Directly related to the strong point that individuals can gain revenues, as discussed above, there is a weakness that not all local people benefit from the new arrangement. For herdsmen this way of earning money does not fit into their cultural pattern and they refuse to collaborate. In the Fulbe culture, it is a shame to earn money through 'slave work' and this is exactly the way the cutting of wood is seen by the Fulbe herdsmen. This is even more striking when we read in a PNGT (1996a) that the herders are expected to be GGF members who are included in the management of the forest.

'It is such a complex problem that we did not know how to handle it until now. It should be best when they entered the GGF as well. That we did not undertake anything until now, is because we can not start everything at the same time. But do not worry, we did not forget this group, we think about them!' (pers. com. Ky Zerbo, PNGT member)

For farmers a solution was succesfully negotiated: farmers leave their plots in the forest but they can profit from cutting wood. Herdsmen, however, are not allowed any more to enter the forest with their animals, but they gain no advantage to compensate this.

Migrants participate in wood cutting, but their only motive is the money they earn. As a result, they are more interested in short term profit than in long term (it is after all an investment in a territory which is certainly not theirs), which seems to have negative impact on the management of the organisation (of the GGF) as is suggested by the case of Bekuy as compared with the GGF of Kadomba. The fact that migrants do not have vested land tenure rights, seems to determine their lack of motivation to participate in the management. This influences, in its turn, their willingness to invest to achieve long-term goals.

A second weakness is the lack of communication between the local population and the traders. All stakeholders have a full knowledge of the ecological processes involved, and what should or should not be done to manage a forest sustainably. This is what Breemer et al. (1995) have called 'sound ecological guidance'. To reach it, the stakeholders in the recource should communicate with each other. The role of the PNGT is to facilitate this communication.

Figure 8.3 shows that all communication passes from traders to PNGT and from PNGT to local population without any direct contact between the population and the traders.

The Environmental Agency has the role to guide the commercialisation process and the PNGT to facilitate the relations between the different actors involved. The PNGT has, however, taken on more the role of an intermediary than of a facilitator. For example, the day lorry drivers come to the village to transport wood is completely arranged by the PNGT without any contact between these two groups. As a result, the local population does not understand what determines the date the lorry will come ('and it is PNGT's fault'). Consequently, local people are not present on the day the lorry comes, which in its turn poses problems for the lorry drivers. Direct contact between the different stakeholders might lead to a better understanding and therefore better collaboration between the different groups. The PNGT has obtained a
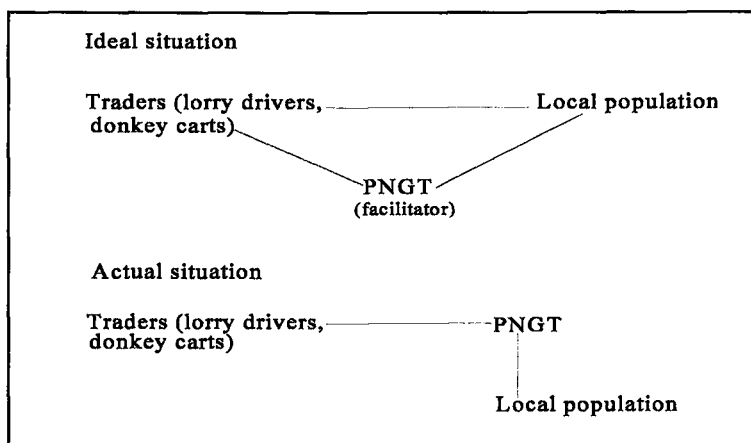
Figure 8.3:   Communication between traders and local population

certain powerful position which can not be justified by their role of facilitator.

At the UGO level, one agreed that the PNGT is too much involved in the management of the FCM;

'Without doubt the PNGT should retire from the management of the forest. We keep arranging everything for the local population but they surely are able to do it themselves. I had a discussion about this with the PNGT members myself the last time I was there' (pers. com. Taoko, UGO member).

PNGT officers were however convinced that the local population was not yet ready to do things themselves;

"It is a process which goes gradually, everybody wants to go quickly but we should not. Our task is to facilitate the commercialisation of wood, the GGFs and the management of the forest, they can not yet do without us. And when you say we are more intermediary than facilitator you did not listen to what we have to say, but takes all the population tells you for granted."

An explication might be that the PNGT is a project intended to disappear in the future, but the *agents des Eaux et Forêts* are intended to stay to execute their control and communication role. Because *the agents des Eaux et Forêts* are employed by the PNGT, this might cause some internal tensions and different role conceptions for individuals.

A third, directly related, weakness is the non-recognition of the importance and role of platforms, as represented in the figure 8.3;
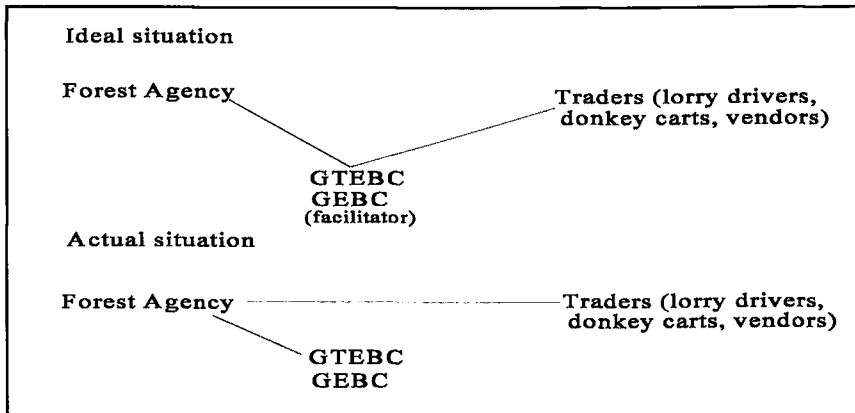
Figure 8.4:   Contact between Forest Agency and traders

As shown, the problem is that communication does not take place between the two *groupements*, but directly between Forest Agency and traders. As a consequence, members do not respect the GEBC or GETBC rules any more, and these *groupements* loose their power. The *groupements* used to control illegal sales, but now that vendors have no need any more to pass by the GEBC or GTEBC, these vendors do not have the signs any more to indicate that they are legal, but they can have the permits anyway. This means that, through this lack of communication, an essential control and power system has been destroyed. Through a renewed communication between the Forest Agency and the GEBC and GTEBC, this problem might be solved.

A fourth weakness is that the conflict resolution mechanism is influenced by cultural rules. In the case of Bekuy, a corrupt village elder could not be punished due to cultural conceptions of the assembly with respect to elder and natives. Such relations of trust and reciprocity seem to be more or less missing when migrants and natives work together. The cultural conceptions which can hinder or temper the functioning of official rules, seem effective among natives.

A fifth weakness is that the whole commercialisation process is guided by the state, and therefore very vulnerable to corruption. It is the state which receives the receipts and hands over the money, it is the state which sells the wood to donkey cart holders, it is the state which gives permits to search or sell wood. In all these links, the risk of corruption is present and several cases of corruption have been mentioned.

A sixth weakness is that the sanctioning mechanisms at the village level are hold by the Forest Agents. This system is also vulnerable to corruption (fines without receipt etc.). The *groupements* (GGF, GEBC or GTEBC) do not have the power to sanction and in the case of GEBC and GTEBC even the monitoring system does not exist any more (see third weakness) which -needless to say- provokes illegal practices.

A seventh weakness are the problems within organisations. We saw that the *groupement* of Bekuy was confronted with corruption and bad leadership. The GEBC and GTEBC are also examples of organisations which obviously do not work perfectly. The problems are organisational, but these seem all to result from a lack of trust between the members. Conflicts of interests provoked a split of the organisation and consequently members did not have faith in their organisations any more.

A final weakness is directly related to the use of the natural forest as discussed above. Because the natural forest is illegally exploited, the traders are confronted with an unfair competition because natural wood is offered on the market and consumers prefer this wood. To reach a more sustainable management of the plantations, sustainable management of the natural forest is indispensable.

Facilitation requires measures at the level of the state and at the level of institutions (in our case PNGT). The state has to create the conditions for the institutions as well as for the population. The institutions have to work within this framework, but they have their own facilitation capabilities (or room for manoeuvre).

Already for four years, the PNGT facilitates the process of sustainable management.

In the first place, it uses communicative interventions to convince the local population that collective action is needed to come to sustainable management. The *diagnostic participatif* has this function and the Forest Agents try to create such awarenes among the local population at any time they can. Study trips are also organized for this purpose. These communicative interventions are mainly meant to stimulate collective action.

Another type of facilitating uses incentives. The PNGT gave boxes of medicines to the local population to take care for injuries resulting from wood cutting. It also provided seedlings for forest replanting.

Apart from these elements, the technical advice which is provided is of a considerable importance. The wood-cutters are advised how to cut the wood. But the PNGT also advises when problems arise in the executive committee at the village level *groupements*.   As explained above, we feel that the PNGT is too dominant and should focus on its facilitatior role.

The state facilitates in creating a legal and regulatory system. It determines, for example, how *groupements* or associations can be legalised. This legalisation is important because such a legalised organisation can obtain the responsibility over part of the forest, according to the new forest codes.

Until now, wood prices has been fixed. After liberalisation, prices are expected to rise considerably, which might be a problem for the consumers (mainly poorer households use wood for food preparation). We feel that consequences of, and possibilities for, liberalisation should be carefully analysed. The control system of the state certainly is not adequate, natural wood enters the village without restrictions. As a GTEBC member said it:

"You should go to the main road coming from Ouagadougou, when you go there at around seventeen hours, I am convinced that you will find at least twenty donkey carts entering with natural wood. In the past, Forest Agents knew these roads and it was not so easily to enter but nowadays the Forest Agents do not control any more."

This diminished control is explained by a lack of financial means. When the state itself is not capable to control illegal activities we wonder if a solution might be to transfer this power to the local population (GGF, GEBC, GTEBC) and provide them thus with an effective sanction and monitoring system.

The Maro forest is rapidely deforested and, like the other forests in Burkina Faso, its forest is trought with social dilemmas. People exploit the forest in their own interest without taking account of the collective interest. Even if people do not farm any more, animals enter and people illegally cut wood. People should accept not to enter and not to chop more than what can be sustained. This is often indicated by the metaphor 'take less'. People should also invest in the management, for example, by replanting and monitoring illegal users. This can be expressed by the metaphor 'give more'.

This use of the forest resource is not faced with only one sort of social dilemma but with a web of such dilemmas. The situation is thus a rather complex one and over time, people have tried to solve them by implementing different property regimes.

The problem of common goods dilemmas can be overcome when stakeholders agree on 'take less' through collective action. So the different stakeholders of the Maro forest should cut less and manage their forest by collective action. However, this requires some public goods, such

as a capacity for policy making, monitoring and sanctioning. Without these collective actions, natural resource management is not possible. For successful collective action, overcoming the public goods dilemma is also important. Stakeholders should be ready to 'give more'.

Co-management practices enabled the development of platforms of the level of villages (the GGFs), of terroirs (the *Comité Villageois de Gestion des Terroirs*), and of inter-terroirs (the *Commission Inter-Terroirs*).

Notes

1. This chapter is based on a MSc thesis by E.S. Nederlof (1997): Facilitation of Forest management. The case of wood exploitation in the classified forest of Maro, Burkina Faso. Wageningen: wageningen Agricultural University. She collaborated within the NIRP programme in the selection of a Burkina case (chapter ...). Hence her own MSc thesis was so relevant to the subject of this book, she graciously consented it to write a version for this book. I (Constant Dangbégnon) greatefully acknowledge this contribution.

2. Until October 1996 our research location was situated in the Houet province, but after the restructuring of Burkina Faso's provinces (creation of 15 new provinces), this province is called Tuy.

3. The Mossi (major ethnic group in Burkina Faso) have a tengsoba, land chief, who is the descendant of the first who arrived on this parcel. He is traditionally the only one authorised to give land away. He redivided the land in his turn over some families, but they only have () rights and no ownership rights.

4. Here the Mossi system is followed.

5. With enclave we mean an area in the classified forest which does not fall under the classification rules and can thus be used for agriculture and other purpose.

6. The RAF was written in 1984 because *"[...] des objectifs fondamentaux de la Révolution tels que l'autosuffisance alimentaire et le logement pour tous ne peuvent être atteints qu'avec un système foncier et agraire qui permette une occupation et une exploitation rationelles des terres."* (ZATU et KITI, 1991: 6).

7. Decentralisation is defined by Dédouni (1997) as *le transfert des compétences étatiques aux collectivités locales leur conféront une personnalité juridique, un patrimoine et un pouvoir de décision qui leur sont indispensable pour assumer la gestion effective de leur terroir (PNGT, 1994).*

8. If the plots had not been cultivated for food, the PNGT would not have forced the owner to leave. Now all plots were used for commercial purpose.

9. According to the PNGT *le diagnostic participatif est un processus d'identification et d'analyse avec les populations de l'ensemble des potentialités et des contraintes de leur milieu afin de disposer d'un programme commun d'actions de développement. Il est donc permanent, itératif et doit permettre l'appropriation de la démarche et des objectifs par les populations. Il est le point de départ de la responsabilisation villageoise* (1997 a&b). See Reseau MARP (1997) for a further description of the MARP method.

10. This is the first year that the PNGT will use a theater to make people aware of the environmental degradation and to introduce the GdT approach.

11. Nowadays there are fourteen *groupements de gestion forestière*; which are: Dorossiamenso, Kadomba, Ramatoulaye, Néfrélaye, Békuy, Lamba, Sara, Bala, Sokourani, Tiérako, Boho-kari, Yabé, Maro et Koukourouna (EMP, 1997: 1).

9 Developing Platforms for the *Gestion* of a *Zone Sylvo-Pastorale* in the Houet Province, Burkina-Faso

9.1 Introduction

'Gestion' and *'aménagement'* of *terroirs* have been implemented since the mid-1980s in the Francophone West Africa. The difference between them will be explained below. These approaches are perceived as a novel solution for environmental degradation in rural areas, mostly at the village' level (Painter, 1993). Donors, governments and planners initiated many actions based on these approaches especially in the Sahelian countries. However, such criticisms (e.g., Tollman, 1993) of the *Gestion Des Terroirs* approach led to the continuous adaptation of these notions[1]. Still, in many circumstances the extent of technical realization prevails in evaluating various actions. Generating a long-enduring organization at the level of a *terroir* is not yet achieved satisfactorily. This chapter assumes that the platform notion is potentially useful to compensate this weakness of the *'gestion'* and *'aménagement'* of *terroirs* approaches.

The present case study deals with the problems in implementing of the *Gestion des Terroirs* by the *Programme National de Gestion des Terroirs* (PNGT) in the particular context of the Burkina Faso. At the beginning of the study, two important documents were available and used as an additional source of data to complement the primary information obtained. The first document (PNGT, 1995) presents the rationale of the national programme for the *gestion des terroirs* in Burkina Faso and defines the national policy. It explains also the general perspective implied in the *gestion des terroirs*, the role of the other actors (national and international NGOs), the conditions for success, and the measures to ensure follow-up of the action of the *gestion des terroirs*. The second document (PNGT/EMP-Houet, 1995) presents the process and content of the *'gestion/aménagement'* in the Houet province, and a detailed description of the area (physical environment, the people and their history and their activities) in which concrete activities are carrying out.

Several research methods and techniques were used for this case study. Individual and group interviews were used to collect data at the level of the stakeholders and the professionals of the PNGT and other actors (NGOs, the extension workers, political authorities). Snow-ball techniques were used and the stakeholders and the professionals helped identify the key informants during the investigations. Group interviews were done with specific interest groups (natives, migrants, and herders) with stakes in the *aménagement* of a ZSP. As will be seen later, many activities were carried out during the study and participant observation was used. At the end of the field research in the region of Bobo-Dioulasso, a group discussion was organised with the professionals of the PNGT. The advantage was that the information obtained from the stakeholders was cross-checked.

This chapter starts with the notion of *aménagement* and *gestion* of *terroirs*, from the perspective of the PNGT in Burkina Faso (§9.2). The following section (§9.3) will explain the concept of the *Zone Sylvo-Pastorale* (ZSP) and present the stakeholders and their livelihoods. Then the *aménagement* of a ZSP done by the PNGT will be analysed (§9.4). This process was operational during the present study. The stakeholders were interpreting and speculating on how they should use the ZSP after the realization. As will be analysed later, there were different perceptions on the ZSP according to the natives, the herders, and the organizational plans perceived by professionals. So anticipating on the analysis of resource management in the ZSP (see §9.5), emerged as a relevant issue. This case study draws specific conclusions about the nature of the platforms for the 'aménagement' and 'gestion' of terroirs (see §9.6).

9.2   *'Gestion des terroirs' and 'aménagement des terroirs'* according to the PNGT

The concepts *gestion des terroirs* and *aménagement des terroirs*

According to the PNGT (cf. PNGT, 1995: 14), 'the *gestion des terroirs* is a rural development approach which is based on the *responsabilisation* and participation of rural communities in managing resources in a defined space called a *terroir*, through land tenure security, and for ensuring the sustainability of these resources. The *gestion des terroirs* combines *aménagement des terroirs*, *agrosylvopastorale* production activities, and the creation of socioeconomic infrastructures, in a perspective on sustainable development at the local level' (my translation CD).

The *aménagement des terroirs* is defined as a process of implementing concerted action and measures for the sustainable valorisation of the natural resources in of the *terroirs*. The development of the *terroir* is not only realized at the community level but also at the individual level by taking into account financial and human resources. *Aménagement* refers to improvement and involves a variety of investments to raise the level of productivity of the natural resources in a given area.

Thus *gestion des terroirs* is broader than the *aménagement des terroirs*. The plans for the *gestion des terroirs* involve *aménagement des terroirs*. *Gestion des terroirs* calls for a rational utilization of all the resources of the terroir (natural resources, human resources, financial resources, etc.). *Aménagement* is used to describe a series of actions which involve using the resource in a particular way, limiting access to certain times and controlling levels of resource use.

Objectives and key features of the *gestion des terroirs* approach of the PNGT

The global objectives of the *Gestion des Terroirs* in Burkina Faso are the following (see PNGT, 1995: 16):

- responsabilisation of the rural communities to face their destiny;
- restoring and improving the potential of natural resources;
- ensuring the reproducibility and durability of actions initiated and realized;
- achieving a better management of space of the natural resources;
- ensuring land tenure security to enable the development of farming systems;
- integrating agricultural activities, livestock, forestry and fishing;
- improving social relationship among farmers, herders, migrants and natives;
- helping the villagers to develop a representative organization which will become a partner for external intervening agencies;
- promoting inter-village organization for the management of rangeland, forest, watershed, community infrastructures, etc.;
- creating conditions for coordinating various activities within the Gestion des Terroirs.

Key features in the *gestion des terroirs* approach are the following:

- the approach is based on participation and the *responsabilisation* of the rural; people. The top-down approach is rejected;
- the approach is global, and it covers multiple sectors to take into account different dimensions of rural livelihoods;
- professionals in the field work in a team. Complementarity between their different disciplines is acknowledged;
- the approach is flexible, bottom-up and decentralised to village level.

The concept of a zone sylvo-pastorale

In the local context of the use of lands, two big spatial units can be distinguished in Burkina Faso: the agricultural lands and the bush ('*la brousse*'). The latter involves the fallow and lands which are not cultivated ('*terre en friche*'). They are grazing areas or natural forests (Hien, 1995). The concept of the *zone sylvo-pastorale* refers to these areas. From the ecological point of view, the vegetation cover of the sylvo-pastoral zone keeps the soils in good condition (prevention of soil erosion and improvement of water retention) and constitutes a land reserve for farming activities (Hien, 1995). A *zone sylvo-pastorale* provides pasture, fuelwood, fruits and natural vegetables for the villagers. It constitutes a reserve of medicinal plants. Increasing drought in Burkina Faso has caused migrations of farmers and herders from the drier regions to the Southern part of Burkina Faso to the Houet Province. Consequently,

the sylvo-pastorale areas are under siege by migrants and conflicts often arise between natives and migrants.

In face of these evolving problems in the Houet Province of Burkina Faso, the *aménagement* of a *zone sylvo-pastorale* was perceived within the *gestion des terroirs* activities[2] by the PNGT in this area. According to the PNGT, the implementation of this action involved:

* decision-making about the allocation of a certain part of village territories to livestock production and tree planting;
* planning of activities for the facilitation of the livestock production in this zone;
* defining the organizational structure which involves the stakeholders in the management.

The end of the *aménagement* means that a *zone sylvo-pastorale* is created. This zone includes a corridor space to enable the passage of cattle. Watering points and animal care paddocks (*'parc de vaccination'*) are created. Tree planting is permitted under the zone framework. The emphasis should be given to the tree species whose leaves can be used as fodder for cattle. The quality of pastures will be improved in this zone through the *aménagement* of the bush with fodder species. Particular attention will be given to the *carrying capacity* of the zone through the rotation of the parcels based on a rational utilization of the pastures. Activities such as farming, hunting and building houses are forbidden in this zone. The *zone sylvo-pastorale* involves, on the one hand, infrastructures such as corridor space, the animal care paddocks, watering points (*'retenue d'eau'*) and fire-breaks in the forested areas. On the other hand, natural resources such as trees, pastures and water need to be managed.

The organizational structure of the PNGT that intervened in the Houet Province is the same as the one described in chapter 8 (see figure 8.2). The EMP operated at the grass-root level, in the villages.

In view of the explanation above, a man-made *zone sylvo-pastorale* as envisaged by the PNGT, involves a process for realizing it (the *aménagement*, see §9.4), and ways of managing it after the creation of the zone (the *gestion*, see §9.5). Before an analysis of the creation of the *zone sylvo-pastorale* and its management, I will discuss the nature of the stakeholders in the intervention area of Houet Province.

9.3   The stakeholders in the intervention area of the PNGT

The intervention area

The intervention area of the PNGT covers all the villages in the *Départements*[3] of Satiri and Bekuy, and all the villages surrounding the Maro forest (see chapter 8) in Houet Province. Geographically the area is between 11°20 and 11°56 North latitude and 3°45 and 4°12 of longitude. The zone has a surface of 2029 km^2. Village targeted by the PNGT for *gestion des terroirs* activities at the beginning of the intervention, i.e., for elaborating plans of

aménagement concerned Kadomba, Sara-Bekuy, Tierako and Bala (cf. PNGT/EMP-Houet, 1995).

Kadomba in the *Département* of Satiri is a village inhabited by the native Bobo, the migrant Mossi and some sedentary herders. The arrival of many migrant Mossi in Kadomba started in 1970, when severe droughts appeared in the Sahel. Land in Kadomba belongs to six big family compounds. Within these families, the family heads have the right to give land to migrants. This prerogative is in the interest of the family heads because the receivers of land will give many presents, for example animals, money, or colanuts, and they will return each year to give a small present, for example chickens. This results in the situation that many migrants received and continue to receive land until now. Land is not purchased by the migrants but it is lent to them and the owners should get it back afterwards. Through this process of giving usufruct, villages which consist only of migrants are created. Ramatoulaye and Nefrelaye are two villages which are in the territory of Kadomba. As will be explain later, this has some implication on the identification of a *terroir*.

The villages Sara and Bekuy are in the *Département* of Bekuy. Here, the Bwaba people are the natives. Ethnic groups such as the Mossi, Dafing and Samon, are the migrants in the two villages. Herders are also in the area. Land property rights are the same as in Kadomba. In Sara, land belongs to ten big family compounds. Lamba is a migrant village in the territory of Bekuy.

Tierako is a village inhabited by the native Bobo. Unlike Kadomba, Sara and Bekuy, there are no migrants in the territory of Tierako. An explanation may be found in the land rights and transaction patterns. The land belongs to the family heads but there is only one chief of land who organizes sacrifices for land use in the village.

Bala is a village inhabited by native Bobo and migrant Mossi as in Kadomba. Lands belong to ten big family compounds. Migrant Mossi gained access to land through borrowing.

In all the villages, many organizations are functional. The *Groupement Villageois des Agriculteurs* (GVA) is the most powerful because of cotton production. Other organizations concerned the *Groupement Villageois Féminin* (GVF); the women's organization; the *Groupement Villageois d'Eleveurs* (GVE), the livestock production organization; the *Groupement de Gestion Forestière* (GGF, see chapter 8); and the *Comité Coutumier des Vieux* (CCV) is found where animism is still practised (e.g., in Kadomba and Bala).

Focus on Kadomba for the study and in-depth analysis

Kadomba was the first village where the *aménagement* of a *zone sylvo-pastorale* started successfully by PNGT professionals. Kadomba was chosen for study and in-depth analysis of the *aménagement* of a *zone sylvo-pastorale*. This choice was made with the help of PNGT professionals in the Houet province. The idea was to follow the existing momentum of the implementation of the *aménagement* from Kadomba to other villages. A *zone sylvo-pastorale* is a desire of many villages. According to the professionals of the PNGT in Houet, the

experience gained with the *aménagement* in Kadomba served as a 'model' for the continuation of the process in the other villages.

From a strategic point of view, Kadomba presented a situation where natives, migrants and herders are frequently in interaction because of repetitive conflicts between the crop-farmers and the herders. The native Bobo, the migrant Mossi and the herders were the potential stakeholders in these conflicts. They needed to agree among themselves how to use the *terroir* so as to reduce conflicts. The intervention of the PNGT aimed to realize this objective.

9.4   Developing platforms for the *Aménagement of a Zone Sylvo-Pastorale*

Problems and perceptions according to various stakeholders and the PNGT

The native Bobo: one economic system should not destroy another

The parable, '*an economic system should not destroy another*' used by a native Bobo, is meant to summarise the main problems of the natives Bobo, the crop-farmers. Farming and herding are considered as two different 'economic system', in the parable used. When the cattle caused serious damages to the crops, the meaning attributed, by the native Bobo, was: an 'economic system' is destroying another. The conflict with the herders started in the early 1970s, the period of the arrival of first herders who stayed temporarily in the village Kadomba. A serious conflict emerged between the native Bobo in Kadomba and the herders as explained by Millogo (see Box 9.1). He concluded that it was an historical event that should not be forgotten in the region.

Box 9.1: Millogo explains the conflict between the native Bobo in Kadomba and the herders

Since 1972, there is a fight between herders and farmers. Their animals caused serious damages in cotton farms. One way to secure your cotton farm was to be there during the nights and prevent the cattle from destroying it. The herders arrived in Kadomba for the first time in 1972. They stayed temporarily during the dry season and returned at the beginning of the rainy season. I cannot forget a case of serious conflict in 1976. There was one death among herders and 14 villagers including myself were arrested. We were in jail for 10 months and 24 days. How the conflict had emerged? The farmers used to cultivate cotton and the harvesting should finish in December. Before the herders arrived in Kadomba, they sent a message and informed the farmers about their arrival. They asked them to complete the harvesting of their cotton farms, if not the cattle should destroy it. Unfortunately, every farmers did not have sufficient labour to complete the harvesting in time. Another problem was that, depending on the period you sow the cotton, the harvesting should start in November while the herders arrived already in October and caused serious damages to the cotton farms. When the villagers noticed that the same problem was repeated every year, they convoked the herders the 10th April 1976 at the Chef du Village place to come to an agreement and avoid conflicts. The herders arrived and at the meeting we said that we are neighbours and an economic system should not destroy another. The cattle did not have to destroy the cotton farms. The herders could not understand because they had already informed the farmers to harvest their cotton farms. This meeting turned to a fight and one herder was killed and another seriously wounded by the villagers. After that, the herders went to the local police and they could give only the names of 14 villagers. These people were arrested and they were put in jail. It was an event that should not be forgotten .... .

The cattle also stamps the watering place used by the villagers. After their passage, the water is not clean and the women complain. A sixty years old stakeholder in Kadomba compared the actual situation to the one when he was too young (twenty years old) and said that there was sufficient space in the past and the population was low. Today, you cannot have a farm somewhere without the presence of a herder near. The number of farmers and herders increases. Very often conflicts occur but it is not easy to resolve them at local or administration levels because the herders have more money than the farmers, and they can to corrupt the officials in order to avoid official sanctions. As a result, the situation was difficult for everybody in Kadomba.

The migrant Mossi: what a blind man wants is to see ...

The parable *'what a blind man wants is to see, what a deaf man wants is to hear and to talk'*, used by a migrant Mossi, can summarize the perception of the problem by the Mossi. The migrant Mossi have another perception of the problem with respect to the need to initiate an *aménagement* of a *zone sylvo-pastorale*. The main problem perceived by the Mossi is the land insecurity they face. The migrant Mossi also raised the problem of soil fertility decline. By analogy, the Mossi identified themselves as a blind man and a deaf mute compared to the Bobo people. Finding a solution to the problem of land insecurity and the declining fertility of their farms was more important than initiating an *aménagement* of a *zone sylvo-pastorale* (see Box 9.2).

Box 9.2: Yameogo, a migrant Mossi from Koudougou 32 years ago, gives his perception of the problem

The parcel I am exploiting for 30 years ago is depleted and has lost its fertility. I got this parcel from a native Bobo landowners. I do not have the possibility to choose another parcel in Kadomba. I do not have other areas to clear and cultivate. ... concerning the problems with the herders ... in the area where the herders and farmers are living, it is normal that a conflict occurs sometimes ... it happens that one day the teeth bite the tongue. But, a good relationship with the herders is important because they are keeping the cattle we need for the ox-plough.

The herders: crop-farms are everywhere

The strategy of the herders to cope with the environmental uncertainties is to move to the humid areas in the dry season in order to find fresh pasture. In the rainy season it is good for the health of the cattle to move to the dry area and avoid too much humidity. Nowadays, the movement from the North (dry areas) to the South (humid areas) is becoming more and more difficult. Sangare, a herder living in Kadomba since 6 years ago, explained his experience and the problem encountered in the seasonal movement with his flock (see Box 9.3).

Box 9.3: Sangare explains the nature of herding and how he copes with the situation

During the dry season I move with my flock to Gaoua, which is more humid, and find pastures and water for the cattle. I return to Kadomba in the rainy season. I left Nouna in the Northern part of Kadomba because the area was very dry and it was difficult to find pastures and water for the cattle. Moving from Nouna to Kadomba was very difficult because of the presence of several crop-farms along the route. Even nowadays it is not easy to go in Gaoua and return to Kadomba. It is common that a cattle enters a crop-farm and causes serious damage. In this

case, I go to the *Chef de Village* with the farmer and together we try to find a compromise. We try to avoid the *fagamaw* (administration) because at this level, the resolution of the problems takes more time and money. We have three basic problems: pastures, watering place and corridor space. There is also the problem of finding *missilayoroko*, a place where a paddock can be made to keep the cattle. During the rainy season, we need a place at the upstream of lands and in the dry season, we need the downstream of the lands, where we can find fresh pastures and trees with green leaves.

Finding pasture and watering places for the cattle in the dry season is a crucial problem for the herders. During the rainy season, the herders have the problem of finding a corridor space because there are crop-farms everywhere. The difficulty to move with the cattle without causing damage to the crops in the rainy season is due to the fact that the existing corridor spaces were closed by the farmers. In the past the herders, could join the *'classified'* forest of Maro and find some places where they could live peacefully with the flocks. But the farmers also moved to the Maro forest to cultivate the fertile lands and the herders were in trouble again in sharing the forest area.

The PNGT: the ecological crisis requires interventions to halt environmental degradation

Burkina Faso is a country where 90% of the population depends on the exploitation of land and natural resources such as water, forests, and pastures for their livelihoods. The contribution of the agricultural sector to the GNP was estimated of 30% in 1992 (PNGT, 1995: 8). Despite this importance, the Burkinabè's bio-physical environment faces severe degradation since 1950 and catastrophic droughts from 1969 to 1973. The consequence is a long term deterioration and the emergence of fragile conditions for the development of the agricultural economy. The terminology used to emphasize the magnitude of the problem is 'the ecological crisis' (PNGT, 1995). A diagnosis of the situation was carried out and two principal factors were found to explain the ecological crisis: (i) physical or agro-climatic factors and (ii) human factors (PNGT, 1995: 89).

The first type of factor originates from the presence of endemic droughts which caused ecological disorders based on the degradation of the structure of the soils, the regress of annual rainfall, and the destruction of the vegetation cover. The second type of factor is attributed to the nature and the impact of human activities on the environment. Demographic pressure causes the reduction of fallow periods and the ever greater exploitation of the natural resources in general. Anarchical land clearing, shifting cultivation, burning, and excessive tree cutting practices as well as unsuitable land tenure systems (parcelling out of lands, conflicts about property which lead to insecurity) were the most critical human factors observed. Migration of people and uncontrolled transhumance from the degraded areas resulted from the ecological degradation.

Burkina Faso governments had no alternative choice but to design interventions to halt the environmental degradation and create conditions for economic growth in the rural areas.

Defining the problem of the aménagement of the zone sylvo-pastorale

From the previous presentation of the perception of the problem by the immediate relevant stakeholders and the PNGT, one can argue that the problematic context is characterized, on the one hand, by serious conflicts among stakeholders; and on the other, by an anarchical utilization of the land based on extensive cultivation and herding. The crop-farmers (both native and migrant) wanted to avoid crop damage by cattle. The herders accused the farmers of closing the corridors for the cattle and making their movement very difficult. Conflicts occur with two types of herders: the herders living at the 'periphery' of Kadomba and the transhumants. The former destroyed the crops just after sowing periods and the latter created troubles during the harvesting times, especially of cotton.

Replanning the utilization of the land areas for a sustainable use (preventing ecological crises) and reducing the conflicts were objectives which can only be reached through shared understandings, negotiated agreements and concerted actions among the stakeholders. They had experienced an alternative solution to the problem, the idea of the public *fourrière* (animal pound). The animals which caused damages to the crops were conveyed to the *fourrière*. The owner of the animals (cattle, sheep, goats, pigs, etc.) needs to pay the cost of the *fourrière*[4] and the estimated damages.

There is evidence which shows that a coercive strategy only does not solve the crucial problem of conflicts among the stakeholders. Rather, the problem was deepened through corruption according to the experience of a stakeholder in Kadomba (see Box 9.4).

Box 9.4: Souleymane, a migrant farmer is disappointed with the resolution of his problems with a herder

In 1996, a flock of cattle went into my maize farm and caused a serious damage to the plants. I succeeded to convey the flock to the *fourrière* of Kadomba. The herder was informed, he agreed on the damages and preferred the resolution of this problem at the level of the local police. The herder paid the pound costs (*frais de fourrière*) and went to the local police in Satiri (*gendarmerie*) to negotiate. I was informed later by the local police that an extension worker will come from Satiri to estimate the equivalent costs of my maize-crops which were damaged. I was waiting and nobody arrived. I explained my problem to the manager of the *fourrière* in Kadomba. He was surprised and went to Satiri to request the arrival of the extension worker in Kadomba. But until this day, nobody arrived. I am disappointed, I believed that the herder corrupted the local police. This problem always happens and we do not know what to do.

Stakeholder analysis for the aménagement of a zone sylvo-pastoral as the solution to the problems

The physical planning of the *Terroir* in the *aménagement* of a *zone sylvo-pastorale* involved the allocation of part of the lands and the vegetation for the pastoral activities (herding) to avoid the interference with the agricultural activities (cropping). From that point of view, the land owners need to sacrifice a portion of their patrimony and the herders must reduce the freedom of the mobility with their flocks. According to the herders, their concrete need can be summarized in the following key words: pastures, watering places, and corridor space. The concession required by the native Bobo, the landowners involved in the reorganization of the *terroir*, would limit their cultivation areas. If nothing was done to reduce this negative aspect

of the trade-off (the positive one should be the reduction of crop damage and conflicts), the crop-farmers would be motivated to break the negotiated agreement in face of the need to extend their farm size or to practise shifting cultivation. The *aménagement* of a *zone sylvo-pastorale* can affect the socio-economic position of the migrant Mossi, for example dispossessing them of the lands they received from the native Bobo. All these issues need a careful analysis for the success of the *aménagement*.

According to the way the professionals of the *Equipe Mobile Pluridisciplinaire* (EMP) learned with the stakeholders at the grass-root level, the facilitation of change in the *aménagement* of a *zone sylvo-pastorale* was based on the support of the local processes which were facilitated by the intervention. The EMP has strong vehicles for the trips from Bobo-Dioulasso to the intervention area. These activities were funded by the World Bank, Norway (NORAD), France *(Caisse Française de Développement* = CFD) and Germany (GTZ).

Starting the *aménagement* of a ZSP: the social learning path of the PNGT team

Village forum and collective decision-making

The PNGT chose participatory processes to learn with the stakeholders to design jointly the intervention to solve the problems. The *Méthode Accélérée de Recherche Participative* (MARP), a participatory action research method was used by the EMP, a pluridisciplinary team. Men and women from Kadomba, be they native Bobo, migrant Mossi, or herders, were invited in participate to village fora. The village fora had taken place before my investigations started. Sanon explains the way the MARP was organized (see Box 9.5).

Box 9.5: Sanon described the participatory action research process in Kadomba

When the PNGT people arrived in Kadomba, they gave the idea of village assemblies to discuss our problems and find solutions about the way we use our 'nature' (*sogoko*). Later, the *Chef de Village* invited everybody and we did the assembly with the PNGT people. At the beginning they asked several questions like:

- According to the fact that your *terroir* is degrading, what are the solutions you have?
- The herders are everywhere in your *terroir*, what is the problem this situation causes? what are the solutions you have?
- What king of relations exist between you and the neighbouring villages?

We gave the following answers:

- *Sogoko* is degrading and we are getting worried about it.
- We have several conflicts with the herders
- Our lands are very poor

After that, we were divided in three groups: old men, young people[5] and women. During three days we discussed the questions in the village. Our conclusion with respect to the conflicts between crop-farmers and herders was: we would like the herders to be in one side and the farmers in other side of the village territory. The PNGT people said that this can be possible and they can help us to achieve this goal. That was the way we started with the idea of the creation of the Missi-sara (sylvo-pastoral zone) in Kadomba. During the assemblies, we did some maps which are with the *Chef de Village*. The maps show the Mara (village territory) of Kadomba.

The main objective for organizing this forum was to facilitate collective learning so that the participating stakeholders would perceive the need to start the *aménagement* of *zone sylvo-pastorale*. The implementation of this activity by the PNGT necessarily required the effective participation of the stakeholders.

Dividing the participants into different groups was a way of making the collective learning more dynamic. For instance, the Chief of Kadomba explained that the mapping exercise which was done by each group was not the same. Professionals of the EMP acted as facilitators. Stones, sticks, and large sheets of paper were used to represent the specific areas of the *terroir* where the crop-farms of the majority of the stakeholders are located, the areas which were often used by the herders, and the locations where the conflicts between the crop-farmers and the herders occur frequently. Several natural systems (rivers and their floodplain, forest, hills) were located by the stakeholders. Different types of maps were drawn according the young, the women and the old men.

Discussion among groups of stakeholders participating in the forum was supported by this mapping exercise which presented a visual ground for exploring alternatives to replan the *terroir*. Collective discussion yielded different ideas and interests for decision-making. The village's forum was also an opportunity for the EMP to collect data based on a participatory rural appraisal.

Collective decision-making at the village's forum took the form of covenants among the participating stakeholders for the re-organization of their *terroir*, as Salon said in Box 9.5: crop-farmers should be in one side and the herders in other side of the *terroir*. One can argue that this way of reasoning by the villagers made visible their interdependence with the herders. The move to this level of perception was necessary for successful collective action between villagers and herders.

However, the migrant Mossi were not interested in this forum for collective decision-making about the *aménagement*. Depending on the way they perceived the village's forum, they feared that the idea to initiate a re-organization of the *terroir* in Kadomba would deprive them of the lands they had borrowed from the native Bobo (see Box 9.6).

Box 9.6 Ouedraogo explains the fears of the migrant Mossi about the aménagement of ZSP

When we started with the PNGT, the idea to use the lands of Kadomba in other ways emerged. There was a misunderstanding between Bobo people and migrant Mossi. I do not have a problem yet. But there are some migrant Mossi who lost the lands they were using in the creation of a reserved forest (*réserve foncière*). The sacred zone covers their farms and they were asked to leave this area. They did not get other lands to cultivate. Since this event, we are not in security of the lands we are using.

The herders did not come to the meeting: they also feared the idea of reorganizing the terroir. The interpretation of the native Bobo was that the herders did not like this idea of reorganizing the terroir because they wanted to use the whole village *terroir* to find pastures for their cattle. This interpretation was confirmed during a discussion with the herders. They would appreciate

the idea of creating a zone *sylvo-pastorale* for the rainy season, the period where there are many crop-farms, but during the dry seasons they would like to go beyond this zone.

The herders did not understand the functioning of the *zone sylvo-pastorale* because the *aménagement* plan (as explained by PNGT professionals) did not deny their access to the whole village territory during the dry season. The fact that they did not participate might also be related to a lack of communication.

Learning about terroir: negotiation of local plans for the aménagement of a zone sylvo-pastorale

The *terroirs* are not congruent with administrative divisions. They are based on the local ownership patterns. The native Bobo in Kadomba were the first to start the discussion with the EMP to allocate a part of their *terroir* for the aménagement of a *zone sylvo-pastorale*. At that stage, the active participation of the 'families' who owned lands in the villages was very important for agreeing on the boundaries of the *terroir*. They helped the PNGT professionals and together an the agreement was made on the boundaries of their *terroir*. The *terroir* is called *Mara* by the native Bobo. The same procedure was done later in other villages of the intervention area.

Map 9.1 presents the *terroirs* under siege and their respective boundaries. One can notice that there are some villages (e.g., Nefrelaye, Ramatoulaye, etc.) which do not have a specific *terroir* because the stakeholders who are living there, the migrant Mossi, are not land owners. The boundaries emerged from negotiation and interactions because the procedure to follow was not well known beforehand by the resource managers.

The professionals of the EMP argued that the so-called landowners in the villages did not have a document which proved their ownership, but everybody agreed in the villages. Officially there is no recognition by the government that the Bobo are the landowners in Kadomba. However, the professionals decided to refer to the existing local land ownership to negotiate the plan. Two criteria were important. The first was that the selection of zones between the *terroirs* should be continuous to enable the improvement of corridor space. The selection of the zone should also be located in the areas of the *terroirs* where there were very few farms. This idea was developed to avoid the dispossession of the migrant Mossi or others.

After Kadomba, the negotiation of physical planning occurred in the other *terroirs*. However, the enthusiasm was different (compared with Kadomba) according to the native Bobo in this village. For instance, the stakeholders in Bala refused at the beginning, they misunderstood the reason that they might allocate a certain part of their *terroir* to the herders. Of interest is the involvement of farmers in Kadomba in explaining the importance of the idea of the PNGT for avoiding conflicts with herders to stakeholders in other villages. The fact that the farmers in Kadomba understood the intervention was an advantage because this stimulated change in other villagers who visited Kadomba to find out what was going on. A plan for the *aménagement* of a *zone sylvo-pastorale* was made (explained below). However, it had to be negotiated at a higher level. Before analysing this process, I will explore how platform development was implemented so as to get insight into learning and negotiation processes.
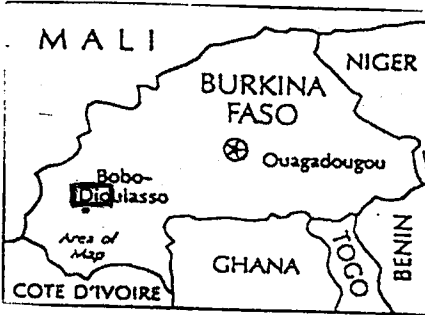
Map 9.1: Terroir boundaries for the aménegement of a zone sylvo-pastorale
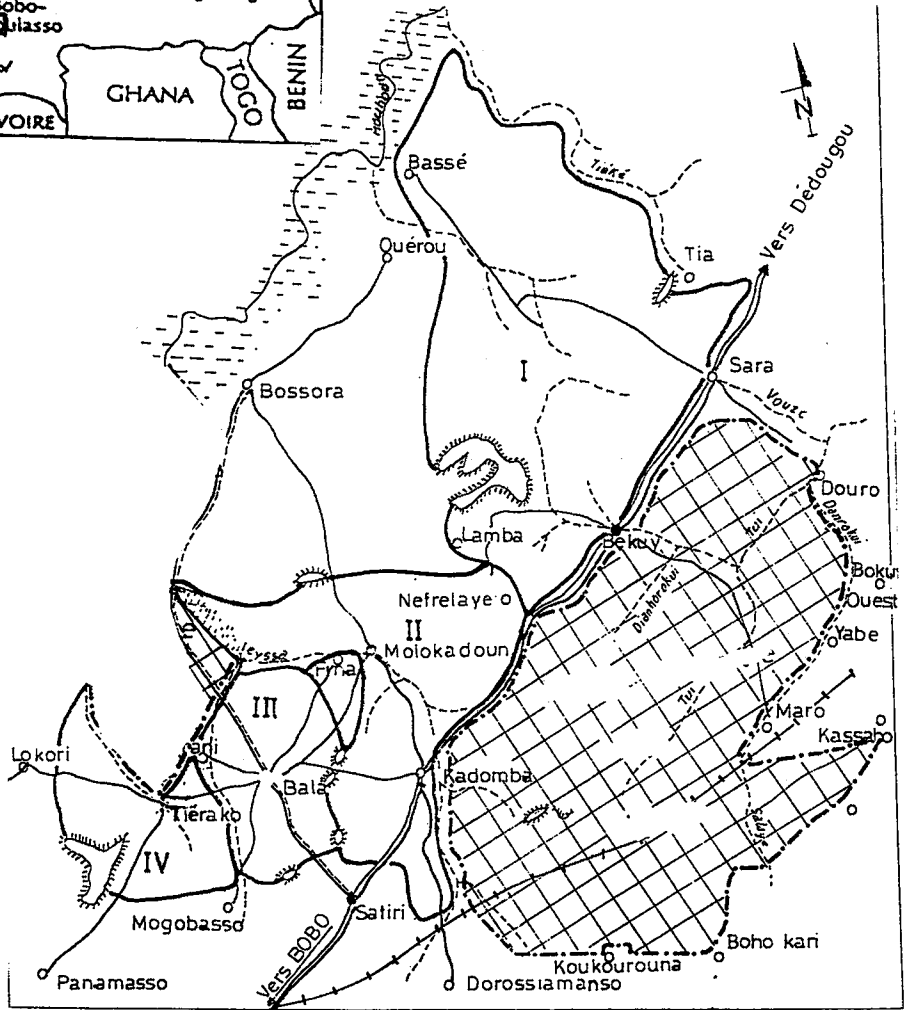
: Terroir boundaries
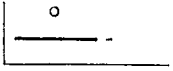
Learning about platform development in the aménagement of a zone sylvo-pastorale

The development of a platform for the *aménagement* of a *zone sylvo-pastorale* was based on the mobilization of existing specific local organizations. The *Groupement de Gestion Forestière* (GGF), a village level structure for the exploitation of the woodlot in the Maro forest (see chapter 9), was involved. But so were many other local organizations. Two of them concerned respectively agriculture (*Groupement Villageois d'Agriculteurs* = GVA) and livestock production (*Groupement Villageois d'Eleveurs* = GVE). The former was the most powerful and constituted, specifically the organization of the cotton producers. Many villagers are crop farmers, or animal (cattle, goat, sheep, and pig) breeders and belong to the GVA and the GVE. The *Comité Technique Villageois* (CTV) which consists of the villagers who were trained in a specific domain (soil erosion control techniques, forestation techniques, beekeeping, etc.); and the *Comité de Gestion du Matériel* (CGM), those who were in charge of the maintenance of the tools and equipments brought by the PNGT, were involved. The women's organization, the *Groupement Villageois Féminin* (GVF) was operational in the villages.

Each of those organizations had their representatives in the *Comité Villageois de Gestion des Terroirs* (CVGT), an organizational structure for solving problems with respect to the *gestion des terroirs*, at the village level, which did not correspond necessarily to the *terroir* level (see fig. 9.1). At the level of the terroir, the *Comité Villageois de Gestion du Terroir* (CVGT), the resource management structure, was created and the leaders were chosen among the representatives of the CVGV. The resolution of many problems, as was the case in the *aménagement* of a *zone sylvo-pastorale*, required a decision making structure across *terroirs*. The creation of an Ad hoc committee was based on the choice of representatives from the CVGTs which were concerned. Figure 9.1 shows three different levels of the representation and organization for the *gestion des terroirs* and especially for the *aménagement* of a *zone sylvo-pastorale*.

The development of the platform for the *aménagement* of a *zone sylvo-pastorale* involving the existing local organizations was expected to enable the mobilization of the local people's experience. The different socioeconomic groups involved was expected to have a voice in the *aménagement* and stimulate a holistic view of the solution to the problems identified. Another reason was that conflicts would be avoided among the existing local organizations in the execution of activities for the *aménagement* and to promote a synergy among them.
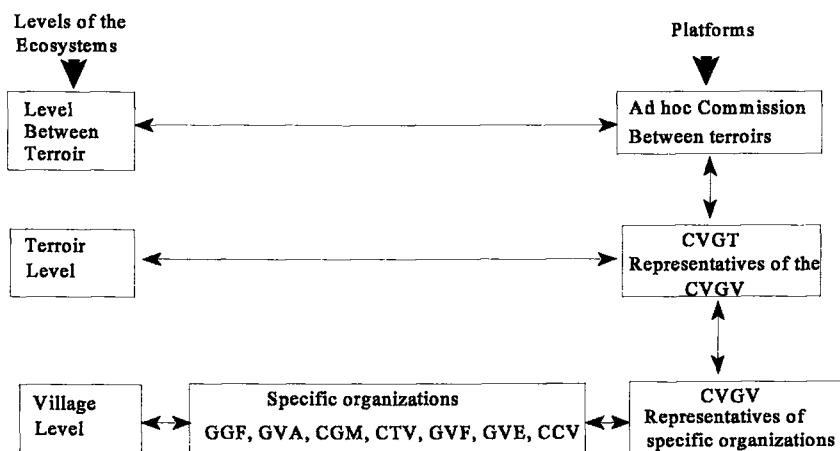
Figure 9.1:   Levels of the ecosystem and platforms for the *aménagement* of a *zone sylvo-pastorale*

Facilitating platforms for concrete action in the *aménagement* of a *zone sylvo-pastorale*

Negotiation and mediation for the official recognition of the aménagement plans

After having negotiated the plans at the level of the stakeholders, the next step was the official agreement at the higher level, the Houet province. The plan needed to be discussed in relation with the government plan. The government physical national plan, the *Aménagement de Territoire* (cf. PNGT, 1995), focuses on harmonious development of the national *terroir* for a better distribution of the population and the activities they perform according to: (i) the constraints and potential of the natural milieu, (ii) technical and human capacities, (iii) economic necessities, and the interactions and the socio-economic characteristics of the regions. The *Aménagement du Territoire* is a frame of reference for political authorities at the levels of nation, regions and the provinces. The physical planning which was done by the EMP and the stakeholders should be consistent with the provincial plan. This accommodation between the 'local' plan and the provincial one took a considerable amount of negotiation and discussions (see Box 9.7).

Box 9.7: Debating the plan of the aménagement of a ZSP in a forum at the province level

A forum chaired by the *Haut Commissaire* of the Province of Houet was organized to discuss, among others, the plan for the *aménagement* of a *zone sylvo-pastorale*. Fifty participants were at this forum which involved political authorities of the province, directors of regional directorates (environment, social action, rural promotion,

urbanism, etc.), journalists, weather forecast service representatives, representatives of the NGOs, and the representative of the PNGT. At this forum, three points were treated: (i) presentation of the PNGT to the assembly; (ii) presentation of the plans for *zone sylvo-pastorale*; and (iii) the examination of the plans. The *Haut Commissaire* of the Houet province opened the forum and emphasized the degradation of the environment which motivated the emergence of the *gestion des terroirs* approach. The participants were informed that the plans which will be examined is the outcome of the work of the PNGT at the grassroot level. The presentation of the plan raised several questions. Examples of important questions which were asked to the PNGT professionals in the following. The first question concerned the legal recognition of the farmers' organization that are functional and the extent to which they could be sustained. Is dividing the *terroir* in the intervention area an appropriate practice? Ro what extent are administrative authorities of the *Département* integrated in the process of plan elaboration? The PNGT people reacted and said that the implementation of the plan will focus on village organizations. There is a procedure for the official recognition of farmers' organisations. The problem is not dividing the *terroir*, but how the villagers can continue to respect the different zones identified for *aménagement*. The participants recommended a clear statement of the possibilities and the limits of the competence of the stakeholders. The plan for the *aménagement* of *terroirs* was adopted by the participants.

The fact that the participants in the discussion forum made suggestions to the EMP for the improvement of the plans of the *aménagement* stimulated another role for the professionals: the mediation between the 'bottom' (stakeholders) and the 'top' (actors at the province level). The role of the mediation was defined in terms of the conciliation of the *aménagement* plans generated at the grassroot level and the conception of the *Aménagement du Territoire* at the level of the province. Mediation was one way to incorporate different values and aspirations from the 'bottom' to the level of development plans at the 'top'. The plan adopted for the *aménagement* was the one which was negotiated with the stakeholders at the grass-root level (see map 9.2).

The implementation of activities in the aménagement of zone sylvo-pastorale

After negotiation and mediation in the forum at the province level, the EMP returned to the grassroot level to implement, with the stakeholders, the activities in the *aménagement* of a *zone sylvo-pastorale*. The principle of the *gestion des terroirs* based on participation and 'responsabilisation' of the local people was applied (cf. PNGT, 1995:17). The activities were organized jointly between the professionals of the PGRN and the members of the *Comité Villageois de Gestion des Terroirs*. The tasks they faced were: the training of some stakeholders, the organization of the activities and the financial and technical support.

The activities in the *aménagement* of a *zone sylvo-pastorale* were the following: establishing the boundaries of the zone to be improved, fixing landmarks or painting the trees
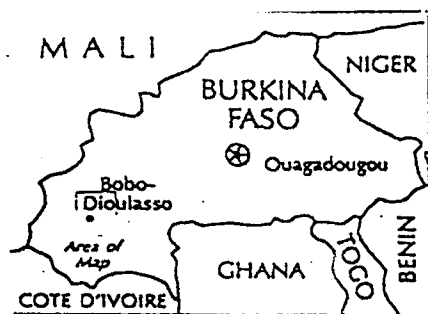
Map 9.2: The zone sylvo-pastoral in the terroirs of Kadomba, Bala, Tierako and Fina
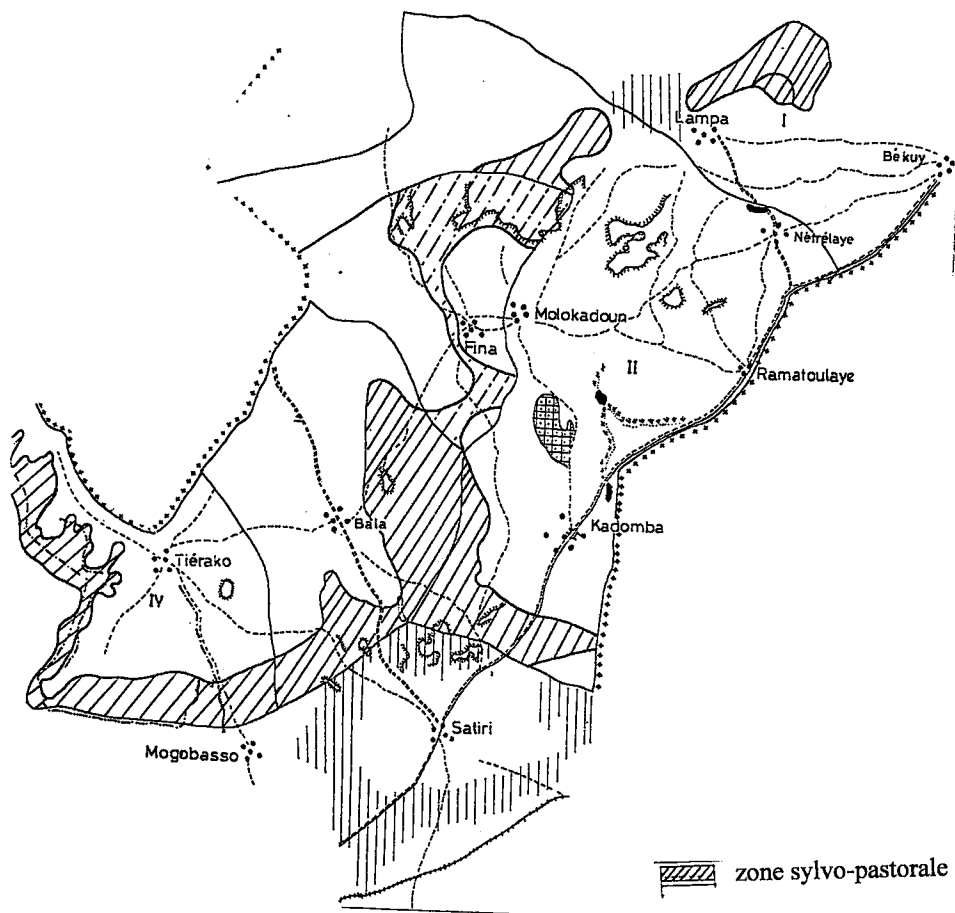
at the borders of this zone to mark out the boundaries, and tracing the corridor space in the zone with landmarks in cement. Some stakeholders were trained to perform these activities. The landmarks in cement were made with the locally available labour.

Using local labour for the activities for setting the boundaries provided an additional source of income because the PNGT assisted the worker financially. They got 500 FCFA per day for participating in these activities.

The incentives for the stakeholders in participating to the activities

Another type of incentive was the official visit and encouragement from political authorities at high level. An example was the visit of the Minister of Agriculture and Animal Resources of Burkina Faso in Kadomba to congratulate the stakeholders. This initiative was well-appreciated in the village. The local people always referred to this event during this study. They believed that they should continue to do the activities with the PNGT in order to maintain their privileged position.

The first activities implemented by the intervention, the composting technique (*fosses fumières*), were successful. The stakeholders discovered that the yield of their farm could be increased and they did not need to extend the size of their farm. The success of this innovation introduced was perceived by the stakeholders as an incentive to continue the activities with the EMP.

Support institutions for the aménagement of a zone sylvo-pastorale

The study found that support institutions for *aménagement* of a *zone sylvo-pastorale* have several dimensions. The first dimension is a clear assignment of responsibility between the relevant organizations for supporting the *aménagement* of a *zone sylvo-pastorale*. The theoretical and methodological backgrounds of the *gestion des terroirs* in Burkina Faso (see PNGT, 1995) explains the way NGOs, government and private organizations should be involved in the *gestion des terroirs* activities. Participatory appraisal and participation in discussion fora for the adoption of physical plans offered opportunities for cooperation. A new role of the extension organization, the DRARA *(Direction Régionale de l'Agriculture et des Ressources Animales)* was defined in terms of the intensification of the *Agro-Sylvo-Pastorale* production. The new role of the *Recherche-Développement* concerned the follow-up of the stakeholders to identify their constraints in other to generate adapted solutions in the context of the *gestion des terroirs*. The *Recherche-Développement* is a section of the Agricultural Research Organization such as the INERA *(Institut d'Etudes et de Recherches Agricoles)* of Burkina Faso. The assignment of activities was an important issue in the *gestion des terroirs*, especially the *aménagement* of a *zone sylvo-pastorale,* because a great deal of money was involved in the implementation of the activities and all the organizations concerned in the rural development activities wanted to participate, but often had no clear idea about their contribution.

The second dimension concerned the definition of property rights to allow a long term security of the investments involved in the *aménagement*. Unfortunately, there still is a confusion due to the coexistence of 'modern institutions' such as the RAF (*Réorganisation Agraire et Foncière*) and the customary land tenure system (de Zeeuw, 1995).

Analysing the effectiveness of the intervention

A strong point that can be learnt from the intervention in the *aménagement* of the *zone sylvo-pastorale* was the attempt of professionals to link grass-root development to the level of policy ascribed above. The facilitation of the aménagement took the form of mediation between the stakeholders and actors at the higher level of the social aggregation. In that aspect, resource management activities resulted from a negotiated agreement at a higher platform.

9.5   Anticipating on the nature of platforms for the *Gestion* of the *Zone Sylvo-Pastorale*

Anticipating on problems perceived by stakeholders

Current problems perceived by stakeholders

What will be the role of the crop farmers after the creation of the *zone sylvo-pastorale*? One informant said that the crop-farmers do not have an answer because this problem basically concerns the herders. It is their responsibility to decide wether other herders should join them to use the *zone sylvo-pastorale*. According to the herders, the creation of the *zone sylvo-pastorale* should attract other herders if the same idea is not developed in many other regions. They would not be able to chase those herders. The *zone sylvo-pastorale* should be the main concern of both herders and crop-farmers.

A discussion with a group of 6 herders revealed that they were worried about the *aménagement* of a *zone sylvo-pastorale*. The fact that they did not participate in the village forum meant that they did not have a clear idea about the way the *zone sylvo-pastorale* will be used. This misunderstanding might create serious problems. But, a professional of the EMP of Houet Province interpreted their absence as a strategy of the herders to not follow the rules of the functioning of the *zone sylvo-pastorale* (see Box 9.8)

Box 9.8: A professional of the EMP-Houet interprets the strategy of the herders

'I do not understand why the herders complain. I think that they are developing a strategy to settle in the zone sylvo-pastoral, or maybe, how they can get a space in this zone. But this is forbidden by the legal statement of the plans. since we created several infrastructures (parking of vaccination of the animals, watering places, etc.) in Weredara (herders' hamlet near Kadomba) for the herders, they should not complain. We explained also that the herders should not be in the *zone sylvo-pastorale* the whole year. During the dry season, when the farmers have completed the harvesting of their crops, they should go to other zones.

Defining the dimensions of the problem and prospective solutions

The first dimension of the problem concerns the maintenance of the infrastructures mentioned above. For instance, users such as transhumants are not necessary located in any *terroir*, and making them contribute to public goods would be very be very difficult like the problem of exclusion from public goods. The stakeholders were thinking already about the solution to this problem. The idea of doing a survey to locate the herders on the *terroirs* and to know the size of their flocks was explained by the secretary of the CGT in Kadomba. One can understand the need to define a user group of the *zone sylvo-pastorale* in order to find a solution for the problem of support of the infrastructures in the *zone sylvo-pastorale* (see Box 9.9)

Box 9.9: A perspective on solution for the maintenance of the infrastructure of the Zone sylvo-pastorale according to a secretary of the CGT

When the *zone sylvo-pastorale* will be created, we will count the number of cattle the herders have. There are also some farmers who keep their own cattle. A tax will be defined for those who have a flock of cattle and would like to use the watering place in the Zone sylvo-pastorale and maybe 200 F CFA/animal/year can be paid. We need to control the *zone sylvo-pastorale* avoid that many herders will come from other regions to benefit. A meeting will be organized with the herders and I am sure that they will accept.

The problem of making transhumants contribute to the maintenance of the infrastructure was not addressed in the idea of the secretary of the CGT. Thinking of a sedentary group of herders in the *zone sylvo-pastorale* would be a great mistake because from that point of view, only a part of the problem can be solved.

The second dimension of the problem would be the development covering the many *terroirs* which hold the *zone sylvo-pastorale* to maintain corridor space (see map 9.2). The strategy of the EMP for solving this problem was to create a forum by which the stakeholders could agree on a form of the organization between *terroirs* for managing the *zone sylvo-pastorale*. But other issues also emerged. How should the stakeholders contribute to sustain such an organization? How should the organizations between *terroirs* be maintained and who will provide the cost of its functioning?

The third dimension of the problem concerns the allocation and regulation of the natural resources such as water and pasture for the cattle, and exploitation of the fuelwood by the stakeholders. During the discussion with the professionals of the PNGT, the idea of the 'carrying capacity' was developed. A system of rotational grazing would be developed. According to the content of the *aménagement* of a *zone sylvo-pastorale*, a watering place was planned which could serve for 4 000 cattle per annual. Moreover, given the fact that the movement of the transhumants is unpredictable in the region, the idea of the 'carrying capacity' for the allocation and regulation of natural resources can hardly be expected to work.

According to me, knowing the dimensions of the problems is a good starting point. Instead of thinking about a pre-conceived solutions like using norms based on the idea of carrying capacity, I take for the granted that, on the one hand, the adapted solutions can only result from a learning process with the stakeholders, and on the other, that the facilitation of

change will involve new roles for the intervention such as the conflict resolution and mediation for the allocation and regulation of the use of the natural resources in the *zone sylvo-pastorale*.

The nature of the social learning for successful resource management in the *zone sylvo-pastorale*

Unlike the situation at the beginning of the *aménagement* of a *zone sylvo-pastorale*, the involvement of the herders should be a priority because they are the main stakeholders for the exploitation of the *zone sylvo-pastorale*. But the herders do really not have a *terroir* and the lands do not belong to them. For this point of view, the native Bobo, the owners of the land, are also important. The learning processes must take place at the level of the *zone sylvo-pastorale*, with all the stakeholders and, from the organizational point of view, involve the platforms for the governance of the *zone sylvo-pastorale*.

Developing curricula through experiential learning for improving and monitoring the physical state of the Zone sylvo-pastorale

The improvement of the physical state of the *zone sylvo-pastorale* will require learning processes for developing indicators which should be well-understood by the stakeholders. The indigenous observation of the *zone sylvo-pastorale* and the indicators used for appreciating the good health of the natural resources (e.g., pastures) should be carefully developed. The importance of indicators is related to the fact that they should provide tools for anticipating on the water depletion and the degradation of the pastures. The indicators can be developed on the basis of an experiential learning with the stakeholders.

Bio-physical scientists should be mobilized at the level of the *zone sylvo-pastorale* to help improve the natural resources. A previous study in Burkina Faso (cf. Hien, 1995) demonstrated that improvement of the *zone sylvo-pastorale* can be brought about through physico-chemical and biological measures. But the appropriation of new methods for improving of the *zone sylvo-pastorale* by the stakeholders should be realized through experiential learning with them. For instance, do the bush fires improve or degrade the pasture? When and how they should be used? Such issues should be subject of experiential learning with the stakeholders.

Learning with the stakeholders about their roles in face of emergencies

There are many problems in the management of resources in the *zone sylvo-pastorale* and their resolution is possible only if the participation of stakeholders is effective. A concrete example is trying to locate those who benefit without contributing to the maintenance of infrastructures in the *zone sylvo-pastorale*.

The nature of the natural resources such water and pastures are vulnerable to depletion. Conflicts can arise among competitive wants. The problem is also that the new comers might not know the rules of using the *zone sylvo-pastorale*. A critical issue is the exclusion of

aspirant users without conflict. The development of strategies for resolving such types of conflicts should be the core for social learning. In many situations, the resolution of the conflicts is left to the political authorities who often use the police. Instead, one should seek negotiated agreement, and avoid worsening the problems by corruption (see §9.3). In this respect, the prevention of conflicts and wars because of the passage or temporary settlement of transhumants is a key issue. Agreement only among the stakeholders for the *zone sylvo-pastorale* about their own interaction is not enough. Instead, they should agree also on concerted action with respect to other stakeholders, such as transhumant herders.

The nature of the platforms for resource management in the zone sylvo-pastorale

The types of resource management activities in the *zone sylvo-pastorale* determines the nature of the stakeholders and the levels at which they should take concerted actions (see table 9.1). There are some activities (e.g., maintenance of the corridor space and watering places) which can only be effective if concerted actions among stakeholders in different *terroirs* is effective.

Table 9.1:   Resource management activities in the Zone sylvo-pastorale and level of effectiveness

Resource management activities in the zone sylvo-pastorale	The relevant stakeholders	Level of the effectiveness	Comments
Maintenance of corridor space	Herders/farmers	Many terroirs are concerned	Herders have to respect the corridor space and the farmers do not cultivate there
Water use by herds and maintenance of infrastructures	Herders/farmers	Many terroirs are concerned	Representative of many terroirs may not be relevant. The agreement on the rules and regulation for the water use and the contribution for the maintenance of the infrastructure are important
Folder cultivation for cattle	Herders	Many terroirs are concerned depending on the location of the herders	Regulation of use, and exclusion of those who did not contribute should be the core issue
Tree planting and woodlot exploitation	Farmers	Terroir	When the villagers of a terroir are interested in tree planting and the wood exploitation

The platform for resource management in the *zone sylvo-pastorale* should not be the same as the CVGT. The ad hoc commission, the structure of the decision-making between different *terroirs* would not be effective because the representatives were selected among the members of the CVGT. The herders who did not have any organization in the villages were

not involved. The *zone sylvo-pastorale* can be governed effectively if platforms at different levels are operational.

What does the *Gestion* of the Zone sylvo-pastorale imply for the facilitation of future concrete actions and platforms?

New roles for the intervention in the gestion the zone sylvo-pastorale

The common thought about the 'responsabilisation' and the participation of the stakeholders in the burkinabè's context was based on the idea of the promotion of local organization capable of generating 'sustainable' development of the local economy. The concepts like the transfer of competencies to local collectivities, decision-making autonomy, and the transfer of certain decision-making powers were used to explain how they should enable the socio-economic development of local collectivities (cf PNGT, 1995: 24-5).

From that point of view, everybody believed that the realization of these conditions would mean the end of the intervention, for instance, in the particular case of the Zone sylvo-pastorale. This question was raised also during the forum discussion held in Bobo-Dioulasso about the *aménagement* plans developed at the grass-root level, the intervention site of the PNGT in the Houet province (see Box 9.7). The professionals in the EMP should not fold their arms after the creation of the Zone sylvo-pastorale. Many new roles should be relevant for the intervention in order to sustain the use of the *zone sylvo-pastorale.*

The observation was made, during the discussion forum about the *zone sylvo-pastorale* at the provincial level, that many litigations and cases under dispute arise which surpass the competence of the stakeholders. Examples are the presence of *transhumants* who cause conflicts and wars, boycotting an agreement of the physical plan of the *zone sylvo-pastorale*, the exclusion of potential stakeholders from opportunities in the *zone sylvo-pastorale*, etc. This conclusion suggests that the new roles of public intervention should be conflict resolution, and trying to mediate disputes among the stakeholders for maintaining the institutions of the Zone sylvo-pastorale. The role of the mediation of the intervention should be to ensure an equitable access and control over the *zone sylvo-pastorale.*

Incentives for maintaining successful collective action by the stakeholders

The extension activities in the intervention area focused on the restoration of the fertility of the soils, a crucial problem of the stakeholders (crop-farmers). The farmers were organized in working groups (*Groupe de Travail*) for their training in composting techniques. Such a contribution of NGOs to the restoration of the fertility of the soils was found also in Kadomba. For instance, the NGO GERN (*Gestion des Ressources Naturelles* = Natural Resource Management) was working with the G*roupement Naam*[6]).

Working together with stakeholders to intensify their cropping systems should be seen as a great incentive for maintaining the *zone sylvo-pastorale*. The role of the extension and the NGOs should be seen in terms of an incentive to participate in the maintenance of the *zone*

sylvo-pastorale. Many stakeholders noticed the importance of composting techniques for increasing the yield without increasing the farm size. This learning of the native Bobo in particular should be an important motivation point for maintaining the *zone sylvo-pastorale*.

Conducive policy contexts for the exploitation of the Zone sylvo-pastorale

The *aménagement* of a *zone sylvo-pastorale* was implemented without any clear statement of the land tenure issue. The accommodation with the landowners allowed the continuation of the activities of the *aménagement*. But the main beneficiaries of the *zone sylvo-pastorale* are the herders who have no land rights. Political measures become relevant to support the maintenance of the *zone sylvo-pastorale*. If no action is taking, the native Bobo should claim their lands in the future.

Many processes in the *aménagement* of a *zone sylvo-pastorale* occurred at the grassroot levels. The transfer of statutory power to this level is important to enable decision-making and statutory prerogatives. This idea was called decentralization in the Burkinabè's context. The realization of this objective should be a strong political shift which would strengthen many development processes at the grassroot level and especially resource management in the *zone sylvo-pastorale*.

9.6   Conclusions

Many factors that contribute to the success of the development of platforms for the *aménagement* of a *zone sylvo pastorale*. First, perceived interdependence among potential stakeholders was a driving force for successful collective action. This interdependence becomes visible through the repeated conflicts between crop-farmers and herders. They can only reduce their suffering if they come together to learn to change the course of conflict situations. Unlike the situation in Benin (chapter 5, Savè area), the villagers who had decision making capacity took a great deal of responsibility.

Second, existing organizations in the villages enable the development of platforms for collective learning at the level of villages, *terroirs*, and inter-*terroirs*. However, the stakeholders can only maintain the *zone sylvo-pastorale* if they keep up the momentum for the *aménagement*, and find ways to exclude other stakeholders from the *zone sylvo-pastorale*. New roles are required for professionals, such as monitoring, conflict resolution and mediation. All these issues are important for the sustainability of the management of the *zone sylvo-pastorale*.

Notes

1. For instance, in Burkina Faso, the professional changed the notion of the *Gestion des Terroirs Villageois* in *Gestion des Terroirs* to adopt inter-village perspective (for more information see PNGT, 1995).

2. The PNGT was carrying out many activities: forest management, watershed development, soil fertility improvement, etc. The *aménagement* of a *zone sylvo-pastorale* is only one aspect of their activities.

3. The administrative structure in Burkina Faso has the following levels: first the State is divided into Regions, a region is divided into Provinces, a Province is divided into *Départements*, a *Département* is divided into *Communes*, and each *Commune* involves many villages.

4. The cost of the fourrière is 500 FCFA per day and per cattle.

5. The difference between old men and young men is not clearly explained. However, most of the family head of big compounds.

6. The Groupement Naam is a form of local organisation which started among Mossi people in Burkina Faso. For more information, see Ouédraogo, 1989.

Part 3: Synthesis & Conclusions

10. Synthesis and Comparative Analysis

10.1 Introduction

This chapter presents a synthesis and comparative analysis of the case studies presented in Part 3. Many issues, be they theoretical or practical for successful resource management, are raised. The case studies are used here as learning experiences from which theories emerge. The arguments in this chapter serve one purpose: understanding the facilitation of deliberate interventions with respect to resource management.

The definition of resource management problems in the chapter 2 suggests that collective action is the first puzzle. The platform, i.e., realizing collective resource management at the appropriate ecosystem levels, is identified as the second puzzle.

For that reason, coupled system thinking is adopted as a perspective for studying resource management problems. In the present chapter, these two puzzles of collective resource management are revisited. After that, on the one hand, the effects of social learning for realizing the conditions for effective resource management are analysed. On the other, the implications are analysed of facilitating resource management puzzles for: (i) problem definitions, (ii) strategies for influencing behavioural change, (iii) institutions and organization, and (iv) policy contexts. Conditions for maintaining for effective resource management are discussed and some lessons from the case studies about the Adaptive Resource Management (ARM) notion are drawn.

In all, this chapter mainly addresses the third research question in chapter 2: Can fresh ideas, concepts and theories, be identified to support the facilitation of deliberate ARM interventions towards greater sustainability?

10.2 Resource management problems revisited

What is the nature of the resource management problems?

The different types of resource management dilemmas discussed in this chapter have been identified in the case studies (see Table 10.1). A new problem that emerges especially in the Lake Aheme case is the so-called second order dilemma.

The second order dilemma is a phenomenon related to the move of a resource management problem to the policy level, especially in the ambiance of an electoral system such as Benin. Any political decision about an endangered ecosystem under siege is not neutral and will demand sacrifices of the stakeholders. Such a situation is qualified by the 'destitution' of the

Table 10.1: Examples of public and common goods, and the nature of resource management problems in the case studies

Case studies	Examples of public goods	Examples of common goods	Nature of resource management problems
Lake Aheme	institutions and organizations for the lake; collective Akaja; Hwédo for a group	fish, shrimp, crab;	Public good dilemma, ecological and social crises, common good dilemma, assurance problem, second-order dilemma
Rangeland	corridor space; institutions and organizations for rangeland (COGEF)	pastures, water for cattle	social crises, public good dilemma
Watershed	contour lines with vetiver; gullies; gallery forest, CGT; UIGREN	rainfall water	ecological crises, public good dilemma
Women's group	infrastructures for producing organic matter; the group itself; REDAD	***	public good dilemma, assurance problem
Maro forest	fire-break; trees; GGF; inter-village, organizations	trees (woodlot)	ecological crises, public good dilemma, assurance problem
GZSP*	corridor space; fire-break; CVGT inter-terroir committee; fodder	pastures, water for cattle, trees (woodlot)	ecological crises, public good dilemma, assurance problem

* = *Gestion zone sylvo-pastorale*

stakeholders (Bennett, 1990). Political authorities prefer to be neutral or maintain the *laisser-aller* because they fear that taking measures might make some stakeholders unhappy which has implications for controlling people, and for strategies for acquiring stakeholders' votes. The second order dilemma in the African context, as in the situation around Lake Aheme in Benin, can be understood also through the parable of Bayart (1989): 'the politics of the belly' (*La politique du ventre*). In many situations, the second-order dilemma denotes the choice between controlling the stakeholders and maintaining political power. This choice overshadows the issue of taking political measures to solve problems related to resource management. The second order dilemma has the consequence of raising the cost for resource management, and of creating a very complex situation for future generations.

How and when do resource management problems evolve?

Public goods dilemmas

A public good dilemma is a crucial problem that emerges in various situations in the case studies. The problem is related to providing and maintaining regenerative practices, and functioning institutions and organizations for resource management.

- The motivation of the stakeholders not to contribute (or contribute less) is very high when they perceive that they can benefit from improvements due to regenerative practices or the performance of institutions and organizations, without being detected by others. Wade (1988) explains this phenomenon by the expression 'noticeability of cheating'.

- The failure to detect the stakeholders, who perceive incentives to free-ride acerbates the public good dilemma. The Lake Aheme case illustrates this problem while the ability to monitor contributions in the cases of the resource-flow management and the Maro Forest enable the exclusion of the free-riders.

- A comparison of sanctioning structure for resource use in Lake Aheme during the pre-colonial and post-colonial times (fishing police) suggests that the less rigid the monitoring and sanctioning structure for preventing and punishing free-riders, the more frequent public goods dilemmas arise. The free-riders do not fear to be detected and punished or believe that they can get out trouble by means of corruption, as happened around Lake Aheme.

Ecological and social crises

- An ecological crisis is perceived as a problem by the stakeholders when it makes sense to them or seriously affects their livelihoods.

The frame of reference, and solutions and opportunities stakeholders had for using the ecosystem under siege, affect their perception on the ecological crisis (example of the watershed cases in Mono and Ouèssè.

Ecological crises perceived at the policy level (e.g., in long term planning) are not always immediately shared by the stakeholders. This is the case for the *gestion des terroirs* programmes in Benin and Burkina Faso. Also, not all the ecological crises can be instrumentally shown. The way one learns towards a shared understanding is challenging. Perceived ecological crises are experienced differently by various interest coalitions or groups of stakeholders. From that point of view, what one considers as an ecological crises can only emerge from an agreement, which is the outcome of interaction and negotiation.

- The ecological crisis is socially constructed as an emergent property of a soft-system, as the cases of Lake Aheme, the rangeland in Benin and Burkina Faso (AZSP), reveal.

All the conflict situations in the case studies are illustrative. The diversity of resource use practices of various groups and coalitions of stakeholders in the ecosystem under siege creates arenas of conflict among different interest coalitions and tensions as in the cases of the Lake Aheme and rangeland (Benin and Burkina Faso). Therefore social crises, especially conflicts, emerge when the actions of one group/coalition of the stakeholders affect the others' activities and livelihoods. A particular issue which emerges from the Lake Aheme case is the role of a third party capable of mediating disputes and establishing social justice about the appropriation of common goods. The absence of such a third party favours the emergence of social crises. In these conditions, conflicts become a refusal to accept attempts by one group /coalition of stakeholders to exert powers over the use of natural resources.

- Social crises evolve when the stakeholders fail to agree upon institutions and organisations for resource management to avoid situations characterized by anarchy and chaos.

Common goods dilemmas

- Common good dilemmas represent market failure to regulate natural resource use. Scarcity is a crucial issue because the scarce the natural resources (common goods), the more they are economically valued.

The historical approach adopted for analysing the Lake Aheme case shows that the common good dilemma emerges in a situation where scarcity of common goods leads to competitive arenas.

- Perceived 'self-efficacy' by the stakeholders in competitive arenas of resource use acerbates a common good dilemma. The concept of 'self-efficacy' is explained by Bandura (1977, 1982). Here, perceived efficacy is the individual stakeholder's expectation that he/she will be able to affect the outcomes.

- The lake Aheme case reveals also that the lack of alternative economic opportunities for the stakeholders, and degradation of their likelihoods, acerbate common good

dilemmas. According to Holling & Sanderson (1996), stakeholders aim for continuity and stability, while a natural resource which is used can be become scarce.

The assurance problem

Assurance problems should not be confounded with public good or common good dilemma. The difference lies in the fact that the behaviour of the stakeholders is conditioned by the way they perceive their fellows or the effectiveness of existing mechanisms for resolving resource use dilemmas.

• The Lake Aheme case reveals that the loosening of sanctioning structures stimulates the emergence of the assurance problem.

• The presence of corruption also enhances the assurance problem. The loss of trust in resource use institutions and organizations has the same effect.

• The assurance problem becomes visible when individual stakeholders are invited to contribute financially to the realization of a collective infrastructure (public good) for resource management. Meanwhile, the assurance problem is less important for contributions to labour for collective work.

This proposition is based on the watershed case in Benin. Collective work, for instance digging gullies for protecting village mud houses against erosion, enable some stakeholders to monitor directly whether his fellows are contributing.

• In the resource-flow management case, the invisibility of the women, their few contributions during meetings about individual contributions for the realization of public goods, is conducive to the assurance problem.

10.3   Solving resource management problems: the need for collective action

Empirical evidence of collective action in resource management

Collective action has been perceived as key first condition for solving resource management problems in chapter 2. Public good dilemmas, common good dilemmas and assurance problems can only be solved if collective action is effective. Ecological and social crises can be solved if the stakeholders share understanding of the problem.

Collective action is a necessary condition because, as is demonstrated in the cases, the solution of conflicts and dilemmas can only result from interaction, negotiation, mediation and conflict resolution (for example rangeland and *aménagement* cases).   The second-order dilemma was found to be a major constraint to effective political measures. A condition for solving it could be the facilitation of organizations and institutions at the grass-root level that integrate politics and ecology (Dryzek, 1995). Yet an ecological democracy at the grass-roots level or a collective 'green environmental' movement to breaking impasses did not emerge in Benin.

All the case studies show that collective action is effective where a relative success in resource management has been achieved. Stinting/quota measures and distributive fishery resources for the Akaja practice in the Lake Aheme, during the colonial period, were not successful because the stakeholders did not accept collective action. Policy prerogatives for establishing social justice, equity and enabling conditions for breaking impasses around Lake Aheme did not succeed because two coalitions of stakeholders (Xha people and Akaja users) did not act collectively. However the governance of this lake was successful when the stakeholder adopted collective action during the pre-colonial times. The case of the women's group in Djeffa reveals that regenerative practices such as resource-flow management are conditioned by successful collective action and by active participation of the stakeholders to provide many public goods. Co-management practices for the Maro Forest in Burkina Faso involve successful collective action to maintain firebreaks and keep the forest from being destroyed by unexpected bushfires.

Can successful collective action be generated for resource management?

Despite the empirical evidence, in many circumstances, the realization of collective action for joint benefits is unlikely especially for large groups as found in resource management context. The theory of Olson (1978), the logic of collective action, assumes the difficulty of getting individuals to achieve joint welfare as opposed to individual welfare. Wade (1988) synthesizes the theory as follows: (i) voluntary collective action will not produce public goods; (ii) collective action based on selective positive or negative incentives may produce public goods. Following Olson (1978), collective action problems have attracted many scholars in the field of social psychology (e.g., Messick, 1983), and political sciences (Hardin, 1982; Sandler, 1992). Their work is mostly based on empirical analyses of factors that affect collective action. Collective action is a main concern in the 'common-pool resources' theory. Steins & Edwards (1998: 3) identify conditions to realize collective action from the work of Wade (1988), Ostrom (1990) and Pinkerton & Weinstein (1995). Lessons from the present study suggest that:

* Collective action is not only the action done together by two or many people (Sandler, 1992: 1). It means also that individual actions are consistent with norms, rules, etc. agreed upon collectively. Collective action can be expressed through the willingness of many stakeholders to act beyond their individual interest, maybe, because of stimuli from their environment.

The case studies suggest that, for effective sustainable collective resource management, some important issues need to be analysed further. First, we shall provide empirical examination of the effects of social learning on collective action. Second, the implications of the facilitation of successful collective action (e.g., institutions, policy contexts) are analysed. Third, conditions for maintaining successful collective action are discussed.

Meanwhile, what are the levels of collective action for resource management in ecosystems under siege? The answer to this question is difficult. The second puzzle for resource management perceived in chapter 2 appears again. In order to discuss the issues raised above, the notion of the coupled system will be used to answer the question about the levels of collective action.

10.4   Coupled systems characterisation for resource management: the need for platform(s)

The coupled system is perceived as a relevant concept for the 'soft-side of land use' (Röling, 1997). This concept is also operationalized in chapter 2. The case studies suggest that the understanding and characterization of coupled systems for resource management remains a major issue. Especially, the boundary problem is critical. The discussion below may provide some ideas for a coupled system characterization.

Ecosystem level(s) for effective resource management: the boundary problem

From the ecological point of view, perceived ecosystem level(s) at which resource management can be effective depend on the structure (organizing principles) and functions (biodiversity, ecological services) of the ecosystems under siege. Previous discussions (in chapter 2) have led to the proposition of four types of ecosystems.

Lake Aheme shows that the effects of ecological services and the functioning of biodiversity (natural regulation of salinity; reproduction of fish species) can only be well-appreciated at the level of the lake. Fishery resources cannot be easily subdivided for management purposes (e.g., rationing of use). But the watershed and forestry cases show that regenerative practices can be implemented in many parts of the ecosystem.

In chapter 2, the issue of boundary is discussed only for the rangeland ecosystem. However, Ostrom (1990: 90) argues that defining the boundaries is an important criterion for maintaining 'common-pool resource institutions in general. The boundary problem is crucial for the conceptualization of resource management for the ecosystems under siege. Below, some concrete propositions are enumerated according to the lessons drawn from the case studies.

- The case studies suggest that what emerges as boundaries, depends on the purpose, perception, interpretation, and interests of the stakeholders, and other actors at higher levels of social aggregation who are concerned with resource management. Ecosystem boundaries reflect a policy issue. According to Mougenont & Mormont (1997), the boundaries evolve from the qualification and designation of areas perceived to be managed.

This outcome is noticed in the watershed development in Benin and the AZSP in Burkina Faso where the choice of the intervention areas for resource management is incorporated in the planning processes by the government. The rangeland cases in Kemon and

Save show that the boundaries are embedded in property right issues based on territories controlled by individual stakeholders, social groups, and communities. However, the boundaries are variable depending on the perception and the activities of the stakeholders. Herders have a different way of interpreting the boundaries. For instance the geographical location and availability of key natural resources (rivers as watering places, availability of pasture according to seasons, etc.) are some key parameters.

- The ecosystem boundary is socially constructed, i.e., negotiable and arbitrarily set up through interaction among stakeholders, an emergent property of a soft system.

As for the Lake Aheme case, different coalitions of stakeholders in conflict perceived their interdependence at the level of the lake for effective resource management. The delimitations of the *terroirs* and the identification of a ZSP and a *voie sylvo-pastoral* (corridor space) in Burkina Faso are based on interaction and negotiation with stakeholders in different villages.

Implications of the boundary problem for stakeholder identification

Who are the stakeholders perceived to be involved in resource management? This is not a simple question. Most of our case studies reveal that the stakeholders emerge temporally according to existing opportunities, the functioning of local organizations, ecological crises (e.g., drought and transhumance of herders), etc. A second critical issue with respect to stakeholder identification concerns the understanding of the existing legally and socially sanctioned ability for exclusion. Below, some concrete ideas are synthesized and existing mechanisms for exclusion of stakeholders in resource management situations are discussed.

- Existing organizations in the local setting, which are operational for resource management, offer an entry point for the identification of the stakeholders. They emerge from conflicts of interests and tensions between activities in resource use arenas. To focus on interest coalitions in the ecosystem under siege is a good start for thinking about the crucial resource management problem (Lake Aheme case).

- Stakeholders can be identified by their perceived interdependence in the ecosystem under siege. A typical example is the watershed development case. Success of downstream stakeholders depends on upstream stakeholders. Improvements by upstream stakeholders are beneficial for downstream stakeholders (watershed case).

- Stakeholders are often arbitrarily identified in ill-defined social structures according to the goals or purposes one seeks to realize. However, the watershed development case poses a concrete problem. The community of the stakeholders do not always correspond to the watershed areas targeted. Stakeholders can be best identified if one starts from the ecosystem under siege and take into consideration, for instance, ownership and use rights questions.

Ostrom (1990) argues that, without defining boundaries and closing it to 'outsiders', stakeholders face the risk that others will benefit from their existing efforts. Many strategies

for the exclusion of stakeholders are identified in the case studies: the establishment of an identification card for the herders in Kemon, the establishment of a membership cost for the Djeffa women's group, a permit for natural stakeholders in the Lake Aheme case (failure after a certain period), and permission to the herders to settle in the *Chabe* community.

However, this question remains difficult because closing boundaries to outsiders is not systematically perceived by the stakeholders. The issue only becomes important, for instance, after repetitive crises (conflict, scarcity of natural resources). The idea of identification card in Kemon emerged after a serious war between the villagers and herders in the region.

The platform notion revisited

The platform notion was discussed in chapter 2. A distinction was made between platform and effective platform. Some ideas were discussed for platform development and I explained that more insights are expected from the empirical investigations.

Previous studies show that the focus on platforms is a focus on social processes, such as conflict resolution, negotiation, institutional development, leadership, power, etc. So platforms can be one time meetings, elected committees, formally appointed boards or councils or even parastatal or government bodies (Röling, 1998).

- The present study reflects on many case studies to argue that the platform notion is dynamic, heuristic and sensitive to the boundary problem within ecosystems under siege for resource management.

The Lake Aheme case has revealed the evolution of a platform for its management. The rangeland case in Benin shows an operational platform in Kemon and a platform perspective in the village Ayedjoco (in Savè case) among *Chabe* people. The watershed development case show many platforms and the importance of scaling up towards the whole watershed identified. The Maro forest case unravels ownership and level of management for the definition of platforms.

But when the boundary is not a relevant issue for the conceptualization of the ecosystem under siege, the effective platform for resource management does not depend on level(s) of ecosystem. This situation is noticed for the resource-flow management case by a women's group in Djeffa. In this situation, networking at higher levels of the social aggregation for several opportunities is the most important.

As in the case of collective action, the analysis will be based on three aspects. First, a systematic empirical examination of the effects of social learning on platform development is carried out. Second, the implications of the facilitation of platforms (e.g., institutions, policy contexts) are analysed. Third, conditions for the functioning of platforms are discussed.

10.5   Social learning: effects on collective actions and platforms for resource management

Social learning in resource management is different from the adoption process according to Rogers (1995). As explained in chapter 2, social learning can take many forms. Three basic issues are discussed from a praxeological focus: learning about ecosystems, learning about social processes, and learning about platform development. However, the various situations enumerated in the case studies are informative and enable more insight.

- The question is then: what are the effects of social learning within resource management, especially on collective action and platform development?

Based on this question, the following issues are discussed below: (i) what is learned and when? (ii) ways of learning revealed in the case studies and their effects within resource management; and (iii) effects of social learning on collective action and platform development.

What are learned and when?

Many ideas developed in chapter 2 concerning learning, are still relevant. Here, only striking issues with respect to resource management will be analysed.

Social crises create a dynamic learning environment with respect to resource management. The case studies reveal various learning situations about social processes.

- Serious crises engage stakeholders in conflict resolution, decision-making, negotiation and mediation (Lake Aheme case, rangeland case, and gestion zone sylvo-pastoral case).
- Learning paths by an intervening agency involved in a social crises situation involve all the issues above, and structuration processes and platform development (see watershed case, rangeland case in Kemon, Maro forest case, and the *aménagement* of a *zone sylvo-pastorale* case).
- Ecological crises in ecosystem under siege are the triggers for stakeholders to learn to adapt continuously to evolving conditions (see Lake Aheme case, resource-flow management case).
- However, the crises might not be perceived immediately by stakeholders. In these circumstances, intervening agencies can pool learning processes about the ecosystem under siege. Informal experiences of Kossi in the watershed development case (Ouesse) and co-management practices in the Maro forest are concrete examples.

Ways of learning: what are the effects within resource management?

Divinatory processes and 'spiritism'

Divinatory processes consist of consulting oracles and speaking with 'Earth-Spirits' to know the causes of problems and the remedies required (for more explanation: see Peek, 1991). The *Fâ* (or *Ifan*) is an example of that way of learning. A divinatory process is a transcendental way of learning about all kinds of perceived problems that have some consequences for livelihoods with respect to local resource management. However, this practice has an informal character and is specific to a community or a particular ethnic group. It is effective for resource management where the stakeholders believe in the relationship between 'spiritism' and sustainability of resource management.

The Lake Aheme case shows that practice of 'spiritism' affect a maintenance of collective action. One effect of this practice is the creation of an environment characterized by fear that stimulates compliance. Nowadays many forests are managed by divinatory processes and 'spiritism'. In AZSP, the *Comité Coutuniers des Vieux* (CCV) is still using this way of learning.

Experimentation and observation

Individual stakeholders, interest coalitions, and intervening parties in resource management are learning entities. Thus stakeholders are stimulated to learn to take advantage when they perceive opportunities in the wider economic environment (for example when the situation changed with respect to Lake Aheme during the colonial time).

Experimentation is based on testing and probing of, for example, regenerative practices, institutional frameworks, or policy measures. A main learning point from all the case studies is that experimentation generates diversity within resource management activities by the stakeholders and intervening parties. A concrete example is that erosion control techniques used in the Mahi village agglomeration were reproduced in different ways. Experimentation leads to self-discovery for many watershed participants in Ouesse.

Observation triggers change of existing norms and practices about the use of natural resources through a mechanism of self-reflection on one's curiosity or others behaviour and activities of interest. Observation stimulates autonomous and horizontal diffusion of soil erosion control techniques in Ouesse. Many villages decided to sign a partnership with the PGRN project after they had observed the activities of the project in other villages. Mutual control in competitive resource use arenas is based on observation of other behaviour.

Metaphors, dialogue and interactive processes

A shared metaphor or proverb is a key element for learning because it synthesises meaning that can be shared. The proverb provides a model for a shared agreement, for instance the *Yankpékpé* in the rangeland case in Kemon (if you need peace, you will not touch Yankpékpé).

Dialogue is another way of learning in resource management. It helps to share ideas, and to enrich one's frame of reference. Field visits, network activities, and exchange journeys, discussed in the case study of the women's group in Djeffa, can also be very effective. Dialogue can take the form of organized interactive processes between an intervening party and stakeholders and lead to agreement on norms, technologies and actions to be undertaken in resource management. I have noticed this way of learning in the watershed case (identification of an alternative contour farming practice in Aplahoué; interactive process to agree on a *Dossier de Financement* in Ouesse).

Interactive processes occur among facilitators and stakeholders through mapping and visioning exercises to agree on *terroir* boundaries, to make decisions for planning, and agree on concrete actions (e.g., the *Aménagement de Terroir* in Burkina, the watershed development in Benin).

Analysis and appreciation of resource use situation

Resource management activities themselves are a potential source of learning. The role of history is important, for instance, the stakeholders compare actual livelihood situations of resource use to the one in the past (common expression: *before it was good .... now it is becoming worse*). Biophysical analysis that is based on the evolution of natural resource appropriation (e.g., catches, wood use) is one way of learning to appreciate the resource use situation (the Lake Aheme case). Aerial photographs are used in the same way (the watershed cases). Analysing practical experiences from ongoing resource management activities itself leads to reflexive learning and consistent decision making. In the lake Aheme case, the government did not pay attention to a reflexive learning and replicated the same decisions (the problem of Akaja and Xha). However, in Burkina Faso, learning from forest management activities to adopt a co-management strategy is successful.

Effects of social learning opportunities on collective action and platform development

In resource management situations, intervention plays a catalytic role for collective learning at the appropriate level of the ecosystem. This happens when decentralized methods are used (e.g., curricula for discovery learning, mapping and visioning), and negotiation, mediation and conflict resolution are successful. For instance, such interventions in realizing collective action and platform development processes were successful in the case studies of the watershed development, the *aménagement* of a *zone sylvo-pastorale*, the Maro forest, and the rangeland in Kemon.

Social learning leads to the creation of 'rich pictures' (e.g., problem perception by various stakeholders) on the problematic resource management situation. At best, it enables a shared vision on ways forward with respect to resource management problem. In Ouesse, a learning path to make the problem visible led to the need for collective action and to an inter-village platform development for scaling up natural resource development.

Situations where joint learning leads to agreement on concrete action are provided by the watershed case and the Maro forest case. In the former, the intervening agency and a group of stakeholders developed a plan (the *Dossier de Demande de Financement*) to start concrete actions. In the latter, co-management practices for exploiting and regenerating the Maro forest were gradually developed by the intervening agency and villagers.

External support and intervention create more active learning environments for the stakeholders, and enrich local learning processes with respect to resource management. The case of the women's group in Djeffa shows how networking activities provided learning opportunities for the development of local initiatives to enhance performance.

Intervening parties also learn from the stakeholders when participatory methods are adopted. For instance, the watershed cases show that the way professionals go about watershed development is learnt from the intervention process. Through social learning, stakeholders and other actors at the ecosystem level of social aggregation realize the need for negotiated agreement or concerted action to solve the problematic situation. A typical example is the rangeland case in Kemon. After negotiation and mediation by the PGRN team, the native *Chabe* realized the importance of involving the herders in their initial committee.

10.6   Facilitation of successful collective action and platforms for resource management

Solving resource management problems is a complex process. It involves trade-offs and sacrifices for the stakeholders. The notion of facilitation applied to resource management goes beyond technology transfer, advisory and information support services, and extension which focuses on solution of specific problems. Critical issues such as breaking impasses, overcoming barriers, scaling up individual actions, etc., enlarge the horizon of facilitation in resource management. Facilitation can focus on a deliberate process of developing or stimulating the use of a regenerative practice (e.g., Akaja, Hwédo or contour farming, see case studies of Lake Aheme and Watershed development). Leadership promotion, development of institutions for solving social dilemmas can be the main issues.

As explained in the previous section, solutions of resource management problems are amenable to facilitating successful collective action and effective platforms. Consequently, the central question discussed below is the following:

- What does the facilitation of successful collective action imply for ways of defining problems, strategies for changing behaviour, institutions, and for conducive policy contexts?

Defining resource management problems

Defining resource management problem for the facilitation of successful collective action and platforms is not a question of biophysical professionals, but of communicative professionals who operate within social and political contexts (cf. Röling, 1994).

- Those professionals are required to make the problem visible among multiple stakeholders in a problematic resource use situation. Soft system methodology is used for the case study of the lake and the aménagement of a zone sylvo-pastorale

- The necessity to share understanding about the problem among various actors in a relevant organization is vital to provide opportunities for successful collective action and platform development. RAAKS windows can be used to enable those actors to develop a common appreciation of the problem, and agree on the coordination required for developing synergy at a higher level with respect to formulating a mission statement about the problem.

- Defining the resource management problem needs the identification of trade-off in changing the situation towards successful collective action and platform development. In these circumstances. Stakeholder analysis has proved useful to perceive the trade-offs and think about how one can go about the process of change. The watershed case shows how professionals learn to make the problem visible, and for Lake Aheme, the fact that the trade-off was neglected was an important factor for failure.

Strategies for stimulating change

Facilitating successful collective action and platforms of resource management implies that strategies based on incentives for stimulating change offer an enabling environment for collective behaviour by the stakeholders.

- Incentives perceived through this enabling environment are to be found in the facilitating process itself, the means available for intervention, and the opportunities offered, for instance the credibility of intervening party or the external support.

- The rangeland case in Kemon shows that an intervention which incorporates local initiatives, by using an innovative approach such as the *Appui-Conseil* is hastily perceived as a great incentive. Nevertheless, repetitive failures of a directive intervention lead to loss of faith in external supports. Excessive corruption has the same implication. Lake Aheme is a good illustration when one refers to the evolution of the lake's problem across various attempts for intervention, and the failure of the fishing police which was established in post-colonial times.

- Thus one can argue that the more effective the nature of external support, the more stimulating the resource management situation is for inducing voluntary behavioural change with respect to collective action and platform development.

Facilitating successful collective action and platforms implies that strategies based on communicative intervention such as *animation rurale*, non-formal education, folk media and participatory learning are used for voluntary collective behavioural change. A Particular phenomenon noticed in the case studies is the emergence of new roles for professionals in the field. Conflict resolution, mediation and negotiation are such new roles. Serious difficulties are also noticed for these emerging roles.

- Observation from Benin and Burkina Faso reveals that resource management activities are imbedded in administrative structures where professionals work with 'instructions'. Moreover, high level positions in resource management organizations are held by specialists in specific domains, i.e., foresters, fishery specialists, veterinarians, etc. Therefore existing conditions do not permit a full exploitation of these new roles. Recently, multidisciplinary teams have emerged at the lower level of organizations' hierarchy. Professional involved at this level are mostly targeted for training programmes to use communicative strategies (participatory methodologies to stimulate changes). Lesson from the case studies reveal that professionals must also be targeted so that they can learn to adopt communicative behaviour to pool efforts for negotiated agreements, concerted action, joint decision making, etc.

Institutions and organizations

Gundersun et al (1995: 496) argue that most institutions are established to carry out some preconceived set of policies, plans or missions. These practices should not be applied in resource management activities if successful collective action and platform development are to be expected at grass-root levels.

Institutional dimensions involve norms to monitor, rules of use, property rights, covenants among the stakeholders and intervening parties, sanctioning arrangements, roles assigned to organizations, and decrees and laws for environmental protection (Ostrom, 1990; Ostrom & Schlager, 1996; Roling & Jiggins, 1998).

- The case studies reveal these issues, but institutions and organizations are socially constructed and negotiable. A critical problem discussed in institutional economics is that the cost of enforcement of the institutions is mostly high, especially for resource management. Cooperation of stakeholders becomes a necessary condition for success (North, 1990).

- The facilitation of change in resource management involving successful collective action and platforms implies that institutions and organizations for resource management are governmental and non-governmental, fluid, malleable , and capable to be locally adapted according to evolving conditions.

- In critical resource use situations, the more effective the implementation of rules, agreements and procedures, the more effective the trust in them and in the opportunities for solving social dilemmas by management. The weakness of such institutions are perceptible in the failure to implement them. The Lake Aheme case reveals that when the involvement of high political entities fail to enforce institutions for resource management, professionals who have the official mandate to work in resource management, fear to try other alternatives. Consequently, the resource use situation leads to loss of faith by stakeholders with respect to the institutional dimension of management, because they perceive that the highest authority system is not capable of enforcement.

Conducive policy contexts

Resource management involves many activities that are developed at the grass-root level, covenants among stakeholders are required for resource management. Moreover, functioning platforms require local decision-making, continual adaptation of institutions, etc. All these issues imply policy contexts which enable transfer of certain decision making powers (statutory, or regulatory) to the local level as a necessary condition for sustaining collectively developed activities by communities. A key word used here is 'decentralization'.

- In addition to the ideas developed in chapter 2, decentralization should not be seen a simple administrative representation, but conditions to enable the creation of local political entities to debate resource management problems and to plan, or deliberate, alternative solutions at the community level. It calls for more participation of stakeholders to enable possibilities for research and development organizations to work with their needs and aspirations.

- The resource-flow management case shows that the national political context has some implication for the performance of resource management activities at the local level. We noticed that a shift in the political system in Benin led to a rapid emergence of many of NGOs, and their competition, which has led to increased of opportunities for stakeholders.

- The Lake Aheme case suggests that only at the policy level can conditions be created to effectively counter failure of mechanisms to reduce use of natural resources and avoid degradation.

    However, the creation of conducive policy context with respect to resource management faces many problems such as instability of administrative bodies, 'unfair' political campaigns based on promises that present immediate benefit for stakeholders (but have further negative consequences), hesitation and lack of courage to undertake complex environmental decision-making by political entities.

    For instance in Benin, political authorities kept on increasing the price of cotton to ensure the votes of stakeholders. But this would inevitably lead to more land degradation in the context of Benin, while the Beninese environmental plan (cf. PAE, 1993) aimed at environmental protection. Lake Aheme has made visible many impediments to creating an effective conducive policy context for resource management.

10.7   Conditions for successful collective action for resource management

The main concern for the analysis below is to understand phenomena that trigger or stimulate successful collective action in resource management situations. Factor identified in the case studies (discussed below) are: perceived interdependence with respect to resource management problem; sharing risks in collective resource management situations, mutual benefits,

perceived externalities within resource management activities, and trust in social capital for resource management.

Perceived interdependence with respect to resource management problems

A historical analysis of the Lake Aheme case shows that scarcity of fishery resources and conflicts between coalitions of stakeholders leads to the realisation of their interdependence and collective learning.

Perceived interdependence with respect to resource management problems positively affects change from individual to collective action. According to Bandura (1977), individual stakeholders judge their self-efficacy and realize that their staying power, capability and strength are individually vulnerable. Then, they perceive the importance of collective efficacy that is also an expression of interdependence.

The Lake Aheme case reveals that self-efficacy falls down due to the 'zero-sum game' (cf. Roe, 1993: 31) with respect to the appropriation of scarce fishery resources. Mahi people in Ouesse realize the need for scaling up watershed development efforts because their continuous shifting cultivation practices would lead to a collective and negative impact (also a situation of interdependence) on the development of the local economy in the future. Mahi people use the metaphor *Sedokou* ('Nature is the wealth of everybody') to explain this idea. Successful collective action for the *aménagement* of a ZSP in Burkina Faso is motivated by a collective negative experience with crop damage and conflicts. The fact that everybody is suffering from it creates a situation in which the stakeholders perceive their interdependence.

Mutual benefits if successful collective action is adopted

Collective action emerged when stakeholders perceive mutual dependence on it. Interaction between villagers and herders and the integration of their economy in Ayedjoco (Rangeland case in Savè) generated collective action because the herders were keeping their cattle. Peace, security and business (cattle trade) created an environment for mutual benefit in Kemon.

• The more stakeholders perceive mutual benefit within their activities, the better the conditions for successful collective action.

Perceived externalities within resource management activities

Opportunities such as access to credit and extension are positive externalities for collective action within resource management activities. These externalities maintain group and collective action in the Djeffa women's case. Externalities are critical factors for the maintenance of public goods.

The watershed case reveals spatial externalities which are also forms of 'market failure', unexpected cost or conditions of stakeholders depending on their location. These act as informal incentives for cooperation (cf. also Ostrom *et al*, 1993: 198).

Risk Sharing, tontine and increasing negotiation power

Risk sharing can be interpreted as informal, and formal mechanisms that induce stakeholders to undertake collectively beneficial actions for resource management (adapted from Seabright, 1993: 117). This factor is identified in the women's group case study in Djeffa. A concrete example is the failure of pig raising activities with a credit obtained from the REDAD. The women refer to this situation to explain the importance of working together as a group.

Trust in social capital for resource management

Trust is the expectation by stakeholders of a group that other members will cooperate. Trust acts as a variable whose value influences the magnitude of collective action. Social capital refers to resource management institutions and organization. For instance, rules and the new organization called *Comité de Gestion du Foncier pastoral* (COGEF) of the local organization of *Chabe* people in Kemon (rangeland case study) is a form of social capital. Trust in social capital refers also to the assurance problem, and is a condition for maintaining successful collective action.

10.8   Conditions for the functioning of effective platforms for resource management

The effectiveness of a platform is discussed here as the extent to which a platform is functioning well and maintained for resource management.
• What are the conditions which enable continuous monitoring of resource use and adherence to covenants among the stakeholders?
Below seven conditions based on lessons from the case studies are discussed.

(1) Collective action

The conditions for maintaining collective action discussed above (§10.7) are valid for effective platforms. A well functioning platform requires collective action. In many circumstances, intervening parties for resource management start directly by creating committees (example of platforms) which are not functional because of the absence of conditions for collective action (e.g., the CGT in the watershed case in Mono, ad hoc commission in the rangeland case in Savè). The Lake Aheme case shows that the local platform of stakeholders was effective when the conditions for maintaining collective action were present, while many committees created afterwards failed when these conditions disappeared.

(2) Representation at the appropriate ecosystem level

A positive impact of a platform depends on the representation of all the stakeholders who are relevant at the perceived ecosystem level which is appropriate for collective resource management. However, this condition works when the ecosystem boundary (discussed in §10.4) is a relevant issue. The amelioration of soil fertility by the women in Djeffa was not

constrained by representativeness because the boundary question was not relevant. Representativeness is perceived as a criterion for fruitful collective resource management by Pinkerton & Weinstein (1995, quoted by Steins & Edwards, 1998: 3). Interest groups, coalitions, categories of stakeholders need to be involved or represented in the platform to enable collective resource use. The Lake Aheme case shows that the initiative of the Xha people failed because (among other reasons) they did not involve the coalition of the Akaja users and other categories of the stakeholders in the lake area.

(3) Quality of leadership

The quality of leadership among the stakeholders is a condition which contributes significantly to the effectiveness of platforms. This notion is seen in a positive sense, which means that the leaders can lead their fellows in dealing with ecological imperatives. This does not necessary include political leadership.

As the Benin context shows, the involvement of the *Association de Développement* (which was supposed to pool grass-roots development efforts) in political arenas transformed the leadership into serving the interests of political parties. The facilitation of leadership becomes a crucial issue to enable a social movement towards collective resource management. In Burkina, a visit of the Minister of Agriculture and Animal Resources in Kadomba to encourage the stakeholders for the *Aménagement* and *Gestion* des Terroirs activities positively affected the quality of leadership. Committees for resource management function well in this village.

(4) Possibilities to meet

Regular meetings enable the participating stakeholders in a platform to assess the resource use situation for decision-making and deliberations. Ostrom (1990) also perceives this condition when discussing monitoring as a criterion for long-enduring common-pool resource institutions. The concrete example of the COGEF in Kemon illustrates the importance of this condition. The members of the committee meet every Wednesday at their headquarters to monitor the extent to which their activities (delivering residence certificates to migrant herders to stay in their territory, controlling transhumance, etc.) are being achieved. The governance of Lake Aheme during the precolonial time, the management of the Maro forest and the *aménagement* de *terroir* activities show the importance of platform meetings.

(5) Capacity for implementing mechanisms for concerted action and conflict resolution

Concerted action depends on platforms and refers to the ability of its participating representatives to negotiate with the wider community of resource users. This role of platforms depends also to the nature of the ecosystem under siege.

Concrete example from the case studies show the importance of the mechanisms for concerted action. The *Bureau* of the Women's group in Djeffa chose meeting as a mechanism for concerted action. The *aménagement* of *zone sylvo-pastorale* in Burkina, the rangeland case

in Kemon, and the watershed case combine committee meetings and village assemblies as the mechanism for concerted actions. In the Lake Aheme case, the mechanisms are complex and involve meetings of the coalition committees, inter-coalition' meetings, village assembly, fishing community's meeting with representatives of the government and political bodies (e.g., *journée de réflexion*).

All the case studies involve conflict situations. The more the representatives in a platform can set up mechanisms for conflict resolution, the more the stakeholders will trust the functioning of the platform. The rangeland case in Kemon is a good illustration. Ostrom (1990) perceives this issue as a design principle for long-enduring common-pool institutions. She argues that stakeholders should have a rapid access to low cost local arenas. However, what should be crucial for a platform is the capacity to judge what types of conflicts they can probably resolve and what should go beyond their competence and require some actors at higher levels (than the platform). Repetitive failures of conflict resolution by a platform affects its credibility. This problem was raised in the AZSP case in Burkina. During a forum at the provincial level, the participants recommended the PNGT team to define clearly the limits of the competence of the local people to resolve conflicts that should emerge within the *Gestion des Terroirs*.

(6) Stakeholders are the main concern for the functioning of operational platforms

The platform is perceived to involve not only the stakeholders, but also other potential actors at higher levels of social aggregation (Röling & Jiggins, 1998: 303; Steins & Edwards, 1998). Still, this arrangement can impede the effectiveness of a platform for resource management when many functions are translated to a higher level. The Lake Aheme case shows that the *Bureau* of the committee generated after the *journée de réflexion* involved only representatives at the ministry level and from political associations. Afterwards, when problems emerged in the lake area, they were not present. Actors at higher levels should support decision-making, create enabling conditions, mediate complex disputes and facilitate the *responsabilisation* of the stakeholders.

(7) Possibilities for continual learning towards adaptability

Continued learning towards adaptability involves modification of rules, monitoring and desired decision-making, re-evaluation of covenants among the stakeholders, etc. These issues are vital for long-enduring platforms for resource management. All the case studies show ongoing dynamics both at the level of ecosystems under siege and human systems. The next section elaborates some lessons from the case studies.

10.9   Adaptive Resource Management (ARM): lessons from the case studies

Adaptive management from the ecological and 'soft' point of view

Adaptive Management is used by Holling (1995, 1996) to explain dynamics between ecological systems and management institutions. The adaptive paths of Holling's notion are based on temporal and spatial dimensions of ecological and social systems. This idea is expressed in the following quote from Holling's (1995: 8-9) work:

'the very success in managing a target variable for sustained production of food and fiber apparently leads inevitably to an ultimate pathology of less resilient and more vulnerable ecosystems, more rigid and unresponsive management agencies, and more dependent societies. ... Moreover, those pathologies occur not only in examples of renewable resource management but also in examples of rigid policies of regulation of toxic materials or in examples of narrow implementation of protection for endangered species'.

But, from the 'soft' point of view, according to Röling (1997), Adaptive Management is not only a question of temporal and spatial dimensions. It involve issues such as 'identity' and 'community', making things visible at the level of ecosystems under siege, monitoring the impact of human activity, negotiated agreement, concerted action and conflict resolution.

Both, the ecological side and the soft side explained above, provide ideas to incorporate adaptive management into resource management. The former reflects temporal and spatial pathways for looking at resource management. The latter reflects social differences and discontinuities in terms of perspectives (my own interpretation of 'identity' and 'community').

Below some evidence from the case studies is presented before some lessons learned will support my clarification of the notion of adaptive resource management.

Some empirical evidence

The Lake Aheme case

The analysis of the lake was carried out through temporal scales. It shows many variations with respect to the evolution of the problem from the pre-colonial time to the democratization era. Learning about the problem and facilitating alternative solutions has led to emergence (e.g., the failure of Akaja). New problems such as ecological crises (e.g., fish scarcity) and conflicts triggered a new learning process and facilitation cycle until impasse has become the most critical for Lake Aheme.

The rangeland case

Resource management here is spatial variable within the same community. In Save, attempts to agree based on learning in Ayedjoco compete with the desire of other stakeholders to continue their shifting cultivation. Conflicts emerged and the problem became the dilemma of some stakeholders between trust in the institutions built by the village and serving their own interests. In Kemon, crises stimulated learning and the implementation of the *Appui-Conseil*

to generate new institutions and organizations. A new problem emerged: the extent to which the new social capital can be maintained.

The watershed case

Resource management for watershed development is spatially sensitive. Establishing the identity of the stakeholders was essential for making the problem visible, and for choosing alternative solutions for soil and water conservation. However, new problems emerged. In Ouesse, the vetiver created new perturbations in the agroecosystem. An increase in labour required for contour farming and maintenance were perceived by the participants in watershed development. These emergent perceptions created new problem definitions process, learning processes, and the facilitation of alternative solutions.

The resource-flow management case

Soil fertility decline has led to the consequence of low income for women's group in Djeffa. This problem stimulates a learning process and a shift to regenerative practices that enable the creation of public goods (the group itself, infrastructures, etc.). From this stage, new problems such as a public good dilemma (contribution problems) emerge. New learning processes and facilitation started for monitoring, continually decision-making within the group, checked on participation to the activities. Sanctioning structure is defined for the noticeability of cheating. For instance, stakeholders are excluded from the public goods which are generated when they did not provide any effort.

The Maro forest case

The analysis of the Maro forest is temporally sensitive and made visible the changing patterns of the forest: (1) use under local rules before 1940, (2) intervention of colonial authorities by changing local law/rules; (3) IDA project period; and (4) the PNGT period. Pressure of stakeholders (crop-farmers, herders, migrant farmers) on the forest can be defined as a problem which motivates tentatively for conservation (intervention of colonial authorities) and exploitation (IDA project) of the Maro forest. Lessons learned continuously from the dynamics of the evolution of the Maro forest stimulated problem redefinition, new learning and facilitation of new alternative solutions. Recently, the PNGT adopted new strategies by involving the stakeholders in the management of the Forest. The problem become now the use of scarce commonly owned forest resources (woodlot), contributions for tree planting and the maintenance of firebreaks. New learning processes involve decision-making arrangements and concerted actions. The professionals facilitated distributive payoffs from wood cutting, and training of local people for transfer of competence for co-management.

The gestion of the zone sylvo-pastorale case

The need to initiate a *gestion* of the *zone sylvo pastorale* resulted from severe transhumance problems, crop damage, clashing interests and conflicts between pastoralists and crop-farmers.

The learning processes for the realization of a ZSP involve collective learning: initiating participatory action with local people, *terroir* mapping, visioning, initiating processes for terroir delimitation, negotiation, structuration and mobilization of existing institutions at the level of a *terroir* and *inter-terroir*. The team of the PNGT provided opportunities like the extension support for the creation of the ZSP, and the training of local people to carry out some activities (e.g., the delimitation of the corridor space). Thus, the introduction of composting technique convinced stakeholders in Kadomba that yields can be increased on a small plot at low cost. However some stakeholders (especially the herders) started anticipating on the problem of exclusion for the *gestion* of this *zone sylvo-pastorale*. Then new learning processes and the facilitation of alternative solutions are projected in the future.

Lessons learned: the adaptive resource management notion

In view of the above, adaptive notion takes for the granted that the resource management problem is dynamic. Therefore the social learning process and facilitation need to be continuously revisited for tackling evolving conditions, which are emergencies in resource use situations.

Learning loops in organizations (cf. Argyris & Schön, 1978; Argyris, 1992) may provide guidelines to argue how continuous adaptation to evolving conditions can be done within resource management activities. Single-loop learning occurs when detections and corrections of errors by stakeholders and an intervening agency permit to carry out resource management activities based on initial objectives. Double-loop learning occurs when, as an example, initial resource management objectives and institutions are changed. Triple-loop learning occurs when initial ways of learning in organization are changed.

Learning loops can be applied to cope with dynamics in resource management (cf. Maarleveld & Dangbégnon, 1998). So one can say that adaptive resource management requires a move from single-loop learning to double-loop and triple-loop learning to cope with evolving conditions and to continuously adapt resource management institutions. Stakeholders and intervening agencies can operate in an adaptive cycle which involves resource management problems, social learning, facilitation, and emergencies (see fig. 10.1).

10.10 Concluding remarks

This chapter probably does not cover all the issues that appear in the case studies (chapters 4 to 9). Our main objective is to pull out some propositions to stimulate reflection for the realization of sustainable collective resource management.

Issues raised reveal the importance of collective action and platform development for sustainable collective resource management as the central issue of resource management. Possibilities for continuous institutional change, a capacity for adaptation in resource

management organization and dynamic policy contexts are essential for adaptive resource management.
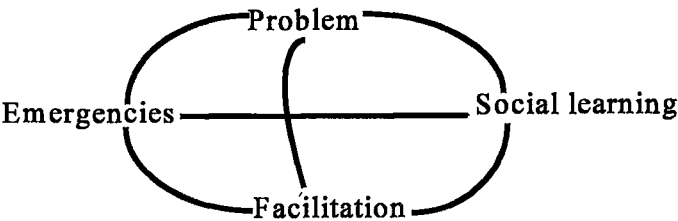
Figure 10.1:   Adaptive learning cycle based on lessons from case studies

11 Conclusions and Recommendations

11.1 Introduction

This chapter concerns the conclusions of the present study and suggests some recommendations for development with respect to adaptive resource management. In chapter two, three main research questions have guided reflection:

- To what extent can various resource management situations from Benin and Burkina Faso, be analysed?
- What are the factors that affect the success or failure of the various resource management situations analysed?
- Can concrete and fresh theories, concepts and ideas, be identified to support the facilitation of deliberate adaptive resource management interventions towards greater sustainability?

Case studies in Benin and in Burkina Faso have revealed that various resource management situations can be analysed with respect to the perspectives and methodologies developed.

Each case study analysed in the previous chapters draws specific conclusions concerning factors that affect the success or failure with respect to resource management. Case studies which show relative success of management, also show successful collective action. Factors governing success are therefore related to the extent to which platform(s) is/are developed and is/are functioning effectively. Factors such as a lack of decision-making capacity, inconsistent institutional and policy frameworks, weak policy contexts, etc., increase the risk of failure in resource management.

Some lessons are learned from the case studies and they provide insight, theories and new ideas (chapter 10) to enrich the perspectives and methodologies initially used.

This chapter will discuss the implications and challenges for new ways of thinking about innovation processes and theory-informed practices with respect to adaptive resource management

11.2 Adaptive resource management is different from conventional technology development

Conventional technology development has dominated ways of dealing solutions with respect to problems in agriculture and resource management. After the green revolution in Asia, some development leaders believes that, of the many problems facing stakeholders in Africa with

respect agriculture and resource management, the most critical is a lack of 'science' and 'technology' (Borlaug & Dowswell, 1995).

This belief heavily tends to emphasize conventional technology development in which 'innovation' is instrumentally perceived for solving critical problems that stakeholders face in African context. This is a limitation with respect to adaptive resource management. Venkantesan (1997: 55) argues that natural resource management requires a decision-making capacity of local stakeholders to plan locally relevant works.

The present study shows that adaptive resource management is different from technology development in which technology transfer is the dominant practice. Widening the concept of innovation has become relevant. Adaptive resource management involves many take-offs, which means that what stakeholders want is not necessary what they should get if sustainability is to be achieved.

- All the case studies have made plausible that innovation concept needs to be widened to involve negotiation between wants and gets in conflicting resource management situations.

- This way of thinking about innovation implies new roles for professionals such as conflict resolution, facilitation of collective action, and platform development, and, according to Röling (1997: 21), negotiated self-restraint of human greed.

11.3   Key emerging issues for the facilitation of adaptive resource management

Praxeologies (theory-informed practices) for intervention, be they Transfer of Technology, Farm Management, Ecologically-sound Agriculture, are discussed by Röling & Jiggins (1998). The framework used for these praxeologies involve the following key variables: practices, facilitation of learning, support institutions and networks, and conducive policy contexts. I will refer to these key elements to argue key issues that emerge concerning the facilitation of adaptive resource management. This choice is made because of my intention to pull out some practical ideas with respect to interventions in this domain. Below concrete ideas are enumerated.

(a) Practices that underpin adaptive resource management
- Successful collective practices at the level of ecosystem, individual actions are consistent with the collective goal;
- taking less from common goods (especially in situations of complex arenas and natural resource scarcity);
- giving more to public goods, be they organizations, institutions, infrastructures, etc.;
- sharing understanding of the ecosystem to resolve social and ecological crises;
- fostering organizational development to counter assurance problems and second order dilemmas.

(b) Learning in adaptive resource management
- accepting multiple perspectives;
- learning to think at the level of ecosystem under siege;
- learning to reach agreement through negotiation, mediation, and interaction;
- creating opportunities for reflexive learning by stakeholders;
- developing opportunities for non-formal education or *animation rurale*.

(c) facilitation of learning
- using soft system methodology to create a rich picture on problematic situations;
- using RAAKS for identifying mission statements among various intervening agencies;
- using Stakeholders Analysis to make trade-offs visible with respect to solutions;
- organizing learning paths to demonstrate mutual inter-dependence;
- creating conditions for discovery learning;
- using a process approach towards a *'responsabilisation'*;
- organizing a structuration process towards platform development;
- promoting leadership to make platforms effective;
- linking platform to higher levels of social aggregation;
- using RAAKS for role development among various intervening agencies;
- training stakeholders, transferring competencies, and training local trainees;
- creating incentives to stimulate successful collective action.

(d) Support institution and networks
- using platform for adaptive resource management at appropriate ecosystem level;
- networking with various governmental or non-governmental organization to perform various activities within resource management;
- using learning groups and stakeholders organizations;
- defining property right institutions with respect to adaptive resource management;
- defining rules of use and covenants to monitor their implementation;
- defining rules for exclusion and designing sanction structures;
- using existing local organizations for adaptive resource management;

(e) Conducive policy context

- decentralizing certain powers to the grass-roots levels;
- supporting learning communities in collective resource management;
- reforming external research and development organizations to become activists at the grass-root level;
- supporting regulations to counter 'market failure' concerning resource use;
- adopting mechanisms for long-term planning with communities.

11.4   About sustainability with respect to adaptive resource management

As assumed in chapter 2, sustainability with respect to adaptive resource management is an emergent property of a soft system. Many sustainable practices with respect to resource management are based on negotiated agreement, and are socially constructed. Lessons from the case studies have made this issue visible.

However, there is still a dominant belief in sustainability in term of instrumental issues, as was noticed in the watershed case in Benin (e.g., investment/realization criterion of the Word Bank, and which was explained by a PGRN professional in the field).

Lessons from the case studies suggest that a new vision is required for the assessment of sustainability with respect to adaptive resource management. Below some ideas are enumerated.

- Sustainability with respect to adaptive resource management depends on the extent to which collective action is being achieved.
- Sustainability with respect to adaptive resource management depends on the extent to which resource management institutions are internalized or become a body of community social capital in which they build trust.
- Sustainability with respect to adaptive resource management depends on the extent to which community decision making capacity, quality of leadership, and management capacity are maintained.
- Sustainability with respect to adaptive resource management depends on the extent to which the policy context enables conditions for adaptive resource management. A concrete example is that there is a strong appeal for participatory process for the *gestion des terroirs* in Africa while the existing institutional framework and the global policy context do not allow an effective realization of such an idea (cf. also Toulmin, 1993).

11.5   Implications of adaptive resource management for planning

Design and implementation of development programmes are mostly instrumentally organized. Practices are based on formulating concrete objectives, defining activities, and identifying 'means' to control achievements. The persistence of this culture may be related to the fact that donors, governments and planners want to know exactly the extent to which 'resources' and 'means' enable the achievement of ultimate goal.

I refer to the work of Woerkum & Aarts (1998) to argue that adaptive resource management requires that planners of development professionals move from an instrumentalist to a more interactive approach. Also I find relevant ideas such as process planning for adaptive resource management.

However, in the African context, the fact that resource management plans make heavy use of external funds often leaves little room for implementing ideas such as an interactive approach or process planning. Probably much research is needed to provide alternative solution for such a complex problem.

11.6   Assessing rigour in the constructivist inquiry used

The constructivist inquiry enabled me to successfully combine various research approaches: exploratory approach for case studies and grounded theory principles (synthesis in chapter 10). Instead of trying to 'prove' preconceived hypotheses in an ex-post phase of the research process by reliability and validity indicators, constructivist methodology has constantly made use of trustworthiness and authenticity criteria for rigour within the present study. My main lesson from the present study is that:

- Making use of the trustworthiness and authenticity criteria in the constructivist methodology is a predisposition which starts from the beginning to the end of a research process.

This lesson is visible in the way the case studies were selected, the constant check on the value system of the stakeholders involved in an in-depth investigation, and the comparison between similar cases.

Trustworthiness criteria are satisfied in the present study by looking at historical development of resource management situations studied, which led (or did not lead) to successful collective action and platform(s), and comparing similar resource management topics that reveal the relevance of collective action and platform(s), e.g., watershed development in two eco-zones, rangeland management on the one hand under local arrangement, and the other by external support.

Authenticity criteria are also satisfied in the present study by using participatory methodologies which help to honour emic construction by stakeholders. Sharing space with stakeholders during participatory action research was another way to ensure authenticity criteria. Concrete examples were the mapping exercise with herders in Savè, and the matrix ranking with a women's group in Djeffa.

11.6   Practical recommendations and suggestions for future research[1]

Practical recommendations

(a) Intervention can be helpful and is often needed; but it should emphasize facilitation and mediation. When governmental, non-governmental and grass-roots (people's) organizations pool their efforts (as in the Burkina Faso case) the relative advantages of each can lead to an optimization of the outcome.

(b) Decision making in adaptive management of natural resource goods should be decentralized and delegated to the relevant ecosystemic level, e.g., natural regions, watersheds and *terroirs* - and not to administrative units which in former colonial countries are often artificial. To enable this change in attitude, decision makers and chief implementers at the centre of power need "training" and encouragement in rethinking their roles in the development process.

(c) Helping local organizations to become more effective enhances their chances to represent the interests of their members on the platforms, on which solutions to conflicts are sought.

(d) Fostering local self-organization, establishing local meeting places, using local media and facilitating transport of local groups to visit other groups to contemplate similar problems, should be enhanced. Meeting other groups and facilitators should enhance the joint learning process which is needed to combine experiences of the past with new opportunities.

(e) Government should have the courage to forbid by laws and other means, practices (e.g., small mesh size of fishing nets, excessive tree cutting for farming, overuse of common goods) that endanger the sustainability of ecosystems .

Suggestions for future research

Lessons from the present study suggest some ideas for future research. There are the following:

- How to optimize the interaction among governmental agencies, non governmental organisations and local peoples' groups in the planning, execution and summing up of field experiments which lead to collective resource management;
- How to enhance the effectiveness of mediation to resolve conflicts about the management of natural resources;
- How to use Geographic Information System (GIS) in an interactive manner with stakeholders to make problem visible in ecosystem so that they can move to a shared understanding to take collective action.

Notes

1..This section make use of the Technical report sent to the Netherlands Israel Research Development Programme (NIRP) who funded the present study. The report was synthesized by Prof. A. Blum, coordinator of the research programme in which this study was based

References

Adams, M.E. 1982 *Agricultural extension in developing countries*. Harlow: Longman.

Adjinacou, C. 1994 Monographie socio-politique de Gbanlin. In: Bierschenk, T. (ed) *Les effeets socio-politiques de la démocratisation en milieu rural au Bénin, Tome 1, Résultats de recherche*. Stuttgart: Universität Hohenhein.

Adjinacou, C. Aho, J. Agbo, E. 1995 *Rapport annuel, Janv.-Dec. 1995 PGRN, volet ABV/GT*. Ouèssè (Bénin): GERAN/PGRN.

AFVP/GERAN 1994a *Ghanlin: diagnostic rapide participatif à Gbanlin. Document 1, Programme test de Recherche-Action-Developpement*. Ouèssè (Bénin): AFVP/GERAM/PGRN.

AFVP/GERAN 1994b *Gbanlin: occupation de l'espace. Diagnostic rapide participatif à Gbanlin. Document 2, Monographie Villageoise*. Ouèssè (Bénin): AFVP/GERAM/PGRN.

Agbo, A.V. 1991 *Civilisation et agriculture paysannes en Pays Adja - Mono (Bénin). Rites, production, reduction des risques et gestion de l'incertitude*. Thèse de Doctorat d'Etat. Paris: Université René Descartes Paris 5.

Aguessy, H. 1984 Convergences religieuses dans les sociétés Aja, Ewé et Yoruba sur la côte du Bénin. In: Medeiros de, F. (ed.) *Peuples du golfe du Bénin (Aja-Ewé)*. Paris: Karthala.

Akpo, F.I. 1995 *Protection du village Gbanlin contre l'effet érosif des eaux de ruissellement. Bassin Versant de la Beffa. S/P Ouèssè. Etude des conditions de durabilité et de reproductibilité*. Mémoire de fin de cycle au CPA II. Sekou: CPA II.

Allen, C. 1989 *Benin: economics, politics and society*. Marxist Regimes Series. Londres: Pinter.

Allen, T.F.H.; R.V. O'Neill, & T.W. Hoekstra 1984 *Interlevel relations in ecological research and management: some working principles from hierarchy theory*. General Technical Report RM-110, United State Department of Agriculture, Rocky mountain Forest and range experiment station, Fort Collins, Colorado.

Allen, T.F.H. & Starr, T.B. 1982 *Hierarchy: perspective for ecological complexity*. Chicago: University of Chicago.

Alloui, M. 1981 *L'administration forestière, les populations rurales et les exigences du développement*. Tunisie: FAO.

Almquist, A. 1991 Divination and the hunt in Pagibeti ideology. In: Peek, M.P. (ed.) *African divination systems. Ways of knowing*. Bloomington & Indianapolis: Indiana University Press.

Anderson, Jn.E.N. 1987 A Malaysian Tragedy of the Commons. In: McCay, B.J. & Acheson, J.M. (eds.) *The question of the commons: The culture and ecology of communal resources*. Tucson: University of Arizona Press.

Baden, J. 1977 A primer for the management of common pool resources. In: Hardin, G. and Baden, J. (eds) *Managing the commons*. San Francisco: W.H. Freeman & Company.

Ban, A.W. van den & Hawkins, H.S. 1996 (Second edition) *Agricultural extension*. Oxford: Blackwell Science.

Bandura, A. 1977 Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 84(2): 191-215.

Bandura, A. 1982 Self-efficacy mechanism in human agency. *American Psychologist* 37(2): 122-147.

Bartos, O.J. 1978 Simple model of negotiation. A sociological point of view. In: Zartman, W.I. (ed.) 1978 *The negotiation process: Theories and Applications*. London: Sage Publication.

Bates, R. H. 1983 *Essays on the political economy of rural Africa*. Cambridge: Cambridge University Press.

Bawden, R. 1995 On the system dimension in FSR. *Journal for Farming Systems Research-Extension* 5(2): 1-18.

Bawden, R. & Macadam, R. 1991 *Action researching systems - extension reconstructed*. Paper for workshop in 'Agricultural Knowledge Systems and the role of Extension'. Stuttagart: University of Hohenheim 21-25 May 1991.

Baxter, J. & Somerville, K. 1989 *Burkina Faso: economics, politics and society*. Marxist Regimes Series. Londres: Pinter.

Bayart, J-F. 1989 *L'Etat en Afrique. La politique du ventre*. Paris: Fayard

Beal, G.M.; Dissanayaka, W. & Knoshima, S. (eds.) 1986 *Knowledge generation, exchange and utilization*. Boulder: Westview Press.

Benda-Beckman, F. von 1992 Understanding agrarian law in society. In: Benda-Beckman , F. von & Velde, M. van der (eds.) *Law as a resource in agrarian struggles*. Agricultural University of Wageningen. Wageningse Sociologische Studies 33, Wageningen.

Benda-Beckman, F. von 1995 *Property rights and common property resources*. Paper presented at the International Conference on Agrarian Question, Wageningen 22-24 Mai 1995.

Benda-Beckman, F. von 1991 Legal uncertainty and land management. In: Savenije, H. & Huisman, A. (eds.) *Making hast slowly. Strengthening local environmental management in agricultural development*. Amsterdam: Royal Tropical Institute.

Bennett, J.W 1990 Ecosystems, environmentalism, resource conservation, and anthropological research. In: Moran, E.F. (ed) *The ecosystem approach in anthropology. From concept to practice*. Ann Arbor: The University of Michigan Press.

Berger, P.L. & Luckmann, T. 1966 *The social construction of reality. A treatise in the sociology of knowledge*. New York: Anchor Books.

Berkes, F. 1996 Social systems, ecological systems and property rights. In: Hanna, S., Folke, C., Mäler, K.-G. (eds.) *Rights to nature: Ecological, Economic, Cultural and Political Principles of Institution for the Environment.* Washington, D-C.: Island Press.

Bernard, R.H. 1988 *Research methods in cultural anthropology.* California: Sage publication.

Berreman, G.D. 1972 *Hindus of the HIMALAYAS: Ethnography and Change.* Berkeley: University of California Press.

Bertaux-Wiane, I. 1981 `The life history approach to the study of internal migration. In: Bertaux, D. (ed.) *Biography and Society.* Berkeley Hills: Sage Publication.

Biaou, G. 1991 *Regime foncier et gestion des exploitations agricoles sur le plateau Adja (Bénin).* Thèse de doctorat du 3eme Cycle. Abidjan: CIRES.

Biaou, G. 1996 *Pouvoir local et gestion des Ressources Naturelles au Benin.* Communication au Symposium International sur Institutions et technologies pour le developpement en Afrique Occidentale. Université de Hohenheim/INRAB Cotonou 16 - 22 Février 1996.

Bierschenk, T. 1988 Development project as an arenas of negotiation for strategic groups. A case study from Benin. *Sociologia Ruralis* 28(#2/3): 146-160.

Biggs, S. 1980 Le paysan et la recherche. *Ceres* 13(4): 23-6.

Billaz, R. & Diawara, Y. 1981 *Enquête en milieu rural sahélien.* Paris: ACCT and PUF

Biokou, S. 1989 *Analyse et diagnostic des systèmes d'élevage bovins sédentaires rencontrés dans les districts de Savè et Ouèssè. Première évaluation des passages des troupeaux transhumants dans la zone.* Thèse Université Nationale du Bénin. Abomey-Calavi (Bénin): FSA.

Blum, A. 1991b What can be learned from a comparison of two agricultural knowledge systems? The case of the Netherlands and Israel. Agriculture. *Ecosystems and Environment* 33: 325-39

Blum, A. 1991a The agricultural knowledge transformation cycle. *Quaterly Journal of International Agriculture* 30(4): 321-33.

Blum, A.; Röling, N. & Engel, P.H.G. 1990 Effective Management of Agricultural Knowledge Systems (AKS). An analytical approach. *Quaterly Journal of International Agriculture* 29(1): 27-37.

Blum, A. & Isaak, M. 1990 Adaptation of the Training and Visit Extension System to changing socio-cultural and Ago-ecological conditions. *Journal of Extension Systems* 6(1): 45-66.

Blum, A. 1994 A confederate agricultural knowledge system: The special case of Switzerland. *European Journal of Agricultural Education and Extension* 1(1): 103-17.

Boon, A.; Mongbo, L.R.; Vodouhê, D.S. & Cino, B. 1997 Intervention et participation paysanne (chapitre 8). In: Daane, J.R.V.; Breusers, M. & Frederiks, E. (eds.) *Dynamique paysanne sur le plateau Adja du Bénin.* Paris: Karthala.

Borlaug, N.E. & Dowswell, C.R. 1995 Mobilising science and technology to get agriculture moving in Africa. *Development Policy Review* 13: 115-29.

Bounkoungou, P. D. 1984 *Etude du milieu*. Ministère de l'Environnement et du Tourisme, Bobo-Dioulasso, Burkina Faso.

Bourdieu, P. 1990 *The logic of practice*. Cambridge: Polity Press

Brand, A. 1990 *The force of the reason. An introduction to Habermas theory of communicative action*. Sydney: Allen & Unwin.

Breemer, J.P.M. van den 1992 Ideas and usage. Environment in Aouan society, Ivory Coast. In: Croll, E. & Parkin, D. (eds.) 1992 *Bush base: forest farm. Culture, environment and development*. London: Routledge.

Breemer, van den J.P.M., Drijver, C.A., Venema, L.B. 1995 *Local Resource Management in Africa*. Chichester: John Wiley & Sons.

Breemer, H.P.M., Bergh, R.R., Hesseling, G. 1995 Towards Local Management of Natural Resources in Senegal. In: Breemer, van den J.P.M., Drijver, C.A. & Venema, L.B. (eds.) *Local Resource Management in Africa*. Chichester: John Wiley & Sons.

Breusers, M. 1990 *Le manioc sur le plateau Adja au Bénin. Une étude de cas d'un système de connaissance local*. Wageningen: Université Agronomique de Wageningen (résumé thèse en Néerlandais).

Briel, J. van den; Schuthof, P. & Topper, E. 1994 *L'aménagement des terroirs villageois: Une contribution à la Gestion des ressources naturelles. Une étude de cas du projet reboisement Rive Droite Téra, Niger*. Wageningen Agricultural University, Tropical Resource Management Papers 5.

Brokensha, D.; Warren, D.M. & Werner, O. (eds.) 1980 *Indigenous knowledge systems and development*. Lanham (USA): University Press of America.

Bromley, D.V. (general ed.) 1992 *Making the commons work: Theory, practice and policy*. San Francisco: ICS

Brouwers, J.; Dangbégnon, C.; & Agbo, V. 1997 La connaissance agricole des Adja, Chapter 7. In: Daane, J.; Breusers, M.; and Frederiks, E. (eds.) *Dynamique paysanne sur le plateau Adja du Bénin*. Paris: Karthala.

Brouwers, J.H.A.M. 1993 *Rural people's response to soil fertility decline, the Adja case (Benin)*. Published PhD Dissertation. Wageningen Agricultural University Papers 93-4.

Brouwers, J. 1991 *"Le palmier c'est notre richesse": Oilpalm on the Adja plateau in Benin (West Africa): An example of agroforestry systems based on local knowledge*. Wageningen: Agricultural University of Wageningen.

Bruyn, T.S. 1966 *The human perspective in sociology. The methodology of participant observation*. New Jersey: Prentice-Hall.

Burgoyne, J.G. (in prep.) Stakeholders analysis. In: Cassel, C. and Symon, G. (eds.) *Qualitative methods in organizational and occupational Pschology*. Sage: London.

Chopra, K.; Kadekodi, G.K. & Murty, M.N. 1990 *Participatory Development: People and Common Property Resources*. New Delhi: Sage Publications India.

Checkland, P. 1994 Systems theory and management thinking. *American Behavioural Scientist* 38(1): 75-91.

Checkland, P.B. & Scholes, J. 1990 *Soft system methodology in action*. Chicester: John Wiley and Sons.

Checkland, P.B. & Casar, A. 1986 Vickers' concept of an appreciative system: a systemic account. *Journal of Applied System Analysis* 13: 3-17.

Checkland, P.B. 1981 *System thinking, system practice*. Chicester: John Wiley.

Chambers, R. , Pacey, A. & Thrupp, L.A. 1989 *Farmer First: Farmer innovation and agricultural research*. London: Intermediate Technology Publications.

Callon, M. & Law, J. 1989 On the construction of sociotechnical networks: content and context revisited. *Knowledge and Society, Studies in the Sociology of Science Past and Present* 8: 57-83.

Chambers, R. 1983 *Rural development: Putting the last first*. Longman: Harlow.

Chambers, R. & Jiggins, J. 1987 Agriculture and resource-poor farmers (Part 1 and 2). *Agric. Administration and Extension* 27: 35-52 and 109-128.

Capra, F. 1996 *The web of life. A new synthesis of mind and matter*. London: Harper and Collins.

Carnevale, P.J. & Pruitt, D.G. 1992 Negotiation and mediation. *Annual Review of Psychology* 43:531-82.

Carruthers, I. 1981 A mental construct for unstructured on-farm interviews for use in rapid rural appraisal. *Agricultural Administration* 8: 271-278.

Cole, S. 1991 *Making science. Between nature and society*. Massachussetts: Harvard University Press.

Conway, G. R. 1994 Sustainability in Agricultural development. Trade-offs between productivity, stability, and equitability. *Journal of Farming Systems Research extension* 4(2): 1-14.

Conway, G.R. 1986 *Agroecosystem analysis for research and development*. Bangkok: Winrock International.

Cornwall, A., Guijt, I. & Welbourn, A. 1994 Acknowledging process: methodological challenges for agricultural research and extension. In: Scoones, I. & Thompson, J. (eds.) *Beyond Farmer First. Rural people's knowledge, agricultural research and extension practice*. London: Intermediate Technology Publications

Costanza, R. and C. Folke 1996 The structure and function of ecological systems in relation to property-rights regime (pp.13-34). In: Hanna, S.; C. Folke; & Mäler, K-G. (eds.) *Rights to nature: ecological, economic, cultural, and political priciples of institutions for the environment*. Washington, D-C.: Island Press.

Coulibaly, B. 1993 *Analyse sommaire du secteur forestier du Burkina Faso et propositions d'actions (document provisoire)*. Ouagadougou, Burkina Faso.

Crehan, K. & Oppen, A. von 1988 Understanding of 'Developments': An arena of struggle. The story of a development project in Zambia. *Sociologia Ruralis* 18(2/3): 113-145.

Croll, E. & Parkin, D. 1992 Anthropology, the environment and development. In: Croll, E. & Parkin, D. (eds.) *Bush base: forest farm. Culture, environment and development*. London: Routledge.

Cross, J.G. 1978 Negotiation as a learning process. In: Zartman, W.I. (ed.) 1978 *The negotiation process: Theories and Applications*. London: Sage Publication.

Daane, J.R.V., Breusers, M. & Frederiks, E. 1997 *Dynamique paysanne sur le plateau Adja du Bénin*. Paris: Karthala.

Daane, J.R.V. & Mongbo, R.L. 1991 Peasant influence on development projects in Bénin: a critical analysis. *Geneve-Afrique* 29(2): 49-76.

Daane, J.R.V. & Perthel, D. 1988 *Transformation socio-structurelle et interventions de développement rural rural sur le plateau Adja (République Populaire du Bénin)*. Sozialanthropologische Arbeitspapier, #7. Berlin: Université Libre.

Dagba, L. 1986 *Problème de la production halieutique du Lac Ahémé (RPB). Influence des activités anthropiques sur la population en poisson et sur la conservation des ressources naturelles*. Thèse Université Nationale du Bénin. Abomey-Calavi (Bénin): FSA.

Dangbégnon, C. (forthcoming) Rural Development in the Western part of the Sous-Prefecture of OUESSE, Benin. In: Hoefsloot, L. (ed.) *Land use planning and negotiating platforms*. (To be published by Dutch Ministry of Foreign Affairs and Cooperation).

Dangbégnon, C. 1996 *Watershed management with indigenous people in Benin*. Paper presented at the International Workshop: "Using Communication to Make Environmentally Sustainable Development Happen". November 1-2, 1996 Burlingame, California (USA)

Dangbégnon, C. 1996 *Breaking the impasse: Platform for Common Property Resource use (The Aheme lake case, Benin)*. Paper presented at the Sith Annual Conference for the International Association for the Study of Common Property Resources. June 4-8, 1996 Univ. of Berkeley, Berkeley California (USA)

Dangbégnon, C. 1995 L'importance des connaissances endogènes pour une agriculture durable au Sud-Bénin. In: Ton, P. & De Haan, L. (eds.) *A la recherche de l'agriculture durable au Bénin*. Amsterdamse Social-Geografische Studies 49. Amsterdam: Instituut von Sociale Geografie.

Dangbégnon, C.; Röling, N.; & Blum, A. 1995. *New perspective on complex environmental problem in Benin: platforms for resource use negotiation*. Paper presented at the International Congress on AGRARIAN QUESTIONS, Wageningen May 22-24 1995, the Netherlands.

Dangbégnon, C. 1995 *Towards common property rights in fishing communities: a platform for negotiating sustainable resource use (The Aheme lake case, Benin)*. unpublished MSc Thesis, Wageningen Agricultural University, The Netherlands.

Dangbégnon, C. 1994 Differentes approches de la Vulgarisation Agricole au Bénin. In: Linde, P. & Riemersa, I. (eds.) *Arrière-plan: reflexions sur l'innovation Agricole.* Wageningen: Peter Linde Production.

Dangbégnon, C. & Brouwers, J. 1991a *Réseau d'informateurs: Une expérience pour l'identification des connaissances locales sur le plateau Adja.* Rapport interne. Section SVR. Abomey-Calavi (Bénin): FSA/UNB.

Dangbégnon, C. & Brouwers, J. 1991b *"Les feuilles font beaucoup de travaux": Connaissances floristiques endogènes sur le plateau Adja.* Rapport interne. Section SVR. Abomey-Calavi (Bénin): FSA/UNB.

Dangbégnon, C. & Brouwers, J. 1991c *Systèmes de classification paysans des sols, variétés de plantes cultivées, composantes du climat, maladies et parasites des cultures sur le plateau Adja.* Rapport interne. Section SVR. Abomey-Calavi (Bénin): FSA/UNB.

Dangbégnon, C. & Brouwers, J. 1990 Maize farmers' informal R&D. *Ileia Newsletter* 6(3): 24-25.

Dangbégnon, C. 1990 *Systèmes de connaissance et recherche informelle paysans. Une étude de cas: la culture du maïs sur le plateau Adja (villages Dadohoué et Dékandji).* Thèse Université Nationale du Bénin. Abomey-Calavi (Bénin): FSA.

Dawes, R.M. 1980 Social dilemmas. *Annual Review of Psychology* 31: 169-93.

De Haan, J.L. 1997 (ed.) *Agriculteurs et éleveurs au Nord-Bénin. Ecologie et genre de vie.* Paris: Karthala.

De Haan, J.L. 1995 Local environment management in North Benin: Bright spots in the local impasse. In: Breemer, van den J.P.M., Drijver, C.A. & Venema, L.B. *(eds.) Local Resource Management in Africa.* Chichester: John Wiley & Sons.

Decret NE 97-110/PRES portant promulgation de la loi No. 005/ADP du 30 Janvier 1997 sur le Code de l'environnement. *Journal officiel du Burkina Faso* du 25 avril 1997.

Decret No. 97-111/PRES portant promulgation de la loi nE006/97/ADP du 31 Janvier 1997 sur le Code forestier. *Journal officiel du Burkina Faso* du 25 avril 1997.

Defoer, T. & Hilhorst, T. 1995 *In search of farmer participatory approach for research and extension in Southern Mali, ESPGRN.* Amsterdam: Royal Tropical Institute.

DGEF 1991 *Programme National de Forestrie Villageoise.* Ministère de l'Environnement et du Tourisme, Ouagadougou, Burkina Faso.

Diarra, S.; Defoer, T. & Hilhorst, T. 1995 *Pour une cartographie paysanne du terroir villageois.* Sikasso (Mali): Equipe Systèmes de Production et Gestion des Ressources Naturelles (ESPGRN)/Institut d'Economie Rurale (IER).

Dilema, S. 1997 *Compte Rendu de session de formation en Droit de l'Environnement (16 au 31 Mai 1997).* Equipe Technique Forestière, Bobo-Dioulasso, Burkina Faso.

Direction Régionale de l'Environnement et des Eaux et Forêts des Hauts-Bassins 1996 *Problématique du ravitaillement de la ville de Bobo-Dioulasso en bois-énergie*. Ministère de l'Environnement et de l'Eau, Bobo-Dioulasso, Burkina Faso.

Direction Régionale de l'Environnement et des Eaux et Forêts des Hauts-Bassins 1995 *Plan d'action annuel 1996 de la DREEF/HB*. Ministère de l'Environnement et de l'Eau, Bobo-Dioulasso, Burkina Faso.

Dissou, M. 1986 *La republique Populaire du Bénin: Milieux naturels, régions, économie agricole régionale. Première partie: le Bas-Bénin*. Abomey-Calavi(Bénin): Projet UNB/UVA/ER.

Djohossou, P. 1993 *Approche et stratégies d'intervention du volet Aménagement des Bassins Versants du PGRN*. Cotonou: PGRN.

Doolette, J.B. & William, B. M. (eds.) 1990 *Watertshed development in Asia. Strategies and technologies*. World Bank Technical Paper 127. Washington, D.C.: The World Bank

Drabo, S. 1985 *Rapport de fin de stage: techniques de pépinières*. Centre agricole polyvalent de Matourkou, Burkina Faso.

Dryzek, J.S. 1995 Political and ecological communication. *Environmental politics* 4(4): 13-30.

Elwert, G. & Bierschenk, T. 1988 Development aid as an intervention in dynamic systems. *Sociologia Ruralis* 28(#2/3): 99-112.

Engel, P. 1997 *The social organization of innovation. A focus on stakeholder interaction*. Amsterdam: KIT.

Engel, P.G.H. 1995 *Facilitating innovation: an action-oriented approach and participatory methodology to improve innovative social practice in agriculture*. Published PhD Dissertation. Wageningen: Wageningen Agricultural University.

Engel, P. & Salomon, M. 1993 *Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) manual*. Department of Communication and Innovation Studies. Wageningen: Wageningen Agricultural University.

Ensminger, J. 1996 Culture and property rights In: Hanna, S.S; Folke, C. & Mäler, K.-G. (eds.) *Rights to nature: Ecological, Economic, Cultural and Political Principles of Institution for the Environment*. Washington, D-C.: Island Press.

Equipe Mobile Pluridisciplinaire (EMP) 1996a *Document non officiel: Elements du plan d'aménagement et de getion de la forêt classée de Maro*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Equipe Mobile Pluridisciplinaire (EMP) 1996b *Bilan des activités (1992 B 1996) et perspectives*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Equipe Mobile Pluridisciplinaire (EMP) 1995a *Organisation du pâturage contrôle dans la forêt classée de Maro: recensement des éleveurs riverains et leur cheptel*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Equipe Mobile Pluridisciplinaire (EMP) 1995b *Rapport de mission de consultation: Etude sur la faune sauvage de la Forêt classée de Maro*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Equipe Mobile Pluridisciplinaire (EMP) 1993   *Rapport sur la situation de l'occupation de la Forêt classJe de Maro*. Programme National de Gestion des Terroirs, Oaugadougou, Burkina Faso.

Equipe Technique Forestière (RTF) 1996 *Rapport d'inventaire forestier Forêt Classée de Maro*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Equipe Mobile Pluridisciplinaire (EMP) 1997 *Point sur l'exploitation forestière de trois campagnes*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Essouman, H. 1992 *Etude socio-économique de quelques facteurs de dégradation des ressources naturelles. Cas de la Sous-Préfecture de Ouèssè (Département du Zou)*. Thèse Université Nationale du Bénin. Abomey-Calavi (Bénin): FSA.

Fairhead, J. 1991 *Indigenous Technical Knowledge and natural resource management in sub-Saharan Africa: a critical overview*. Paper National Resource Institute, Chatham (UK).

Fanou, J.A. 1992 *Stratégies d'accumulation en milieu rural au Bénin: le plateau Adja (Mono)*. Thèse de Doctorat. Lille: Université de Lille.

Floquet, A. 1993 *Dynamique de l'intensification des exploitations au Sud du Bénin et innovations endogènes. Un défi pour la recherche agronomique*. Thèse de Doctorat. Stuttgart: Université de Hohenhein.

Floquet, A. Agli, C. 1991 *Savoir paysan et changements techniques dans la conduite et la Gestion de la fertilité des terres. Rapport de recherche*. Cotonou: projet Uniho-DRA.

Fresco, L.O. 1986 *Cassava in shifting cultivation. A system approach to agricultural technology development in Africa*. Amsterdam: Royal Tropical Institute.

Funtowicz, S.O. & Ravetz, J.R. 1993 Science for Post-Normal Age. *Futures* 25 (7)

Funtowicz, S.O. & Ravetz, J.R. 1990 *Global environment issues and the emergence of second order science*. Brussels: EC, Directorate General for Science, Research Development.

Funtowicz, S.O. & Ravetz, J.R. 1994 The worth of a songbird: ecological economics as post-normal science. *Ecological Economics* 10: 197-207.

Geertz, C. 1983 *Local knowledge. Further essays in interpretative anthropology*. New York: Basic Books.

Giddens, A. 1984 *The constitution of society. Outline of the theory of structuration*. Cambridge: Polity Press.

Glaser, B.G. & Strauss, A.L. 1967 *The discovery of grounded theory. Strategies for qualitative research*. Chicago: Aldine Publishing Company

Gnanglè, C.P. 1992 *Etude du fonctionnement de la jachère à palmiers utilisée sur le plateau Adja (Département du Mono, Rep. du Bénin)*. Thèse Université Nationale du Bénin. Abomey-Calavi: FSA.

Godin, F. 1986 Benin 1972-1982. *La logique de l'Etat Africain*. Paris: L'Harmattan

Goudet, J. P. 1982 *Projet forestier (forêt de Maro): rapport de mission d'appui au programme de recherche appliquée au projet*. Centre technique Forestier Tropicale, Nogent sur Marne, France.

Grant, W.E., Pedersen, E.K. & MarXn, S.L. 1997 *Ecology and natural resource management. Systems analysis and simulation*. New York: John Wiley & Sons

Grimble, R.J & Chan, M.K., Aglionby, J. & Quan, J. 1995 *Trees and trade-offs: a stakeholder approach to natural resource management*. Gatekeeper series 52. London: IIED.

Guba, E.G. & Lincoln, Y.S. 1994 Competing paradigms in qualitative research. In: Denzin, N.K. & Lincoln, Y.S. (eds.) *Hanbook of qualitative research*. Thousand Oaks: Sage Publication.

Guba, E.G. & Lincoln, Y.S. 1989 *Fourth generation evaluation*. London: Sage Publication.

Gunderson, L.H.; Holling, C.S.; Stephen, S.L. (eds.) *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.

Gundersun, H.L.; Holling, C.S. & Light, S.S. 1995 Barriers broken and bridges built: a synthesis (pp 389-532). In: Gundersun, H.L.; Holling, C.S. & Light, S.S. (eds.) *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.

Hagberg, S. 1992 *Document de travail: Aménagement des forêts naturelles: la forêt classée de Toumousséri, Burkina Faso*. Uppsala, Suède.

Hakim, C. 1987 *Research design. Strategies and choices in the design of social research*. London: Allen & Unwin

Hamilton (Gus) N.A. 1998 Co-learning tools: powerful instruments of change in Southern Queensland, Australia (chapitre 10). In: Röling, N.G. & Wagemakers, M.A.E. (eds.) *Facilitating sustainable agriculture. Participatory learning and adaptive management in times of environmental uncertainty*. Cambridge: Cambridge Unviversity Press.

Hamilton (Gus) N.A. 1995 *Learning to learn with farmers. A study of on adult learning extension project conducted in Qeensland, Australia. 1990 - 1995*. PhD. Dissertation. Wageningen: WAU

Hanna, S.S; Folke, C.; Mäler, K.-G. (eds.) 1996 *Rights to nature: Ecological, Economic, Cultural and Political Principles of Institution for the Environment*. Washington, D-C.: Island Press.

Hanna, S. & Jentoft, S. 1996 Human use of the natural environment: an overview of social and economic dimensions. In: Hanna, S.; Folke, C. & Mäler, K-G. (eds.) *Rights to nature: ecological, economic, cultural, and political priciples of institutions for the environment*. Washington, D-C.: Island Press.

Hardin, G. & Baden, J. (eds.) 1977 *Managing the commons*. San Francisco: W.H. Freeman and Company.

Hardin, G. 1968 The tragedy of the commons. *Science* 162: 1243-1248

Harding, R. 1982 *Collective action*. Baltimore: The Johns Hopkins Press.

Hargreaves Heap, S.P. & Varoufakis, Y. 1995 *Game theory: a critical introduction*. London: Routledge

Harrison, P. 1991 *Une Afrique verte*. Paris: Karthala.

Hart, K. 1982 *The political economy of West African agriculture*. Cambridge: Cambridge University Press.

Havelock, R. 1986 Modelling the knowledge system. In: Beal, G.M.; Dissanayake, W. & Konoshima, S. (eds.) *Knowledge generation, exchange and utilization*. Boulder: Westview Press.

Haverkort, B.; Gibbon, D.& Bayer, W. 1991 *Research for the future: An overview of existing research in sub-Saharan Africa for the development of Low-External-Input and sustainable agriculture*. SAREC(Stockholm) & ETC(Leusden), The Netherlands.

Herring, R.J. 1990 Rethinking the Commons. *Agriculture and Human Values* 7(2): 88-104.

Hiddink, B. 1991 *Indigenous knowledge systems and soil management: case study, Benin*. Unpublished M.Sc. thesis. Wageningen: Wageningen Agricultural University.

Holling, C.S. 1995 What barriers? What bridges? (Introduction). In: Gunderson, L.H.; Holling, C.S.; Stephen, S.L. (eds.) *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.

Holling, C.S. & Sanderson, S. 1996 Dynamics of (Dis)harmony in Ecological and social systems. In: Hanna, S.; Folke, C.; & Mäler, K-G. (eds.) *Rights to nature: ecological, economic, cultural, and political priciples of institutions for the environment*. Washington, D-C.: Island Press.

Holling, C.S.; Schindler, D.W. Brian, Walker, W. & Roughgarden, J. 1995 Biodiversity in the functioning of ecosystems: an ecological synthesis. In: Perrings, C.; K-G. Mäler; C. Folke, C.S. Holling, and Jansson, B-O. (eds.) *Biodiversity loss. Economic and ecological issues*. Cambridge: Cambridge University Press.

Horowitz, M. & Painter, T.M. 1986 *Anthropology and rural development in West Africa*. London: Westview Press

Horton, R. 1993 *Patterns of thought in Africa and the West. Essays on magic, religion and science*. Cambridge: Cambridge University Press.

Hounkpodote, R.M. & Bediye, P. 1995 *Methodologie d'appui-conseil pour une meilleure gestion de la transhumance dans le bassin versant de la Beffa (Ouèssè)*. Volet foncier du PGRN. Ouèssè: PGRN.

Hountondji, P. 1989 Benin National Working Group: Research on traditional knowledge and knowhow. *CODESRIA Bulletin #2,3*

IDS Workshop, 1989 Farmers' knowledge, innovations, and relation to science. In: Chambers, R.; Pacey, A. & Thrupp, A.L. (eds.) *Farmer First: Farmer innovation and agricultural research*. London: Intermediate Technology Publications

Ingold, T. 1992 Culture and the perception of environment. In: Croll, E. & Parkin, D. (eds.) *Bush base: forest farm. Culture, environment and development.* London: Routledge.

INSAE 1993 *Deuxième recensement général de la population et de l'habitation, Fevr. 1992. Vol. 1, Résultats définitifs.* Cotonou: Ministère du Plan et de la Restructuration Economique

Jackson, M.C. 1985 Social system theory and practice: The need for a critical approach. *International Journal of a General Systems* 10: 135-151.

Jodha, N. S. Property Rights and Development In: Hanna, S., Folke, C. & Mäler, K.-G. (eds.) *Rights to nature: Ecological, Economic, Cultural and Political Principles of Institution for the Environment.* Washington, D-C.: Island Press.

Jungerius, P.D. 1985 *Perception and use of the physical environment in peasant societies.* The 16th Norma Wilkinson Memorial Lecture, Geographical papers 93: 1-19.

Kaboré, C. 1994 *Bilan provisoire de la campagne d'exploitation forestière 1994.* Programme National de Gestion des Terroirs, Bobo Dioulasso, Burkina Faso.

Kaboré, T.M. 1995 *Les conflicts et leur gestion autour des forêts clasées: le cas de la forêt classée de Maro.* Programme National de Gestion des Terroirs, Bobo Dioulasso, Burkina Faso.

Karemangingo, C. & Agbo, A.V. 1990 *Projet aménagement des ressources naturelles et protection de l'environnement. Données de Base pour l'aménagement du Bassin Versant de la Beffa.* Cotonou: MDR, Programme des Unis pour le Developpement, et Banque Mondiale.

Karl-Augustt, E. 1984 Les populations du Mono Béninois (esquisse historique). In: Medeiros de, F. (ed.) *Peuples du golfe du Bénin (Aja-Ewé).* Paris: Karthala.

Kelman, H.C. 1969 Process of opinion change. In: Bennis, W.G.; Benne, K.D.; Chin, R. (eds., Second edition) *The planning of change.* London/New York: Holt, RineHart and Winston.

Kindervatter, S. 1979 *Non-formal education as an empowering process.* Amherst: University of Massachusetts

Kloppenburg, J.Jr. 1991 Social theory and the De/Reconstruction of Agricultural Science: Local Knowledge for Alternative Agriculture. *Rural Sociology* 56(4): 519-48.

Knorr-Cetina, K. 8 Cicourel, A.V. (eds.) 1981 *Advances in social theory and methodology: Towards an integration of micro and macro-sociologies.* Boston/London: Routledge

Koestler, A. 1969 Beyond atomism and holism: the concept of the holon. In: Koestler, A. & Smythies, J.R. (eds.). *Beyond reductionnism: new perspectives in the life sciences.* New York: The Hutchinson Publishing group.

Kolb, D.A. 1984 *Experiential learning. Experience as a source of learning and development.* New Yersey: Prentice-Hall, Engleweed Cliff.

Koudokpon, V. (ed.) 1992 *Pour une recherche participative. Stratégie de développement d'une approche de recherche avec les paysans au Bénin.* Cotonou: Direction de la Recherche Agronomique et Amsterdam: Institut Royal des Tropiques.

Kuhn, T. 1970 (second ed.) *The structure of scientific revolution.* Chicago: The University of Chicago.

Kuzel, A.J. 1992 Sampling in qualitative inquiry. In: Crabtree, B.F. & Miller, W.L. (eds.) *Doing qualitative research.* London: Sage Publication.

Lafaye, C. & Thevenot, L. 1993 Une justification ecologique? Conflicts dans l'aménagement de la nature. *Revue Française de Sociologie* 4: 495-524.

Latour. B. 1987 *Science in action.* Milton Keynes: Open University Press.

Lee, K.N. 1993 *Compass and gyroscope. Integrating Science and politics for the environment.* Washington, D.C: Island Press.

Leeuwis, C. 1993 *Of computers, myths and modelling. The social construction of diversity, knowledge, information and communication technologies in Dutch horticulture and agricultural extension.* Ph.D Dissertation. Wageningen: Wageningen Agricultural University.

Lekanne, B. 1995 *Rapport de deux missions au Burkina Faso.* Antenne Sahélienne, Ouagadougou, Burkina Faso.

Linstone, H. 1989 *Multiple perspectives on technology diffusion: insights and lessons.* Laxenburg (Austria): International Conference on Diffusion of Technology and Social Behavior, June 14-16, 1989.

Long, N. & Villareal M. 1994 The interweaving of knowledge and power in development interfaces. In: Scoones, I. & J. Thompson (eds.) *Beyond Farmer First. Rural people's knowledge, agricultural research and extension practice.* London: Intermediate Technology Publications

Long, N. & Long, A. (eds.) 1992 *Battlefields of knowledge: the interlocking of theory and practice in social research and development.* London: Routledge.

Long, N. (ed.) 1989 *Encounters at the interface; a perspective on social discontinuities in rural development.* Wageningen: Wageningse Sociologische Studies.

Long, N. & Ploeg, J.D. van der, 1989 Demythologising planned intervention. *Sociologia Ruralis* 29(3/4): 226-249.

Lynam, J.K. & Herdt, R.W. 1992 Sense and sustainability: sustainability as an objective in International Agricultural Research. In: Moock, J.L. & Rhoades, R.E. (eds.) *Diversity, farmer knowledge and sustainability.* Ithaca: Cornell University Press.

Maarleveld, M. & Dangbégnon, C. 1998 *Managing natural resources in face of evolving conditions: a social learning perspective.* Paper presented at the 7th Conference of the International Association of the Study of Common Property. Vancouver 10-14 June, 1998.

Maas, A. 1991 *Inventaire des produits traditionnels pour le traitement de la diarrhée chez les petits ruminants dans le Mono.* Rapport de stage. Lokossa (Bénin): Direction de la Recherche Agronomique(DRA)/projet RAMR.

Manning, F. 1982 *Slavery, colonialism and economic growth in Dahomey.* Cambridge: Cambridge University Press.

Maturana, R.H. & Varela, F.J. 1992 *The Tree of Knowledge. The biological roots of human understanding*. London: Shambhala

May, T. 1993 *Social research: issues, methods and process*. Philadelphia: Open University Press.

McCall, G.J.& Simmons, J.L. (eds.) 1969 *Issues in participant observation: A text and reader*. *Reading/Massachusetts*: Addison-Wesley Publishing Company.

McCay, B.J. & Acheson, J.M. 1987 Human ecology of the commons. In: McCay, B.J. & Acheson, J.M. (eds.) *The question of the commons: The culture and ecology of communal resources*. Tucson: University of Arizona Press.

Mckean, M. 1992 Success on the commons. *Journal of theoretical Politics* 4(3): 247-281.

Mensah, R. 1995 *Impact de la colonisation agricole sur la dégradation des ressources naturelles: cas de la Sous-Préfecture de Ouèssè (Département du Zou)*. Thèse Université Nationale du Bénin. Abomey-Calavi: FSA.

Merlo, C. & Vidaud, P. 1984 Dangbé et le peuplement Houéda. In: Medeiros de, F. (ed.) *Peuples du golfe du Bénin (Aja-Ewé)*. Paris: Karthala.

Messick, D.M. & Brewer, M.B. 1983 Solving social dilemmas, a review. *Review of Personal and Social Psychology* 4: 11-44.

Millar, D. 1996 *Footprints in the mud: Re-constructing the diversities in rural people's learning processes*. PhD. Dissertation. Wageningen: Wageningen Agricultural University.

Mitchell, J. C. 1983 `Case and situation analysis'. *The sociological Review* 31(2) (new series): 187-211.

Mondjannagni, A.C. 1977 *Campagne et ville au Sud de la République Populaire du Bénin*. Paris: ACCT.

Mondjannagni, A.C. 1969 *Contribution à l'étude des paysages végétaux du Bas-Bénin*. Annales de l'Université d'Abidjan, Série G, Tome 1, Fascicule 2.

Mongbo, L.R. 1995 *The appropriation and dismembering of development intervention: policy, discourse and practice in the field of rural development in Benin*. Ph.D Dissertation. Wageningen: Wageningen Agricultural University.

Moore, H. 1988 *Feminism and Anthropology*. Cambridge: Polity Press.

Moscovici, S. & Doise, W. 1994 *Conflicts and consensus. A general theory of collective decisions*. London: Sage Publications.

Mougenot, C. & Mormont, M. 1997 *Governing biodiversity*. Paper presented at the Symposium on Environmental Valuation, Veaux de Cernay, 4-7 Octobre 1997.

Moulton, J.M. 1977 *Animation rurale: education for rural development*. Amherst: University of Massachusetts.

Nana, N.J.B. 1990 *Projet Forestier IDA: exploitation de plantations à grande échelle et commercialisation des produits*. Ecole Nationale des Eaux et Forêts, Dinderesso, Burkina Faso.

Nederlof, N.S. 1997 *Facilitation of Forest management. The case of wood exploitation in the classified forest of Maro, Burkina Faso.* Wageningen: Wageningen Agricultural University.

Ninan, K.N. 1998 *An assessment of European-aided watershed develpment projects in India from the perspective of poverty reduction and the poor.* CDR Working Paper 98.3. CDR: Copenhagen

Nonfon, M. 1988 *Données préliminaires sur l'écologie de la production halieutique des trous à poissons de la rive gauche de la base vallée de l'Ouémé (Bénin).* Thèse Université Nationale du Bénin. Abomey-Calavi (Bénin): FSA.

North, D.C. 1990 *Institutions, institutional change and economic performance.* Cambridge: Cambridge University Press

O'Neill, R.V.; DeAngelis, D.L.; Waide, J.B. & Allen, T.F.H. 1986 *A hierarchical concept of ecosystems.* Princeton: Princeton Univerty Press

Oakerson, R.J. 1992 Analysing the commons: a framework. In: Bromley, D.V. (general ed.) *Making the commons work: Theory, practice and policy.* San Francisco: ICS.

Oloulotan, S. & Onibon, P. 1990 *Etude des ressources pastorales et des transhumances dans le Département du Zou: Synthèse des données agrostologiques, synthèse des données sur la transhumannce.* Bohicon (Bénin): Projet Promotion de l'Elevage dan le Zou.

Oloulotan, S. & Onibon, P. 1994 *Faisabilité de petites retenues d'eau à usage pastoral pour les agro-élevateurs de la zone d'intervention du PGRN à Ouèssè.* Ouèssè (Bénin): GERAM/PGRN.

Olson, M. 1978 *La logique de l'action collective.* Paris: PUF.

Onibon, P. & Okou, C. 1995 *Etude sur la gestion de la transhumance et des colons agriculteurs dans le bassin versant de la beffa (Ouesse). Project de gestion ressources naturelles, volet Aménagement des Bassins Versants, composante operations foncieres. Rapport de consultation.* Cotonou: GERAM/PGRN.

Onibon, A. 1993 *Evaluation participative de la degradation des ressources naturelles et approches de solution pour l'aménagement du Bassin Versant de la Beffa. Rapport de consultation.* Ouèssè: AFVP/GERAM/PGRN.

Onibon, P. 1990 *Etude des troupeaux transhumants dans la Province du Zou: Périmètre Savè Ouèssè.* Thèse Université Nationale du Bénin. Abomey-Calavi: FSA.

Ostrom, E., Schlager, E. 1996 The formation of property rights. In: Hanna, S.S; Folke, C.; Mäler, K.-G. (eds.) *Rights to nature: Ecological, Economic, Cultural and Political Principles of Institutions for the Environment.* Washington, D-C.: Island Press.

Ostrom, E.; Schroeder, L. & Wynne, S. 1993 *Institutional incentives and sustainable development. Infrastructure policies in perspective.* Boulder: Westview Press.

Ostrom, E. 1990 *Governing the commons. The evolution of institutions for collective action.* Cambridge: University Press.

Ouattara, C. 1997 *Forum National sur la gestion des terroirs: La dimension rurale du processus de décentralisation au Burkina Faso*. Commission Nationale de la Décentralisation, Ouagadougou, Burkina Faso.

Ouden, J.H.B. den 1997 Gestion de la main-d'oeuvre et accumulation. In: Daane, J.R.V.; Breusers, M. & Frederiks, E. 1997 (eds.) *Dynamique paysanne sur le plateau Adja du Bénin*. Paris: Karthala.

Ouden, J.H.B. den 1989 *Ma richesse est dans mes terres: différentiation socio-économique et stratégies d'accumulation dans un village <<riche>> du plateau Dogbo-Tota, Province du Mono - Bénin.* Abomey-Calavi: Université Nationale du Bénin, Faculté des Sciences Agronomiques; et Wageningen: Université Agronomique de Wageningen.

Ouden, J.H.B. den 1986 *Ils ont déjà à manger? Differentiation des droits de contrôle sur la terre dans un village Adja du plateau de Dogbo-Tota. Province du Mono, Bénin. Rapport de recherche, Projet UNB/LUW/SVR*. Université Nationale du Bénin. Abomey-Calavi: Faculté des Sciences Agronomiques.

Ouédraogo, S. 1990 *Organisation de la vente des produits ligneux à l'UOB: quelques suggestions pour l'améliorer*. Ecole Nationale des Eaux et Forêts, Dinderesso, Burkina Faso.

Ouédraogo, K. M. 1990 *Situation actuelle de la recherche forestière du projet forestier IDA à Maro*. Ecole Nationale des Eaux et Forêts, Dinderesso, Burkina Faso.

Ouédraogo, B. L. 1990 *Entraide villageoise et développement. Groupements paysans au Burkina Faso*. Paris: L'Harmattan.

Painter, T.M. 1991 *Getting it right: Linking concepts and action for improving the use of natural resource in Sahelian West Africa*. Agriculture in sahelian west Africa. Agriculture and natural resources report series # 3. CARE: New York.

Parson, E.A. 1995 Sustainable development as social learning: theoretical perspectives and practical challenges for the design of a research program. In: Gunderson, L.H.; Holling, C.S.; Stephen, S.L. (eds.) *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.

Pazzi, R. 1984 Aperçu sur l'implantation actuelle et les migrations anciennes des peuples de l'aire culturelle Aja-Tado. In: Medeiros de, F. (ed.) *Peuples du golfe du Bénin (Aja-Ewé)*. Paris: Karthala.

Peacock, J.L. 1986 *The anthropological lens: Harsh Light, Soft focus*. Cambridge: Cambridge University Press.

Pearce, D. and Moran, D. 1994 *The economic value of biodiversity*. London: Earthscan Publication and IUCN-The World Conservation Union.

Peek, M.P. (ed.) 1991 *African divination systems. Ways of knowing*. Bloomington & Indianapolis: Indiana University Press.

Pelto, P.J. & Pelto, G.H. 1978 *Anthropological research: the structure of the inquiry*. Cambridge: Cambridge University Press.

Perrings, C.; Mäler, K-G.; Folke, C.; Holling, C.S. & Jansson, B-O. (eds.) 1995 *Biodiversity loss. Economic and ecological issues*. Cambridge: Cambridge University Press.

Perrings, C.; Mäler, K-G.; Folke, C.; Holling, C.S. & Jansson, B-O. 1995 Introduction: framing the problem of biodersity loss. In: Perrings, C.; Mäler, K-G.; Folke, C.; Holling, C.S. & Jansson, B-O. (eds.) *Biodiversity loss. Economic and ecological issues*. Cambridge: Cambridge University Press.

Perrings, C.; Mäler, K-G.; Folke, C.; Holling, C.S. & Jansson, B-O. 1995 Unanswered questions. In: Perrings, C.; Mäler, K-G.; Folke, C.; Holling, C.S. & Jansson, B-O. (eds.) *Biodiversity loss. Economic and ecological issues*. Cambridge: Cambridge University Press.

Pfeiffer, V. 1988 *Agriculture au Sud du Bénin. Passé et perspectives*. Paris: Harmattan.

Pinkerton, E. 1989   *Co-operative management of local fisheries. New direction for improved management and community development*. Vancouver: University of British Columbia Press.

Pliya, J. 1980   *La pêche au Sud-Ouest du Bénin. Etude de géographie appliquée sur la pêche continentale et maritime*. Paris: ACCT.

Popkin, S.L. 1979 *The rational peasant: the political economy of rural society Vietnam*. Berkeley: University of California Press.

Pretty, J. 1998 Supportive policies and practices for scaling up sustainable agriculture. In Röling, N.G.& Wagemakers, M.A.E. (eds.). *Facilitating Sustainable Agriculture: participatory learning and adaptive management in times of environmental uncertainty*. Cambridge: Cambridge University Press.

Pretty, N.J. 1995 *Regenerating Agriculture. Policies and practices for sustainability and self-reliance*. London: Earthscan Publications.

Pretty, N.J. 1994 Alternative systems of inquiry for sustainable agriculture. *Ids bulletin* 25(2): 37-48.

Pretty, J.N. & Chambers, R. 1994 Towards a learning paradigm: a new professionalism for a sustainable agriculture. In: scoones I. & Thompson, J. (eds). *Beyond Farmer First: rural people's knowledge, agricultural research and extension practice*. London: Intermediate Technology Publications.

Programme National de Gestion des Terroirs (PNGT) 1997a *Document d'orientation sur le diagnostic participatif dans le cadre de la gestion des terroirs*. Ministère de l'Agriculture et des Ressources Animales, Ouagadougou, Burkina Faso.

Programme National de Gestion des Terroirs (PNGT) 1997b *Rapport de l'atelier préparatoire `des journées de concertation sur la gestion des terroirs', tenu à Ouagadougou du 26 au 28 mars 1997*. Ministère de l'Agriculture et des Ressources Animales, Ouagadougou, Burkina Faso.

Programme National de Gestion des Terroirs (PNGT) 1997c   *Document d'orientation sur la responsabilisation villageoise dans le cadre de la gestion des terroirs*. Ministère de l'Agriculture et des Ressources Animales, Ouagadougou, Burkina Faso.

Programme National de Gestion de Terroir (PNGT) 1995 *Les grandes orientations en matière de gestion des terroirs au Burkina Faso, deuxième version*. Ministère de l'Agriculture et des Ressources Animales, Ouagadougou, Burkina Faso.

Programme National de Gestion des Terroirs (PNGT) 1994a *Note de réflexion: plans combinés de gestion des forêts et terroirs*. Ministère de l'Agriculture et des Ressources Animales, Ouagadougou, Burkina Faso.

Programme National de Gestion des Terroirs (PNGT) 1994b *Gestion des terroirs et décentralisation.* Ministère de l'Agriculture et des Ressources Animales, Ouagadougou, Burkina Faso.

Pruitt, D.G. & Carnevale, P.J. 1993 *Negotiation in social conflict.* Buckingham: Open University Press.

Rap, E. 1997 *Preparing exploratory research. A guideline for the design of a research proposal for MAKS students.* Wageningen: Wageningen Agricultural University.

Ravnborg, H. M. 1990 *Peasant production systems and their knowledge of soil fertility and its maintenance. The case of Iringa District, Tanzania.* Kopenhagen: CDR.

Ravnborg, H.M. & Guerrero, M.P. 1997 Stakeholders analysis in natural resource management. *ILEIA Newsletter* 13(1): 12-3

Réseau de Développement d'Agriculture Durable (REDAD) 1996 *Rapport dactivités 1995-1996.* Cotonou: REDAD.

Reseau MARP 1997 *Les principes et les outils des approches participatives, le cas de la MARP.* Communication presentée par le reseau MARP du Burkina Faso aux Journées de concertation des projets gestion des terroirs, 14-16 avril 1997. Ouagadougou, Burkina Faso.

Richards, P. 1985 *Indigenous agricultural revolution. Ecology and food production in West Africa.* London: Hutchinson.

Roe, E.M. 1993 New frameworks for an Old Tragedy of the Commons and an Aging Common Property Resource Management. *Agriculture and Human Values,* 11(1): 29-36.

Rogers, E.M. 1983 *Diffusion of innovation, third edition.* New York: Free Press.

Rogers, B. 1980 T*he domestication of women. Discrimination in develping societies.* London/New York: Tavistock Publication.

Röling, N.G. & Wagemakers, M.A.E. (eds.) 1998 *Facilitating sustainable agriculture. Participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge Unviversity Press.

Röling, N.G. & Wagemakers, M.A.E. 1998 A new practice: facilitating sustanaible agriculture (chapter 1). In: Röling, N.G. & Wagemakers, M.A.E. (eds.) *Facilitating sustainable agriculture. Participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge Unviversity Press.

Röling, N. & Jiggins, J. 1998 The ecological knowledge system. In: Röling, N.G. & Wagemakers, M.A.E. (eds.) *Facilitating Sustainable Agriculture: Participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge University Press.

Röling, N. 1997 *The soft side of land: socio-economic sustainability of land use systems.* Paper presented at the Conference on Geo-Information for Sustainable Land Management, Enschede, 17-21 August 1997, International Institute for Aerospace Survey and Earth Science.

Röling, N. 1996 Towards Interactive agricultural science. *European Journal of Agricultural Education and Extension* 2(4): 35-46.

Röling, N. 1994a *Creating Human Platform to manage Natural Resources: First result of a research Programme*. Proceedings of the International Symposium on System Oriented Research in Agriculture and Rural Development, Montpellier, France, 21-25 November 1994.

Röling, N. 1994b Communication support for sustainable natural resource management. *Ids bulletin* 25(2): 125-33.

Röling, N. & Van de Fliert, E. 1994 Transforming extension for sustainable agriculture: The case of Integrated Pest Management in rice in Indonesia. *Agriculture and Human Values*, Spring-Summer, 11(2/3): 96-108.

Röling, N. 1992 The emergence of knowledge system thinking. *Knowledge and Policy* 5(1): 42-64.

Röling, N. 1988 *Extension science: Information systems in agricultural development*. Cambridge: Cambridge University Press.

Röling, N. & Engel, P. 1988 *IKS and knowledge management: utilizing indigenous knowledge in institutional knowledge system*. Washington: Academy for International Development, 15-16 dec.

Sack, R.D. 1986 *Human territoriality. Its theory and history*. Cambridge Studuies in Historical Geography 7. Cambridge: Cambridge University Press.

Salomon, M & Engel, P. 1997 *Networking for innovation. A participatory actor-oriented methodology*. Amsterdam: KIT.

Sandler, T. 1992 *Collective action. Theory and applications*. Michigan: Michigan University Press.

Schutz, A. & Luckmann, T. 1973 *The structure of the life-world*. London: Northwestern University Press.

Schelhaas, R.M. 1978 *Les sols à vocation horticole du Sud-Est du BJnin et leur fumure à la gadoue*. KIT: Amsterdam.

Schrijvers, J.T.H. 1986 *Mothers for life: Motherhood and marginalization in the North Central Province of Sri Lanka*. Delft: Eburon.

Scott, R. W. 1995 *Institutions and organizations*. London: Sage Publications.

Seabright, P. 1993 Managing local commons: theoretical issues in incentices design. *Journal of Economic Perspectives* 7(4): 113-134.

Sen, A.K. 1967 Isolation, assurance and the social rate of discount. *Quarterly Journal of Economics* 81: 112-24

Sibide, A. 1996 *Rapport de stage de fin de cycle: Recensement des mares et des salines de la Forêt classée de Maro*. Ecole Nationale des Eaux et Forêts, Dinderesso, Burkina Faso.

Sidibe, A. 1992 *Organisations des populations riveraines pour une occupation effective des enclaves (Forêt classée de Maro)*. Ecole Nationale des Eaux et Forêts, Dinderesso, Burkina Faso.

Sloep, B.P 1994 The impact of sustainability on the field of environmental science. In: Skirbekk, G. (ed.) *The notion of sustainability and its normative implications*. Oslo: Scandinavian University Press.

Souleymane, D.; Thea, H.; N'Golo, C. 1994 *Vers une gestion durable des ressources naturelles. Quelques experiences avec des programmes tests de Gestion de terroir villageois an Mali-Sud*. Proceedings of the International Symposium on System Oriented Research in Agriculture and Rural Development, Montpellier, France, 21-25 November 1994.

Spector, B.I. 1978 Negotiation as a psychological process. In: Zartman, W.I. (ed.) 1978 *The negotiation process: Theories and Applications*. London: Sage Publication.

Spiertz, J. & Wiber, M.G. (eds.) 1996 *The role of law in natural resource management*. 's-Gravenhage: VUGA.

Sriskandarajah, N.; Bawden, R. and Packam, R. 1989 *Systems Agriculture: a paradigm for sustainability*. Paper presented at the Ninth Annual Farming systems research/extension symposium. Fayetteville, Arkansas: University of Arkansas, 9-11 Oct.

Steins, N.A. & Edwards, V.M. (in press). *Platforms for Collective Action in Multiple-Use CPRs*. Discussion paper for the Panel 'Multiple-Use CPRs, Collective Action and Platforms for Resource Use Negotiation'

Strauss, A. & Corbin, J. 1990 *Basics of qualitative reseach. Grounded theory procedures and techniques*. Newbury: Sage Publication.

Tchègnon, Ph. 1995 *Migrations rurales, strategies foncières et gestion des ressources naturelles dans le Département du Zou: cas de la Sous-préfecture de Savè*. Thèse Université Nationale du Bénin. Abomey-Calavi: FSA.

Tiffen, M. & Mortimore, M. 1992 Environment, population growth and productivity in Kenya: A case study of Machakos District. Draft for *Development Policy Review*.

Tinondé, P. 1997 *Mission d'appui à la mise en place d'une Union Inter-Villageoise de Gestion des Ressources Naturelles à Ouèssè Zone Ouest*. Ouèssè (Bénin): AFVP/GERAM/PGRN.

Tossou, R.C. 1995 *People's response to policy change in agricultural development organization*. Ph.D dissertation. Wageningen: Wageningen Agricultural University.

Toulmin, C. 1993 *Gestion de Terroir Principles, First lessons and implications for action. A discussion paper prepared for UNSO*. Drylands Programme. London: IIED.

Toulmin, C. 1991 *Natural Resource Management at the local level: will this bring food security to the Sahel?* Ids Bulletin 22(3).

Ubels, J. 1989 Irrigation systems as social interfaces: towards an understanding of irrigation development as an interactional process. In: Long, N. (ed.) *Encounters at the interface; a perspective on social discontinuities in rural development*. Wageningse Sociologische Studies.

UNB/FSA/DESR, 1985 *Etude de reconnaissance des systèmes d'exploutation agricole du plateau Adja (Province du Mono)*. République Populaire du Bénin. Rapport de recherche no. 1-85. Abomey-Calavi (Bénin): FSA.

Unité de Gestion Opérationelle (UGO) 1997 *Présentation des missions du PNGT à l'échelle nationale.* Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Unité de Gestion Forestière 1995 *Rapport sur la campagne de l'exploitation forestière 1994/1995 dans le Houet.* Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Unité de Gestion Forestière (UGF) 1994 *Plans d'amenagement et de gestion des plantations forestières de la forêt classée de Maro et de la reserve de la biosphere de la mare aux hippopotames.* Programme national de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Unité de Gestion Forestière (UGF) 1992 *Rapport d'activités dans le Houet.* Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Uphoff, N. 1992 *Learning from Gal Oya: possibilities for participatory development and post-Newtonian social science.* Ithaca: Cornell Univerity Press.

Uphoff, N. 1986 *Local institutional development: an analytical sourcebook with cases.* USA: Kumarian Press.

Uvin, P. & Miller, D. 1996 Paths to scaling up: alternative strategies for local Nongovernmental organizations. *Human Organization* 55(3): 344-54.

Van Woerkum, C. & Aarts, N. 1998 Communication between farmers and geovernment over nature: a new approach to policy development (Chapter 15). In: Röling, N.G. & Wagemakers, M.A.E (eds.). *Facilitating Sustainable Agriculture: participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge University Press.

Van de Fliert, E. 1993 *Integrated Pest Management: Farmer Field Schools Generate Sustainable Practices.* A case study in central Java Evaluating IPM Training. Published doctoral dissertation. Wageningen: WAU Papers, 93-3.

Verschoor, G. 1997 *TACOS, TIENDAS AND MEZCAL. An actor-network perspective on small-scale enterpreneurial projects in Western Mexico.* PhD Dissertation. Wageningen: Wageningen Agricultural University.

Vodouhê, D.S. 1996 *Making rural development work. Cultural hybridization of farmers' organizations.* The Adja case. Ph.D Dissertation. Wageningen: Wageningen Agricultural University.

White, A. & Runge, C. F. 1994 Common property and collective action: Lessons from cooperative watershed management in Haiti. *Economic Development and Cultural Change* 43(1): 1-41.

Wade, R. 1988 *Village republics: economic conditions for collective action in South India.* Cambridge: Cambridge University Press.

Warren, M.D 1991 *Using indigenous knowledge in agricultural development.* World Bank Discussion Papers 127. Washington D.C.: World Bank.

WCED (World Commission Environment Development) 1987 *Our common future.* New York: Oxford University Press.

Weinberg, G.M. 1975 *An introduction to general system thinking.* New York: Wiley

Welcome, R.L. 1971 *Rapport au gouvernement du Dahomey sur l'évolution de la pêche intérieure, son état actuel et ses possibilités*. Programme des Nations Unies pour le Développement. Rôme: FAO.

Wiber, N.G. & Kearney, J.F. 1996 Stinting the commons: property, policy or power struggle? Company quota in the Canadian dairy and fisheries sectors. In: Spiertz J. & Wiber, N.G. (eds.) *The role of law in Natural Resource Management*. 's-Gravenhage: VUGA

Wiersum, K.F. & Lekanne dit Deprez, B.E.J.C. 1995 The Forestry Agent at the Interface between Local level Environmental Management and External Policies: Reflections on Forestry Interventions in the Sahel. In: Breemer, van den J.P.M., Drijver, C.A. & Venema, L.B. (eds.) *Local Resource Management in Africa*. Chichester: John Wiley & Sons.

Wilson, K. & Morren, G.E.B.Jr. 1990 *System approach for improvement in agriculture and resource management*. New York: Macmillan.

Woodhill, J. and Röling, N. 1998 The second wing of the eagle: the human dimension in learning our way to more sustainable futures (chapter 3). In: Röling, N.G. & Wagemakers, M.A.E. (eds.). *Facilitating Sustainable Agriculture: Participatory learning and adaptive management in times of environmental uncertainty*. Cambridge: Cambridge University Press.

Woodhill J. 1993 *Science and the facilitation of social learning, a system perspective*. Paper prepared for the 37th Annual Meeting of the International Society for the Systems Sciences, University of Western Sydney, July, 1993.

Yin, R.K. 1984 *Case study research: design and method*. Berkeley Hills: Sage Publications.

Zampaligre, I. 1995 *Etude sur la faune sauvage de la forêt classée de Maro: rapport de mission*. Programme National de Gestion des Terroirs, Ouagadougou, Burkina Faso.

Zartman, W.I. 1978 Negotiation as a joint decision-making process. In: Zartman, W.I. (ed.) *The negotiation process: Theories and Applications*. London: Sage Publication.

ZATU & KITI 1991 *Textes portant Réorganisation Agraire et Foncière*. Front Populaire. Ouagadougou, Burkina Faso.

Zeeuw, F. de 1995 *Sécurité foncière et gestion des ressources naturelles dans la Boucle de Mouhoun, Burkina Faso*. Document sur la Gestion des Ressources Tropicales 9. Wageningen: WAU

Zoungrana, K. 1996 *Rapport de stage: participation et place de la femme dans l'exploitation forestière (cas des Groupements de Gestion Forestière des villages de Kadomba, Ramatoulaye et Néfrélaye)*. Ecole nationale des Eaux et Forêts, Dinderesso, Burkina Faso.

Summary

The present book focuses on platforms for (natural) resource management. It analyses various case studies in Benin and Burkina Faso. Conditions for collective resource management in conflict and interdependent situations are the most critical issues. The present study raises the importance of socioeconomic sustainability. It aims at incorporating social perspective within economic growth by focusing on stakeholders needs and by learning with them to respond to evolving conditions.

The present book is based on three main parts. After an introductory chapter (chapter 1), the first part discusses the perspectives and methodologies used to carry out the present study. The second part analyses six case studies, and the third part presents a synthesis and the main conclusions.

Part one: perspectives and methodologies
In part one, perspectives and methodologies used to carry out the research are developed. First, resource management problems are elaborated. They cover several dimensions: social dilemmas in interdependent resource use situations, and social and ecological crises. Collective action and platforms are the puzzles of effective resource management in face of these problems. These two notions are the central points of my argumentation if conditions for sustainably managing natural resources is to be realized.

The fact that resource management problems unravel two different assets, the social (stakeholders) and the natural (ecosystems), I have used 'coupled systems thinking' to elaborate perspectives with respect to resource management (chapter 2). Based on this notion, 'hard system thinking' is applied to conceptualize ecosystems for the purpose of resource management. 'Soft system' is also applied as a form under which we organize our attempt to reach common appreciation of problematic situations. These perspectives enable me to develop the notions of platform, social learning to cope with both ecosystem and social dynamics, and the facilitation of change in resource management (communicative intervention, incentives, support institutions, and policy contexts). Having elaborated my perspectives for the present study, I could define first, the following problem statement:

> 'The extent to which the perspectives elaborated, help develop theories, practices and ideas, in the particular contexts of resource use in Benin and Burkina Faso, for the facilitation of adaptive resource management in various attempts to enhance regenerative practices and sustainable development in ecosystems'.

Second, I define the following research questions:

* To what extent can various resource management situations from Benin and Burkina Faso, be analyzed?
* What are the factors that affect the success or failure of the various resource management situations analyzed?
* Can concrete and fresh theories, concepts and ideas, be identified to support the facilitation of deliberate adaptive resource management interventions towards greater sustainability?

The methodologies of the present study (chapter 3) involve a scientist's curricula for discovery learning and the concrete research methodology. Case study research approach, grounded theory and comparative study are used. Exploratory research is done to gain novel

and fresh arguments that contribute to the scientific and public debate with respect to resource management practices.

Part two: case studies
Six case studies were carried out (four in Benin and two in Burkina Faso). The first case study (chapter 4) deals with fishery resource management, specifically Lake Aheme in Benin. An analysis of the evolution of the platform for Lake Aheme's resource management is done from the pre-colonial period to the recent democratization process in Benin. The major conclusion from the Lake Aheme case is that, sustainability is an emergent property of a soft system, which means that the impasse noticed in the management of the lake can only be broken if two conditions are satisfied. On the first hand, collective action is effective for regulation, mutual control and monitoring. On the other hand, a platform is developed for governing the lake and resolving conflicts.

The second case study (chapter 5) deals with rangeland resource management within the *Chabe* community in Benin. Two situations are compared: the local arrangement in Savè area and the implementation of the *Appui-Conseil* for collective rangeland resource management. The first situation reveals that, a lack of decision making capacity and concerted action, and an absence of organizations and institutions for resource management, affect failures. In the second situation, a negotiated agreement and concerted action led to the development of a platform. The major conclusion from this case study is that, barriers to collective rangeland resource management can be overcome if different categories of stakeholders adopt collective action, develop platforms for decision-making, monitoring, sanctions and exclusion at the level of gaa, villages and regions.

The third case study (chapter 6) presents watershed development problems with two ethnic groups, the Adja and Mahi people in Benin. The critical issue here is the extent to which scaling up watershed development from the level of farms to the watershed for intervention, is effective. This implies the need to develop inter-village perspectives. Within both the ethnic groups, the absence of consistent property right institutions was a barrier for watershed development. Platforms for pooling a systematic treatment of micro-watersheds towards the watershed development based on inter-village structuration (scaling up) did not yet emerge in Mono. A reason was the nonexistence of local organizations that could strengthen this process. In Ouèssè, the creation of the *Union Inter-Villageoise pour la Gestion des ressource Naturelles* (UIGREN) also called SEDOKU, was a platform at the level of the region of Mahi people. The success of the scaling up process was due to existing organizations and a collective learning path adopted by the intervening agency.

Resource-flow management to improve soil fertility by a women's group is analyzed in the fourth case study (chapter 7). The analysis considers two different contexts: before, and during democratization process in Benin. Resource-flow management can be effective only if successful collective action is maintained to provide public goods (e.g., infrastructures, the group itself). A major conclusion for this case study is that, a shift in the political system of Benin, has some implications for making grass-root development processes more dynamic. Many opportunities such as credit, training, exchange of experience, enable the maintenance of the group, and in turn, collective action for resource management.

The fifth case study (chapter 8) shows the evolution of forestry problems from a purely indigenous regulation to the recent intervention of the PNGT and co-management practices in Burkina Faso. This case study reveals that, the evolution of the platform is sensitive to

ownership issues concerning the Maro forest. This case involves both public goods (e.g., fire break) and common goods (e.g., trees). Co-management practices, exclusion of free-riders and monitoring, enable collective action and platforms for regenerating the Maro forest.

The gestion des terroirs applied in a physical planning process to enable the creation of a zone for herding and tree planting, is analyzed in the sixth case study (chapter 9). The main issue was the *aménagement* of a *zone sylvo-pastorale*. The need to initiate this *aménagement* emerged from severe problems such as crop damages due to the transhumant herders, and clashing interests among herders, the native Bobo and the migrant Mossi. Perceived interdependence among these stakeholders was a driving factor for successful collective action and platform development for the *aménagement* of a *zone sylvo-pastorale*. This interdependence has become visible through repeated conflicts between herders and crop-farmers. However, the case study reveals that the management of the *zone sylvo-pastorale* will require new roles such as monitoring, conflict resolution, and mediation for professionals.

Part three: synthesis and conclusions
Many propositions and concrete ideas are pulled out with respect to resource management (chapter 10). They are addressed to resource management problems, social learning, and the facilitation of changes. Crises in ecosystems are triggers of social learning by stakeholders and intervening agencies. The facilitation of change goes beyond transfer of technology, advisory work and information support services, and extension which focuses on solution of specific problems. The case studies acerbate the importance of collective action and platforms to realize a successful collective resource management. Collective action means that individual action are consistent norms, rules, etc., which are collectively agreed upon. Collective action can be expressed through the willingness of many stakeholders to act beyond their individual interest, maybe because of stimuli from their environment. Conditions for successful collective action are: perceived interdependence with respect to resource management; mutual benefits; perceived externalities within resource management activities; risk sharing, *tontine* and increasing negotiation power; and trust in social capital for resource management. The platform notion is dynamic, heuristic and sensitive to the boundary problem within ecosystems under siege for resource management. Conditions identified for the functioning of effective platforms are: collective action, representation at the appropriate ecosystem level, quality of leadership, possibilities to meet, capacity for implementing mechanisms for concerted action and conflict resolution, stakeholders are the main concern for the functioning of operational platforms, and possibilities for continual learning for adaptability. The present study explains adaptive resource management concept. A major conclusion (chapter 11) is that adaptive resource management is different from conventional technology development. Sustainability with respect to resource management depends on collective action, trust in resource management institutions, decision making capacity, quality of leadership, management capacity and policy contexts. Implications of adaptive resource management for planning are discussed. Practical recommendations are suggested. They are addressed to the role of governments, local communities, and effectiveness of adaptive resource management.

Résumé

Ce livre concerne le changement social et la durabilité socio-économique dans le domaine de la gestion des ressources naturelles. Il fait une analyse de comment conduire des processus de changement pouvant aboutir à une gestion rationnelle et collective des écosystèmes menacés de dégradation par une forte pression humaine. Il met un accent particulier sur l'utilisation des ressources naturelles dans des contextes caractérisés par des situations conflictuelles et d'interdépendence. Plusieurs études de cas ont été analysées au Bénin et au Burkina Faso. La durabilité socio-économique qui révèle une grande importance, implique l'intégration des sciences sociales dans la croissance économique. En d'autres termes, il s'avère indispensable de prendre en compte les besoins des parties prenantes, puis de faire l'apprentissage avec elles pour réagir continuellement face aux nouvelles mutations et des changements par rapport aux conditions existantes.

     Le présent livre s'articule autour de trois parties. Après un chapitre introductif (chapitre 1), la première partie présente les perspectives et méthodologies utilisées pour conduire la présente étude. La seconde partie analyse six études de cas, et la troixième présente une synthèse et les conclusions.

Première parties: perspectives et méthodologies
Les perspectives et méthodologies qui ont guidé la réflexion dans la conduite de la présente étude, ont été développées. Premièrement, la nature du problème de la gestion des ressources naturelles a été élaborée (chapitre 2). Elle est multi-dimensionnelle: les dilemmes sociaux dans des situations d'interdépendence pour l'utilisation des ressources naturelles et les crises sociales et écologiques dans les écosystèmes sous une forte pression humainne. De ce fait, les problèmes identifiés ne peuvent trouver de réponse qu'à travers une action collective et au développement des plateformes, facteurs déterminant pour une gestion rationnelle des ressources naturelles. Ces deux concepts (action collective et plate-formes) ont servi de fil directeur pour notre argumentation dans l'analyse critique de toutes les études de cas. Les succès ou échecs identifiés en dépendent.

Les problèmes de la gestion des ressource naturelles ci-dessus énumérés intègrent le niveau de l'environnement physique (les écosystèmes) et l'environnement social (les parties prenantes). Pour adopter une démarche intégrale qui prend en compte ces deux niveaux, nous avons utilisé une perspective basée sur la notion du `coupled systems thinking' c'est-à-dire organiser la réflexion sur la base des systèmes couplés pour la résolution des problèmes (chapitre 2). Cette démarche a permis d'une part la conceptualisation des écosystèmes dans l'optique de la gestion rationnelle des ressources naturellles; et d'autre part, l'identification des systèmes sociaux (`soft systems') pour développer une appréciation commune des problèmes. Dans la concrétisation de cette approche, nous avons discuté l'idée de développer des plate-formes, en d'autre terme, des niveaux des écosystèmes où une action collective est nécessaire pour la gestion collective des écosystémes. La dimension sociale de la gestion des ressources naturelles impose une vision dynamique dans la manière de résoudre des problèmes environnementaux. Nous avons développé deux concepts: apprentissage social (`social learning') et la facilitation d'une démarche systématique pour la résolution des problèmes liés à la gestion des ressources naturelles. L'accent est mis sur des méthodes d'intervention communicative et incitative, l'analyse du cadre institutionnel et des contextes politiques. Dans

une suite logique, l'élaboration des perspectives a permis de positionner la problématique de la présente étude. Elle est définit de la manière suivante:

> Jusqu'à quelle envergure les perspectives élaborées permettent de développer des théories, pratiques et idées dans les contextes spécifiques du Bénin et du Burkina Faso dans l'optique de la facilitation de la gestion adaptative des ressources naturelles et des pratiques régénératrices et un développement durable dans les écosystèmes.

Trois grandes questions de recherche ont été définies:

- Jusqu'à quelle envergure des situations variées concernant la gestion des ressources naturellles au Bénin et au Burkina Faso peuvent-elle être analysées?
- Quels sont les facteurs qui affectent le succès ou l'échec des situations variées de la gestion des ressources naturelles qui ont été analysées?
- Peut-on identifier des theories nouvelles, des concepts et idées pour la facilitation des interventions en vue de la gestion adaptative des ressource naturelles vers une durabilité?

Nous avons utilisé des méthodologies assez diversifiées pour conduire la présente étude. D'une part, elles concernent des curriculums qui permettent au chercheur de 'faire des découvertes' à travers l'apprentissage collectif et des methodes de recherche participative. D'autre part, la méthodologie de recherche est basée sur les études de cas, une démarche exploratoire et comparative (chapitre 3).

Deuxième partie: les études de cas
Six études de cas (quatre au Bénin et deux Burkina Faso) ont constitué la base empirique de ce livre. Elles couvrent des domaines variés tels que la pèche, la gestion des pâturages, l'aménagement des bassins versants, l'horticulture bio-intensive, la foresterie, et la gestion et l'aménagement des terroirs.

La première étude de cas (chapitre 4) analyse la gestion des plans d'eau, plus précisement le cas du Lac Ahémé au Sud du Bénin. L'évolution de la plate-forme pour la gestion des ressources du lac a été analysée selon une démarche historique de la période pré-coloniale au processus récent de la démocratisation au Bénin. L'impasse constatée sur le lac Aheme ne peut être rompue que si des parties prenantes adoptent une action collective et développent une plate-forme pour la résolution des conflits et une bonne gouvernance du lac Ahémé. Il résulte de cette analyse approfondie qu'une gestion durable des ressources du lac ne peut se concevoir sans la mobilisation des organisations des parties prenantes qui sont perçues pour la définition et le respect des institutions du lac (règles, interdits, control reciproque, etc.).

La deuxième étude de cas (chapitre 5) analyse la gestion des pâturages et la résolution des conflits liés au phénomène de la transhumance dans les communautés *Chabè* du Benin. Deux situations différentes et complémentaires ont été comparées. La première révèle le manque d'une capacité de prise de décision, le manque d'action concertée et une absence des organisations et institutions susceptible de favoriser une gestion collective des pâturages et de la transhumance par les acteurs potentiels. Ces problèmes ainsi énumérés sont à la base des échecs pour une gestion durable. Dans la deuxième situation, des arrangements négociés pour action collective soutenue par l'Appui-conseil, ont facilité la création d'une plate-forme pour la résolution des conflits et la gestion de la transhumance à Kemon. Il résulte de cette étude

de cas que les barrières vers une gestion collective des ressources naturelles ne peuvent être rompues que si les différentes catégories des parties prenantes adoptent une action collective et développent des plate-formes pour la prise de décision, le monitorage, des mécanismes de sanctions et d'exclusion à l'échelle villageoise, inter-villageoise et régionale.

La troisième étude de cas (chapitre 6) présente une analyse des problèmes liés au développement des bassins versants avec deux groupes ethniques du Bénin: les Adja (Département du Mono) et les Mahi de Ouèssè (Département du Zou). Le problème critique dans cette étude se traduit par la démarche effective à mettre en oeuvre pour le développement des bassins versants à partir de la parcelle individuelle des paysans jusqu'aux micro-bassins versants et le bassin versant entier qui justifie une intervention. Cette spécificité du développement des bassins versants sous-tend la nécessité de développer une approche inter-villageoise. Aussi les études conduites dans deux ecozones différentes en milieu Adja et Mahi font-elle ressortir l'absence des institutions efficaces pour la gestion de la ténure foncière qui constitue une barrière pour l'aménagement des bassins versants. Le développement des plate-formes pour le traitement systématique des bassins versants n'a pas encore émergé dans le Mono. Des organisations locales à l'échelle inter-villageoise, pouvant faciliter un tel processus, n'ont pas encore été mobilisées. Par contre à Ouèssè, la création de l'Union Inter-villageoise pour la Gestion des Ressources Naturelles (UIGREN) offre une plate-forme pour le développement des bassins versants au niveau de la région Mahi de la Sous-Préfecture de Ouèssè. L'existence d'organisations locales des parties prenantes, l'apprentissage collectif organisé par une Organisation Non-Gouvernementale (ONG) et la prise en compte des priorités de développement de ces parties prenantes ont contribué au succès relatif, noté dans l'aménagement des bassins versants à Ouèssè avec les Mahi.

La quatrième étude de cas (chapitre 7) analyse la gestion de la fertilité des sols par un groupe de femmes. L'accent est mis sur la gestion des flux de ressources à travers les activités génératrices de revenu qui sont faites par les femmes (transformation des noix de coco en hule, transformation du manioc en gari, elevage du porc, etc.). L'analyse a pris en compte deux contextes différents: la période d'avant, et durant le processus de démocratisation au Bénin. Cette étude de cas a révélé que la gestion des flux de ressource ne pourrait être effective que si une action collective efficace est soutenue pour la provision des biens publiques du groupe (p.e., infrastructure et le goupe même). Une conclusion majeure de cette étude de cas se présente de la manière suivante: le changement de la politique nationale au Bénin a des implications sur la dynamique des processus de développement à la base. Des opportunités telles que le crédit, la formation et l'échange d'expériences a un effet positif sur le maintien des groupes et une action collective pour la gestion des ressources naturelles.

La cinquième étude de cas (chapitre 8) fait une analyse historique de la gestion de la forêt classée de Maro au Burkina Faso. Cette analyse prend en compte les changements de l'évolution de la régulation endogène de l'utilisation des ressources de cette forêt vers une pratique récente de co-gestion. Cette étude de cas a révélé que l'évolution de la plate-forme pour la gestion de la forêt classée de Maro est liée aux changements qui sont intervenus dans les droits de propriété. Aussi les problèmes liés à la gestion des biens publiques (p.e., pare-feux) et des biens communs (p.e., bois de feu, bois de construction) constituent-ils des tâches majeures pour le fonctionnement des plate-formes dans le modèle de co-gestion. Dans le même ordre d'idée, la pratique de co-gestion, l'exclusion des 'free-riders' (ceux qui désirent profiter sans contribuer) et le monitorage ont permis d'une part, l'émergence et le maintien d'une action collective, et d'autre part le fonctionnement des plate-formes pour la régénération de

la Forêt Classée de Maro.

La sixième étude de cas (chapitre 9) présente une analyse de la gestion des terroirs dans la situation concrète de l'aménagement d'une zone sylvo-pastorale. La nécessité d'une telle action résulte des problèmes sérieux tels que les dégats causés par les troupeaux transhumants, des conflits et des intérêts divergents entre éléveurs, autochtone Bobo et migrants Mossi. L'interdépendance perçue par les différents parties prenantes a un effet positif sur une action collective et le developpement des plate-formes au niveaux terroirs et inter-terroir. Cependant, il résulte de cette étude de cas que la gestion d'une zone sylvo-pastorale nécessitera de nouveaux roles pour les professionels, tels que le monitorage, la résolution des conflits et la médiation en matière de gestion des terroirs.

Partie 3: Synthèse et conclusions
L'analyse des études de cas a généré plusieurs propositions pour la facilitation d'une gestion rationnelle des ressources naturelles (chapitre 10). Un accent particulier a été mis sur la nature des problèmes en matière de gestion des ressources naturelles, l'apprentissage social et collectif et la facilitation du processus de changement vers une durabilité socio-économique. Les crises c'est-à-dire les problèmes environnementaux et sociaux qui en découlent stimulent l'apprentissage social par les utilisateurs des ressources naturelles et les organismes d'intervention. La facilitation du processus de changement va au-delà du simple transfert de technologies, de l'assistance à la résolution d'un problème, de l'information, et de la vulgarisation qui s'occupe de la recherche de solutions spécifiques à un problème donné. Toutes les études de cas ont démontré l'importance d'une action collective et la nécessité de développer des plate-formes pour réussir une gestion collective des ressources naturelles. Il resulte de nos analyses qu'une action collective signifie des actions individuelles conformes aux normes, règles, conventions, etc. qui ont été collectivement définies. Une action collective se définit aussi comme la volonté de plusieurs individus à agir au-delà des intérêts individuels et égoistes. Des conditions identifiées pour générer une action collective sont les suivantes: la perception d'une interdépendance par les parties prenantes à travers la gestion des ressources naturelles, la perception de bénéfices mutuelles par les parties prenantes, le partage de risques, les tontines, la perception d'une capacité de négociation par l'action collective, la crédibilité du capital social pour la gestion des resources naturelles (institutions, organisations, etc.). Par ailleurs, les études de cas ont révélé que la notion de plate-forme est dynamique, heuristique et variable en fonction des spécificités de la délimitation des écosystèmes dont les resources font (ou feront) l'objet d'une gestion rationnelle. Des conditions identifiées pour générer des plate-formes pouvant fonctionner effectivement sont les suivantes: l'existence des conditions d'une action collective; la représentation au niveau approprié de l'écosystème concerné pour mieux gérer les resources naturelles; la qualité du leadership; les possibilités pour les représentants de se rencontrer pour délibérer; la capacité de développer des mécanismes pour une action concertée et la résolution des conflits; la responsabilisation; et enfin la possibilité d'un apprentissage continue et susceptible d'être adapté. Une conclusion majeure de ce livre (chapitre 11) souligne que la gestion adaptative des ressources naturellles est différente de l'approche classique de développement technologique. la durabilité socio-économique en matière de la gestion des ressources naturelles dépend d'une action collective, de la crédibilité des institutions pour la gestion des ressources naturelles, de la capacité de prise de décision, de la qualité de leadership pour une bonne gouvernance, de la capacité de gestion, et des contextes politiques. Ce livre a discuté des nouveaux roles au niveau des gouvernants, des

organisations de développement et des communautés locales en vue d'une gestion durable des ressources naturelles. Des recommandations ont été faites pour des recherches futures.

Samenvatting

Dit boek behelst een studie over sociale verandering en sociaal-economische duurzaamheid in het beheer van natuurlijke hulpbronnen. Het analyseert hoe veranderingsprocessen gestuurd kunnen worden teneinde een rationeel en collectief beheer te bewerkstelligen van ecosystemen die ten onder dreigen te gaan aan een hoge bevolkingsdruk. Het accent ligt op het gebruik van natuurlijke hulpbronnen in conflictsituaties en situaties van onderlinge onafhankelijkheid. Hiertoe zijn er verschillende case-studies uitgevoerd in Bénin en Burkina Faso. Het belang van sociaal-economische duurzaamheid maakt de integratie van sociale wetenschappen in economische groei noodzakelijk. In andere woorden, de behoeften van de sociale actoren (stakeholders) moeten in acht worden genomen en met hen moet een leerproces worden doorlopen om doorlopend op nieuwe veranderingen in de omgeving te kunnen inspelen.

Het boek bestaat uit drie delen. Na een inleidend hoofdstuk, komen in het eerste deel de perspectieven van waaruit de studie is ondernomen aan de orde en vervolgens worden de methoden besproken die in het onderzoek zijn toegepast. In het tweede deel worden 6 case-studies gepresenteerd en in het derde deel wordt een synthese gemaakt en conclusies getrokken.

Deel 1: perspectieven en methoden

In het eerste deel worden zowel de perspectieven van waaruit deze studie ondernomen is, als de methoden die daarbij zijn toegepast, uitgewerkt. Allereerst wordt er nader ingegaan op de meerdimensionale problemen in het beheer van hulpbronnen. Ze betreffen sociale dilemmas in situaties van wederzijdse afhankelijkheid bij het gebruik van natuurlijke hulpbronnen, maar ook sociale en ecologische crises bij hoge bevolkingsdruk. Vraagstukken van collectieve actie en platformen zijn de stukjes van een puzzel die moeten worden opgelost om deze problemen het hoofd te kunnen bieden. Deze twee concepten van collectieve actie en platformen, vormen de kern van mijn betoog als het er op aankomt voorwaarden voor duurzaam beheer van natuurlijke hulpbronnen te scheppen. Succes of mislukking blijken er onlosmakelijk mee samen te hangen.

In de problematiek van het beheer van natuurlijke hulpbronnen komen twee verschillende soorten aspecten samen: de fysische omgeving, d.w.z. het natuurlijke milieu of het ecosysteem, enerzijds en de sociale omgeving, de betrokken *stakeholders*, anderzijds. Om een integrale onderzoeksbenadering toe te passen die zich voldoende rekenschap geeft deze twee schillen, hebben we een perspectief gehanteerd dat gebaseerd is op het concept van *coupled systems thinking*. Aldus is een *hard systems benadering* gehanteerd om ecosystemen te conceptualiseren met het oog op het (rationeel) beheer van natuurlijke hulpbronnen. Een *soft systems* benadering is toegepast om na te gaan hoe mensen zich pogen te organiseren om tot een gezamenlijke standpuntbepaling te komen in probleemsituaties. Voortvloeiend uit deze perspectieven wordt vervolgens de platform gedachte nader uitgewerkt, dat wil zeggen het concept van sociaal leren om het hoofd te kunnen bieden aan de sociale en fysische dynamiek van ecosystemen, alsmede het concept van faciliteren van een systematische benadering voor het oplossen van problemen rond het beheer van natuurlijke hulpbronnen (communicatieve interventie, stimuli, ondersteunende en facilitaire diensten, beleidscontext, etc). Een en ander heeft geleid tot het volgende onderzoeksprobleem:

1. In welke mate kunnen de hiervoor gepresenteerde perspectieven helpen theorieën te ontwikkelen en praktijken en ideeën te creëren in concrete situaties in Burkina Faso en Bénin met het oog op het faciliteren van beheersvormen voor het regenereren en verduurzamen van natuurlijke hulpbronnen (*adaptive resource management*).

Vervolgens zijn er drie centrale onderzoeksvragen geformuleerd:

2. In welke mate kunnen uiteenlopende situaties van milieudegradatie in Bénin en Burkina Faso, gezamenlijk, worden geanalyseerd?

3. Welke factoren beïnvloeden succes of mislukking in een verscheidenheid aan bestudeerde gevallen van beheer van natuurlijke hulpbronnen?

4. Kunnen er nieuwe, verfrissende theorieën, concepten en ideeën worden geïdentificeerd ten behoeve van het faciliteren van weloverwogen duurzame beheersvormen van hulpbronnen in een steeds veranderende omgeving?

Tijdens het onderzoek heb ik een uiteenlopend scala aan onderzoeksmethoden gehanteerd, variërend van ontdekkend leren aan de hand van bepaalde curricula, via methoden van participatieve observatie, tot het gebruik van vooraf opgestelde kwantitatieve methoden. Ik heb case studies verricht, gebruik gemaakt van de grounded theory benadering en comparatieve studies uitgevoerd. Voor zover het ging om het verkrijgen van nieuwe en verfrissende ideeën om het academische en wetenschappelijke debat te voeden, had de studie een meer verkennend karakter.

Deel 2: case studies

Er zijn 6 case studies uitgevoerd, 4 in Bénin en 2 in Burkina Faso, om het empirisch materiaal voor deze studie te verzamelen. Ze bestrijken disciplines als de vishouderij, het beheer van weidegrond, inrichting van irrigatie- en afwateringssystemen, input-intensieve tuinbouw, bosbouw en landinrichting en landschapsbeheer.

De eerste case, in hoofdstuk 4, gaat over aquacultuur, met name het beheer van de visstand in Lac Ahieme in Bénin. De evolutie van het platform voor het beheer van Lac Ahiemes natuurlijke hulpbronnen wordt geanalyseerd in een historisch perspectief vanaf de pré-koloniale periode tot aan het recente democratiseringsproces in Bénin. De belangrijkste conclusie uit deze case-studie is dat de impasse in het beheer van de natuurlijke hulpbronnen slechts doorbroken kan worden, als de betrokken partijen (*stakeholders*) gezamenlijk actie ondernemen en een platform gestalte geven om de gerezen problemen het hoofd te bieden en een bevredigend beheer te bewerkstelligen. Collectieve actie is nodig voor effectieve regulering, wederzijdse controle en monitoring; een platform is ook noodzakelijk voor het beheer van het meer en het oplossen van problemen die daar mee verband houden. Met andere woorden, duurzaamheid is een emergent property van een *soft system*.

De tweede case-study (hoofdstuk 5) heeft betrekking op het beheer van collectieve weidegrond en het oplossen van problemen die samenhangen met de jaarlijkse trek van veenomaden (*transhumance*) in de Chabe gemeenschap in Bénin. Twee verschillende situaties worden met elkaar vergeleken. In het eerste geval (Savé) is er sprake van een locaal of traditioneel arrangement, in het tweede van de invoering van een adviesorgaan (*Appui-Conseil*) voor het beheer van communale weidegrond. Uit het eerste geval blijkt dat het uitblijven van beslissingen (in afwezigheid van duidelijke beslissingsbevoegdheden) en het ontbreken van instellingen voor het beheer van de gemeenschappelijke weidegronden,

mislukkingen in de hand werken. In het andere geval heeft onderling overleg, gesteund door het Adviesorgaan, geleid tot de vorming van een platform voor het oplossen van mogelijke conflicten en tot het maken onderlinge afspraken betreffende het gemeenschappelijk beheer van communale weidegronden. Deze case wijst vooral uit dat belemmeringen in het beheer van gemeenschappelijke weidegrond kunnen worden geslecht als verschillende >stakeholders gezamenlijk actie ondernemen, platforms ontwikkelen voor besluitvorming, monitoring en sanctieuitoefening inclusief het sociaal isoleren van betrokkenen op dorpsniveau, tussen dorpen en regionaal.

In de derde case studie, hoofdstuk 6, komen problemen rond een stroom- en afwateringsgebied aan de orde tussen twee etnische groeperingen in Bénin (de Adja in het Departement van de Mono en de Mahi in het Departement van de Zou). De kritieke vraag hier is óf en in hoeverre in hoeverre afwateringsproblemen op niveau van het individuele huishouden op een hoger niveau van afwatering- en stroomgebied, effectief kunnen worden geïntegreerd en aangepakt. Zon aanpak veronderstelt een gemeenschappelijke kijk en benadering tussen dorpen. In beide ecozones, zowel bij de Mahi als de Adja, bleek de afwezigheid van efficiënte organen voor het reguleren van grondbezits- en -gebruiksverhoudingen een groot obstakel in het collectief beheer van watergebieden. In de Mono zijn er nog geen instituties gecreëerd voor het collectieve beheer van afwateringsgebieden, hetgeen mede verklaard kan worden uit het ontbreken van locale organisaties om de vorming van platformen te bevorderen. In Ouessé, daarentegen, is er wel een platform van de grond gekomen in de vorm van de UIGREN (Union Inter-Villageoise pour la Gestion de Ressources Naturelles), ook wel Sedoku genaamd, die zich tot doel heeft gesteld het afwateringsprobleem op regionaal niveau te benaderen, een soort waterschap dus. Het succes om dit niveau naar een hoger niveau van aggregatie te tillen is mede gelegen in het feit dat er een aantal locale organisaties bestonden, inclusief een interveniërende initiatiefnemer die een benadering van collectief leren hanteerde en de ontwikkelingsprioriteiten van de bevolking in al zijn gelaagdheden ter harte nam.

In de vierde case studie (hoofdstuk 7) wordt geanalyseerd hoe een groep vrouwen bodemvruchtbaarheidsproblemen te lijf gaat middels de inzet van door hen zelf gegenereerd inkomen (via de verkoop van olie verkregen uit kokosnoten, het houden van varkens en het verhandelen van tot meel verwerkte maniok). De analyse vergelijkt twee verschillende episodes: vóór en tijdens het democratiseringsproces in Bénin. Uit de studie kan worden geconcludeerd dat het beheer en uitwisseling van (individuele) goederen alleen dan effectief is wanneer er via collectieve actie voorzien wordt in de levering van publieke diensten (bijvoorbeeld openbare infrastructuur of voor de groep zelf). Een andere belangrijke conclusie uit deze case studie is dat veranderingen in het politieke systeem (de beleidscontext), een positieve weerslag hebben op de dynamiek van het ontwikkelingsproces op dorpsniveau. Het verschaffen van kredietfaciliteiten, het geven van scholing, het bevorderen van ervaringsuitwisselingen tussen verschillende personen en groepen, bevordert de groepssamenhorigheid, haar voortbestaan en dus gemeenschappelijk actie.

De vijfde case studie speelt zich af in Burkina Faso (zie hoofdstuk 8). Het behelst een historische analyse van het beheer van een beschermd natuurgebied (*forêt classée*), vanaf een zuiver endogene, locale vorm van beheer naar een nieuwe, meer recente aanpak van gedeeld management (met de overheid). De studie stelt vast dat veranderingen in het beheer van dit beschermd gebied (Forêt de Maro), samen hangen met wijzigingen in

grondbezitsverhoudingen en in de eigendoms- en gebruiksrechten. De voornaamste taak van het platform voor gedeeld beheer betreffen met name problemen die te maken hebben met het beheer van publieke zaken als bosbranden (als vorm van natuurbeheer) en van gemeenschappelijke, communale, goederen zoals brandhout en hout voor de constructie van woningen en dergelijke. Activiteiten van collectieve actie, zoals gedeelde management verantwoordelijkheden, het uitsluiten van profiteurs die niets terug doen (*free-riders*), en het gezamenlijk toezicht houden op de gemaakte afspraken, hebben niet alleen bijgedragen tot de regeneratie van het Forêt van Maro, ze hebben ook het ontstaan en handhaving van het Platform bevorderd; het is een proces van onderlinge wisselwerking.

Hoofdstuk 9 gaat over het beheer en de inrichting van sylvo-pastorale gronden *(aménagement sylvo-pastorale)*, dat wil zeggen gebieden waar bomen kunnen worden gekweekt en vee kan grazen. De aanleiding voor deze onderneming was o.a. gelegen in het feit dat het loslopend vee, veelal eigendom van nomadische veehouders, veel schade toebracht aan bomen en gewassen. Daarnaast waren er veel belangenconflicten tussen veehouders onderling, maar ook tussen de autochtone Bobo-bevolking en Mossi-immigranten. Het feit dat men zich er van bewust was dat men van elkaar afhankelijk was, heeft in belangrijke mate bijgedragen tot het succesvol ondernemen van gezamenlijke actie en tot het creëren van platformen op verschillende niveaus voor de inrichting en het beheer van sylvo-pastorale zones. Deze onafhankelijk werd zichtbaar door de vele conclicten die zich tussen de verschillende *stakeholders* voordeden. De studie heeft ook naar voren gebracht dat het beheer van sylvo-pastorale gronden nieuwe rollen van functionarissen met zich mee brengt die zich daar beroepshalve mee bezighouden, zoals monitoren en evalueren, toezichthouding, conflicthantering, onderhandelen, etc.

Deel 3: synthese en conclusies
De studie heeft talrijke ideeën aangereikt ten behoeve van het beheer van natuurlijke hulpbronnen (hoofdstuk 11). Zij hebben te maken met het hanteren van beheersproblemen, sociaal en collectief leren en het faciliteren van verandering ten behoeve van duurzame ontwikkeling. Fysieke en sociale crises in ecosystemen, zoals milieuproblemen, kunnen dienen als springplank voor sociaal leren door *stakeholders*, inclusief de interveniërende of faciliterende partij. Het bevorderen en faciliteren van sociale verandering is meer dan het overdragen van technologie, gaat het simpele advieswerk of het beschikbaar stellen en toegankelijk maken van informatie te boven; het is meer dan voorlichting geven gericht op het oplossen van specifieke problemen. Alle case-studies wijzen op de noodzaak van collectieve actie en het creëren van platformen om van succesvol beheer van collectieve hulpbronnen te kunnen spreken. Gemeenschappelijke actie veronderstelt dat individueel gedrag in overeenstemming is met bepaalde normen, waarden en regels die in onderling overleg zijn vastgesteld en waar men het gezamenlijk over eens is geworden. Collectieve actie kan ook worden gezien als de bereidheid van vele *stakeholders* om niet alleen te handelen uit eigenbelang, wellicht omdat signalen uit hun omgeving hen daar toe nopen. Voorwaarden om tot succesvolle collectieve actie te komen, zijn: men moet zich bewust zijn van de onderlinge onafhankelijkheid met betrekking tot beheer van hulpbronnen; men moet de verwachting hebben dat het oplossen wederzijds profijtelijk is, dat risicos gedeeld worden, en dat men er in toenemende mate onderhandelingskracht aan overhoudt; het hebben van vertrouwen in het sociale kapitaal voor gemeenschappelijk beheer van hulpbronnen

(instituten, niet gouvernementele organisaties, overheidsinstellingen, etc). Ook het bestaan van tontines, locale vormen van sparen en kredietverlening, kan bevorderend werken. Het platform concept is dynamisch, heuristisch en ontvankelijk voor problemen gelieerd aan de definiëring van de grenzen van ecosystemen om wier beheer het uiteindelijk gaat. De volgende voorwaarden zijn geïdentificeerd voor een effectief functioneren van platformen: gemeenschappelijke actie; vertegenwoordiging van belanghebbenden op de geëigende niveaus van het ecosysteem; leiderschapskwaliteiten; mogelijkheden om elkaar te ontmoeten om te overleggen en te onderhandelen; het vermogen om mechanismen voor onderling overleg en conflicthantering in te voeren en te handhaven; decentralisatie van bevoegdheden en deskundigheidsbevordering van *stakeholders*, inclusief mogelijkheden voor doorlopende (bij)scholing. De onderhavige studie behandelt het concept van *adaptive resource management* en laat in hoofdstuk 11 zien dat het, als instrument om het systeem doorlopend aan veranderende omstandigheden te kunnen aanpassen, fundamenteel verschilt van conventionele praktijken van technologieontwikkeling. Duurzaamheid met betrekking tot het beheer van natuurlijke hulpbronnen berust op collectieve actie, op vertrouwen in instituties belast met dat beheer, op beslissingsvaardigheden, op leiderschapskwaliteiten, managementvaardigheden en beleid. Dit boek heeft laten zien dat er voor duurzaam beheer van natuurlijke hulpbronnen nieuwe rollen zijn weggelegd voor ambtenaren, ontwikkelingswerkers en andere professionals, voor hun organisaties en voor de overheid. Het doet praktische aanbevelingen in die richting en suggereert themas voor vervolgonderzoek .

Curriculum vitae

Constant Dangbégnon was born in Natitingou (Bénin) on December 12th, 1962. In 1990 he completed his *Ingénieur Agronome* degree in Rural economy and sociology at the *Université Nationale du Bénin* (UNB). In January 1995 he obtained his M.Sc. in the Management of Agricultural Knowledge Systems (MAKS) at the Wageningen Agricultural University (WAU) in the Netherlands.

From 1990 to December 1991, he worked in an inter-university project between the WAU and the UNB (projet LUW/UNB/SVR), as a research-assistant in the section *Sociologie et Vulgarisation Rurales* (SVR) of the *Faculté des Sciences Agronomiques* (FSA) of the UNB. Constant started networking activities for the development of sustainable agriculture in 1991. This initiative led to the creation of the *Réseau de Développement d'Agriculture Durable* (REDAD) in January 1992 in Benin.

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