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# ENGINEERING IN ITS SOCIAL CONTEXT

**farmer participation in the Betsiboka irrigation  
system, Madagascar**

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## Glossary and abbreviations

AHT	AHT International GmbH, Essen , Germany
AREMA	The socialist party of president Ratsiraka, single-party during 1975-1992
Application to the fields	Management of water from distributaries to the plots
COMEMA	Semi-public irrigation service and development authority (1964-1974)
Corporal	Field level employee in the Development Authority with water management tasks, locally recruited (abolished 1991)
Councillor	Official in the Development Authority with water management tasks (abolished 1991)
Distributary canal	Secondary canal, taking water from a main canal, to farm channels
Farm channel	Tertiary canal, usually serving many small plots. Sometimes plots get their water directly from a distributary canal
FAO	Food and Agriculture Organisation (of the United Nations)
FIFABE	Public irrigation service and development authority (since 1974), a deconcentrated autonomous service of the Ministry of Agriculture
Headworks	Structure regulating the amount of water that flows from a source into a main canal.
Joint Commission	Commission composed of water users' association representatives FIFABE's design and construction direction. Makes the yearly, central level plan for maintenance that requires machines.
Joint Committee	Committee composed of representatives of water users' associations taking water from a collective main canal. Has O&M functions. There are several Joint Committees.
KfW	Kreditanstalt für Wiederaufbau, a German development bank
Main canal	Canal taking water from a source (via headworks). The Betsiboka system, having multiple sources, has several main canals.
NGO	Non-governmental organisation
O&M	Operation and maintenance, i.e. operation and application to the fields, policing, conflict resolution, and maintenance
Operation	Water management from the headworks to the distributaries, including opening and shutting the inlets of the distributaries
PRA	Participatory rural appraisal, a tool for analysis with a group
SWOL	Strengths-weaknesses-opportunities-limitations, a tool for analysis and planning
TDG	Technology and Development Group, University of Twente, Enschede, The Netherlands
Vafa	Water headman (Malagasy traditional)



## Preface

Why publish a case study on participatory irrigation management in Madagascar? Is participation not established as a guiding principle and as a practical imperative for irrigation management since a long time? What does this report offer in addition to the existing case studies, policy studies and training manuals?

Two considerations led to the efforts of the authors, the editors of the series, and two anonymous reviewers. The first is a need for comparative material alongside the classic cases (for instance in the Philippines and Sri Lanka), and the turnover experiences which recently receive much attention (for instance Mexico).

The second consideration is that participation in system (rehabilitation) design, and participation early on, when there are no formal organisations yet, are underdeveloped or at least underreported in the literature. The approach applied in the Betsiboka plains has much to offer in this respect, and integration of technical and social aspects stands at its heart. Interaction of technical and social aspects are a central theme in the Liquid Gold series. Participation in design is where the literature is weak and the model in Madagascar is strong.

This Special Report on Madagascar is the fruit of a joint research programme on local institutional development of the Technology and Development Group of the University of Twente (TDG, Enschede, The Netherlands) and AHT International (Essen, Germany). The authors wish to thank the many people involved. First and foremost, thanks are due to Jean-Claude Rocaboy and Jean-Francois Contin – originators of the approach in Madagascar – who were very generous with their time and information. Much the same applies to Noëline Rafaraso and Arthur Randraifanomezana. Ed Platel at AHT in Essen has been a mainstay of this study for both his formidable co-ordination skills as well as for his intimate knowledge of Madagascar. Furthermore, the study took place within the framework of the programmes and projects of Georges Rakotonirina (FIFABE), Rainer Hempel and Philippe Grandjean (AHT), who are thanked for the opportunities and for the valuable contributions to the content in interviews and meetings. Sasja Hulscher (TDG grad. student) contributed with her study on village politics and the way this influences the way the system is managed. And last but not least, thanks are due to the extension workers of the 'Ingénierie Sociale' squad and the FIFABE officials in Marovoay, and to many farmers in sectors three, four and thirteen of the Betsiboka system. They contributed to the study with insights, with hospitality, and with a graceful willingness to be observed, interviewed, and to play their part in the strange exercises we call 'participatory'.

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# 1 Introduction

## 1.1 Focus and structure of the paper

How participatory is an irrigation management arrangement? The question has been on the irrigation management agenda for at least two decades. In this paper, the case of the Betsiboka plains in Madagascar is used to investigate it, and at the same time, a participation policy is outlined of which several elements are something of a model. This report does not try to *prove* that the model worked perfectly in the Betsiboka plains. Much of the judgement would depend on whether adverse circumstances and incomplete implementation can disqualify a model. Instead, the aim here is to display and analyse the motivations and considerations underlying the participation policy, and to see how it resulted in more participatory practice despite the far-from-ideal circumstances.

The structure of this report is as follows. This chapter presents some characteristics of this study and its field work. In chapter 2, some participation concepts are briefly lined up, and an analytical framework is presented. The framework has been developed by scholars of the University of Twente on the basis of well-known publications by Ostrom and Uphoff.

The idea of the case study part is to stick to themes that are central to the Liquid Gold series. Chapter 3 will introduce the Betsiboka irrigation system and chapter 3.3 outlines the water users' associations' roles.

What follows in the case study part – instead of an evaluation type analysis of all participation processes with an assessment of what worked and what did not – is two focus chapters. One of these chapters (4) offers an in-depth analysis of participation in system rehabilitation design. The other focus chapter (5) is about the legal underpinnings of the participatory organisations.

The final chapter (6) feeds back into the analytical framework, and outlines conclusions. The setup of the report is visualised in the following diagramme.

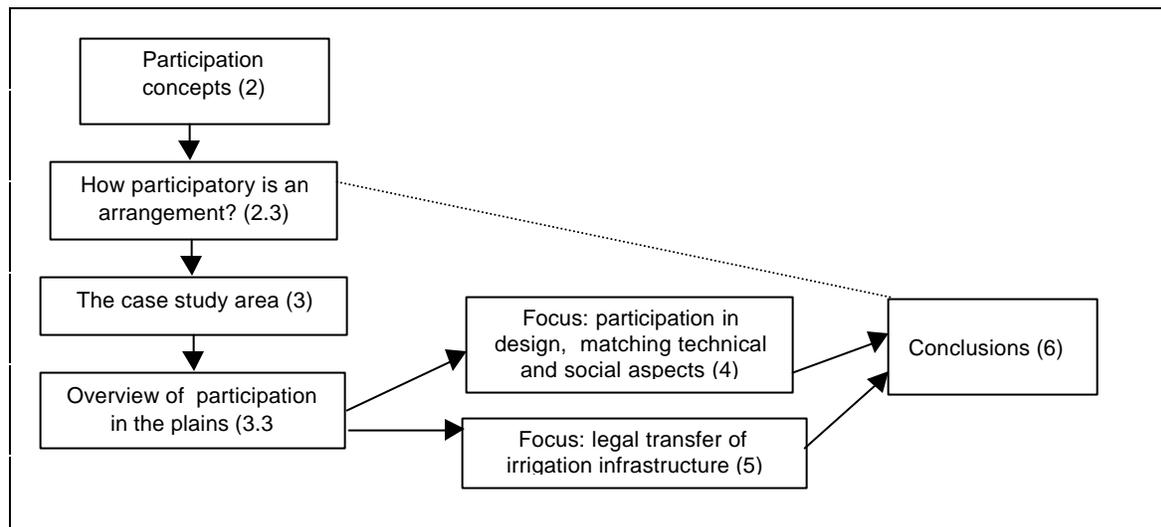


Fig. 1. Structure and focus chapters

## 1.2 The relevance of the Betsiboka case in international perspective

Why read about participation in irrigation management in the lower Betsiboka plains in Madagascar? An assessment of the relevance of the case in international perspective involves three issues:

- What is new about the Betsiboka approach?
- What is the context in which the approach is applied?
- To what degree does the case represent other cases?

The first issue is the approach itself. (The details are discussed in 3.3 and in 4.) Its main characteristics are derived from the model for participatory irrigation management developed in the eighties in the Philippines and in Sri Lanka. This means that participation starts at tertiary level, with water users' associations for water management. Subsequently, secondary and main system level are drawn into the arrangement, whereas sectorally, it diversifies to incorporate first maintenance and then, sometimes, commercial activities.

The Betsiboka approach adds to this systematic attention to the period running up to organised participation. This attention shows up in two ways:

- Long and flexible procedures for establishing water users' associations, in order to build consensus and to have disadvantaged groups included in the process;
- The participatory design procedures. These are innovative in themselves, and during the design stage, future water users' associations also get to practice their consensus building skills and the communication with the State's organisations.<sup>1</sup>

The second issue for the relevance of the case is the context in which the approach is applied. The literature lists some positive conditions or 'enabling environmental factors' for farmer participation. Prominent among these are the need for a clear policy on the part of the State, commitment to participation, and existing farmer institutions to build on.<sup>2</sup> Neither of these were present in Madagascar. The State was still heavily involved, disengagement was far from systematic, political attacks on the participatory arrangement were frequent and highly visible, and the social structure of the plains prevented stable farmer institutions from arising so far. The policy question is: what do you do under such adverse circumstances?

The third issue is relevance in a comparative perspective. The Betsiboka system represents a set of cases, namely relatively new, large scale irrigation systems with farmer populations that started out as migrants.<sup>3</sup> One of their relevant features is that the post-colonial State, as well as the settling farmers, need a lot of time to develop institutions that are stable. Conflicts among farmers and between farmers and State organisations are frequent in this situation.

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<sup>1</sup> Robert Yoder of IIMI coined the phrase 'construction as management training' (Yoder 1994 p.17). Here, 'design and construction as management training' would be appropriate.

<sup>2</sup> For instance, participation orthodoxy is based on experiences with the National Irrigation Administration of The Philippines (where a very high placed official was a champion for participation who ensured a coherent policy, and backing for it) or the famous Subaks of Bali, Indonesia (where stable farmers' institutions have been present for centuries).

<sup>3</sup> Relatively new meaning here that the systems were constructed in the middle of the 20<sup>th</sup> century or later, quite probably under a colonial regime or as internationally financed investment during the green revolution years. Examples are big parts of Gal Oya in Sri Lanka, some Indus Basin systems in Pakistan, settlement projects in Sulawesi and Sumatra in Indonesia, and the Office du Niger system in Mali.

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In brief, the Betsiboka case is interesting because of some institutional innovations and because the circumstances were rather more challenging than is often assumed in the literature. The challenging circumstances can be found elsewhere.

## 1.3 The research setup and methodology

### **The phases of the Madagascar study**

The Betsiboka case study was undertaken in 1998 and 1999. After an initial literature study, key policy people were interviewed throughout Europe and two subsequent field periods took place in Madagascar. The data were taken back to Germany and The Netherlands, were an internal report was reviewed and debated by the authors and a group of experts on the matter.

A history of participation was made. In the Betsiboka plains, the formal roles of water users' associations and their representatives were enlarged step by step throughout the nineties. The considerations and the formal relationships of policy-making actors were reconstructed on a timeline in this phase.

In a subsequent phase, the research was taken to water users' association and farmer level. The objectives were to find out how tasks were taken up in practice, and crucially what sentiments and judgements different actors (farmer as well as policy level) had about the participatory arrangement at different moments in time.

A range of techniques was used. For the first phase, classic content analysis of documents and interviewing provided most of the data. For the latter two phases, observation and PRA tools were also much relied on.

### **Selection of water users associations**

The analysis concerns mainly water users' associations, the project, and the State's irrigation/extension service cum development authority named FIFABE. Five water users' associations were selected in different sectors of the system. A spread was achieved over important characteristics:

- Socio-economic characteristics. Criteria were sociological differences between the villages where the selected water users' associations draw their members from, access to markets, and the open occurrence of conflicts;
- Hydraulic characteristics. The selected water users' associations had the following characteristics: one in a tailend part of a rehabilitated sector, one in the upstream part, and one somewhere in the middle range; one tailend water users' association in an unrehabilitated sector (extremely unreliable water supply); one water users' association in a pump sector;
- In terms of policy, the selection resulted in four water users' associations which had gone through the participatory design process (one had not), and in three water users' associations that went through legal transfer of irrigation infrastructure procedures (two did not).

### **Implications for generalisation and reliability**

An important question is what the achieved depth of the analysis and the spread of the water users' association selection implies for reliability and for the possibilities to generalise the results.

The selection may not completely represent the entire population of water users' associations. The selected water users' associations have their peculiar characteristics. However, they all were in the same participatory programme: the participation policy is a constant factor and the spread in the

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selection was explicitly designed to assess its interplay with factors that vary throughout the population of water users' associations.

The second claim on possibilities to generalise the results concerns the procedures for analysis. In Madagascar, data on the five selected water users' associations have been fed back regularly into project, government and third party informants who had detailed knowledge on the general trends in the Betsiboka plains. The question whether the observed processes represented general phenomena was explicitly raised with these informants.

As to the reliability, two possible sources of bias stand out:

- The researchers operated within the context of the project, so that interview data had to be accompanied by an estimate of the (positive or negative) opinion a particular respondent had about the project and its relationships with the State;
- The research suffers some elite bias. Farmers from disadvantaged groups were included, but their numbers and hence the diversity of opinions on their part are smaller than those of elite farmers. Furthermore, instances were noted where farmer elites had influenced the things disadvantaged farmers said.

Care has been taken in dealing with the sources of bias. In general, it helped that AHT and FIFABE were so generous as to allow for six months total field time. Specific actions were undertaken to further diminish bias:

- Field visits were carried out without the trappings of project or government interventions, such as cars, and most of the interviews have been carried out with no State or project people present;
- Elite bias was countered by organising separate PRA activities and interviews outside the villages for disadvantaged groups;
- Gender bias was dealt with in much the same way. Furthermore, a female graduate student (Ms. Hulscher) executed part of the study, reducing gender bias during the separate interviews.

Together with the triangulation provided by the multiple research techniques, we come to the confident statement that, at the aggregate level, the results are reliable.

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## 2 Images of participation

Chapter 1 started with a question: 'How participatory is an irrigation management arrangement?'. This chapter will provide a framework to analyse this in the case of the Betsiboka Plains in Madagascar. It starts with a distinction between participation as a means to achieve sustainability or management performance (instrumentalism), and participation as an end in itself (empowerment).<sup>4</sup>

Participation is often motivated with reference to both perspectives. However, participatory processes in practice are rarely so clear-cut that a happy marriage unfolds. The tension between the most empowering solution and the most sustainable solution may run especially high in the case of large scale irrigation. This first reason for this is that the level of State involvement in large scale irrigation is often high, because issues of natural resources planning, economic planning, national food security are at play. In this situation, there is no objective way of telling to what degree a State ought to disengage in order to further participation. In practice the State retains at least regulatory functions. Mexico and Turkey seem to approximate this situation of 'full transfer' nowadays.<sup>5</sup>

The second reason for tension between empowerment and instrumentalist participation is that there is much interdependency<sup>6</sup> in a large scale system. Whether this can be handled satisfactorily is very context dependent. Interdependency issues are not easily resolved even in small scale irrigation, and in large scale irrigation, the tension between the empowering solution and the sustainable solution tends to arise again and again.

So there are at least two different interpretations of what participation is. There is a need for a precise conceptual tool, geared to the analysis of what actually happens. This is the framework elaborated in 2.3. But first this chapter features brief discussions of empowerment and instrumentalism.

### 2.1 Empowering participation

From the empowerment perspective, injustice, unaccountability and lack of self-determination of farmers is the problem, with lack of power the underlying cause. Participation is then a goal in itself because it is seen as the opposite of that situation.

Participation's moral force makes it hard to be against it. Authors and policy makers have exploited that. And in concrete cases, persuasive arguments can often be made that the obstacle to development is indeed power relations. To accurately identify a problem, however, is only a first step towards doing something about it. Someone with an empowerment agenda will want to know whether the right thing is done. In other words, planning and evaluation of participation policies depend on indicators of participation. In the debate on indicators, some problems with the empowerment perspective show up.

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<sup>4</sup> Nelson & Wright 1995

<sup>5</sup> Geijer 1995 (ed.) p.6/7

<sup>6</sup> Interdependency meaning here that (groups of) farmers depend on other (groups of) farmers' actions. This may concern canal and drain maintenance and the financing of it, operation, water application to the fields, choice of crops and when to start cultivation.

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The currency of success from the empowerment perspective is whether power relationships changed in favour of disadvantaged groups. This applies to the relationships between the State and the farmers, as well as to the relationships that disadvantaged farmers have with their relatively well-off counterparts. How to check whether this took place in a concrete case like irrigation management?

In a seminal FAO publication on monitoring and evaluation of participation, Peter Oakley lists indicators of participation and discusses their use.<sup>7</sup> He indicates that power is hard to measure, and it cannot simply be taken away from one actor and given to another through a participation policy.<sup>8</sup> Evaluators of participation therefore have the following problem:

Qualitative indicators (for instance attitude indicators like 'farmer group cohesion') involve much interpretation, and much effort and rigorous methods are required to tell to whom of the farmers they apply.

Whereas scores on quantitative indicators like 'frequency of meetings' or 'number of farmers who attend' may actually say little about changed power structures. There are many social mechanisms that may emasculate or circumvent the empowering impact of the events of which the frequencies and numbers are measured.

## **2.2 Instrumental participation**

The instrumental perspective on participation has a problem definition that is different from the empowerment perspective: inefficient and poorly performing irrigation management is the problem, and participation a means to do something about it.

This non-moral performance perspective is especially strong in the irrigation sector. Its background are the concerns about sustainability by international donor agencies. They worry about degrading irrigation infrastructure and about the economic viability of irrigation as an enterprise. Proponents of empowerment sometimes denounce the 'rhetoric' of these donors. As a matter of fact, the World Bank professes empowerment as the main goal of participation, for instance in its 1994 World Bank participation sourcebook. However, in subsequent publications like Meinzen-Dick 1994 and the World Bank technical paper no. 354 (1997), performance and the likely contribution of participation is again at the center of concerns.

Worries about irrigation management performance are legitimate, if only because a minimal performance is a precondition for related aims. But it is unhelpful that the instrumentalist perspective gives way to constant shifting of the meaning of participation. Take for instance the decision about the role of farmers in the organisation of irrigation management. It matters whether a State organisation involved in irrigation management is conceived of as a Development Authority or as an organisation for water service delivery. Johnson, Vermillion and Sagardoy signal a recent diversification of models (they list no fewer than twelve variations), in each of which participation takes on a different meaning.<sup>9</sup>

From the instrumental point of view, participation is a success when it enhances economic viability of the irrigation enterprise. Indicators for the instrumentalist kind of participation are easier to find than for empowering participation. To find out whether recurrent costs are met, or whether operation and management costs for the State go down, poses less difficulties than the question of whether power structures have changed. And although maintenance standards are debatable, once a standard is set, it is relatively easy to observe and quantify whether things are moving in the right direction.

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<sup>7</sup> Oakley 1988 p.18 et seq.

<sup>8</sup> Nelson & Wright 1995 give an in-depth analysis of this.

<sup>9</sup> Johnson, Vermillion and Sagardoy 1995 p.3 et seq.

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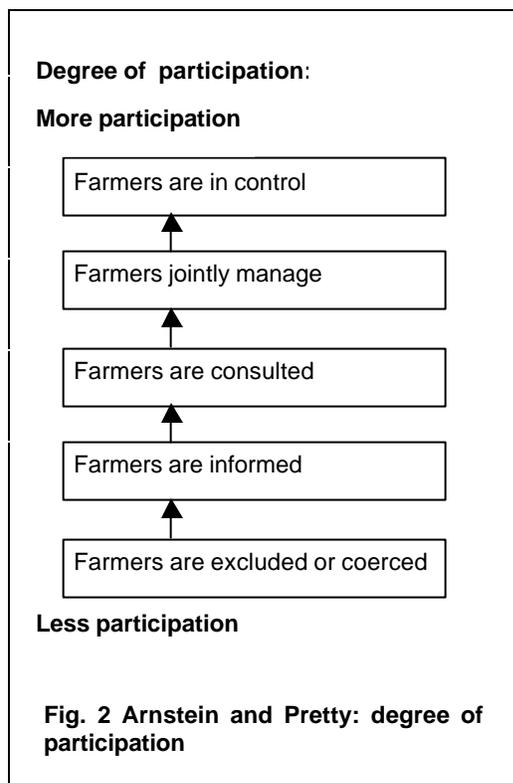
The main problem with instrumentalist indicators is that they are proxy measurements. Almost by definition, they measure something to which participation is supposed to contribute, but which is caused by many things besides participation. For instance, indicators of the type 'how many farmers pay the water fees to the water users' association' are notorious for suffering from complex economic and legal contexts that make them hard to interpret.

## 2.3 How participatory is a management arrangement?

Is there a way to analyse how participatory a management arrangement is? The tool for analysis should be relatively free of instrumentalist-empowerment controversies. In this paper, a framework is proposed which has been developed by Frans Coenen, Peter Hofman and Dave Huitema of the University of Twente. Developed originally for the assessment of participation in environmental decision making, it has been adapted to suit irrigation in this report. The main insights of the conceptual framework are derived from Elinor Ostrom<sup>10</sup> and Norman Uphoff<sup>11</sup>.

### Participation ladders and dimensions

The question of how participatory an activity or decision is, has often been answered by ranking forms of participation into a degree typology: a ladder. Sherry Arnstein (1969) made one of the earliest. Jules Pretty (1995) made one that is often referred to when agricultural development is concerned.



The idea of a participation ladder is simple. It is captured in figure 2. Whether it is useful for analysis of our case depends on how much politics creeps into the definition of its rungs. Arnstein is honest about it: she considers forms of instrumental participation lower than empowering forms. The more normative standpoints feature in degree typologies, the more their analytical value diminishes.

But there are issues with which even well-defined participation ladders cannot cope. For one, Norman Uphoff, in his vast *oeuvre* on local institutional development and participation, repeatedly raises the issue of 'Who participates?'. Ladders are often too simple to handle the question of different farmer groups satisfactorily.

Moreover, Uphoff insists on asking the question: 'Participation in what? In the costs and the execution of activities, in decision making, or also in the profits?' Farmers generally do not like to contribute in costs, especially if there is no participation in decision making to come with it. And when farmers have no say but their 'participation' is solicited when hard work needs doing, it makes sense to give the arrangement a low ranking whatever its theoretical position on a participation ladder.

<sup>10</sup> Ostrom 1990, 1992, and Ostrom & Schroeder & Wynne 1993.

<sup>11</sup> Uphoff 1986, 1993, and Uphoff, Cohen and Goldsmith 1979

### A framework for analysis

A further problem with ladders is raised by Coenen, Hofman and Huitema. Suppose that farmers have the authority to veto a government decision. This would take the arrangement high up a participation ladder. But further suppose that they lack the information about what is going on, that the government decides on the alternatives, and that only a limited number of farmers have access to the process. Surely it would be better to have a consultative process halfway up the ladder, where informed farmers meet government officials willing to be swayed by farmers' arguments. Another example is a situation in which farmers decide on the water fees together with the irrigation service, but that *lower* water fees for next season will never be accepted as an outcome of that process.

Coenen, Hofman and Huitema propose to precisely analyse the rules that govern participatory decision making. They first distinguish four types of rules that govern a participatory process.<sup>12</sup> The rule types are:

- Boundary rules. These define who is in and who is out of the process, and by which conditions;
- Authority rules. These rules prescribe who can take which actions and decisions, how they are ordered, processed, and terminated. This is the participatory process in a narrow sense;
- Information rules. These establish information channels, state when they are open or closed, create an official language, and prescribe how information is to be processed;
- Aggregation rules. These rules prescribe the formulae for weighing and calculating options for the actions of individuals or groups.<sup>13</sup> Aggregation rules determine what the acceptable outcomes of the participatory decision making process are.

Coenen, Hofman and Huitema proceed by combining the idea of a participation ladder with the rule types. It yields the table in figure 3, in which some cells are adapted from their work to suit the irrigation sector.

Rule Type	Less Participation	←————→	More Participation
<b>Boundary</b>	Farmers have no access to the decision making process.	Access to the decision making process is restricted or conditional.	All affected farmers have access to the decision making process.
<b>Authority</b>	Farmers cannot put forward proposals; Farmers cannot decide on policy, neither on concrete details; Centralised decision making.	Farmers and other parties may put forward proposals; Farmers may decide either on details or policy; Local decision making with central interventions.	Only farmers can put forward proposals; Farmers can decide on details and on policy; Local decision making.
<b>Information</b>	Farmers receive no information and no support collecting it; Only professional information is relevant to the decision.	Farmers receive information from others but are not supported in processing it; Professional and local information are relevant.	Farmers receive information and can collect their own information; Only local information is relevant to the decision.
<b>Aggregation</b>	Decisions based on a judgement of the greatest good for the greatest number by expert-consensus.	Decisions based on negotiation between parties, resulting in a trade-off of interests	Decisions are based on consensus resulting from dialogue in the farmer community.

**Fig 3. Coenen, Hofman and Huitema: degree of participation based on rule types**

<sup>12</sup> This is done on the basis of a typology by Ostrom. Ostrom distinguishes more types of rules, but Coenen, Hofman and Huitema argue that some of these show sufficient overlap in order to group them into four types for the purpose of analysing participation.

<sup>13</sup> Coenen, Hofman and Huitema 1998 p.3

The table facilitates a fairly neutral analysis of what is participatory and what is not. In fact, the cells may be seen as descriptive little scenarios. It is with this framework in mind (empowerment-instrumentalism, decisions-financing-execution, and the degree of participation based on rule types) that the case will be presented and analysed in the chapters to come.



### **3 The Betsiboka plains, system, and farmers' organisations**

The irrigation system in the plains of the lower Betsiboka river of Madagascar was built piece by piece in colonial times. Today, it covers about 15 000 hectares, on which mainly rice is cultivated. It is a complex system. There are multiple sources of water, seven small dams and two small diversion weirs, one natural source and nine pump stations. It is estimated that 110 000 people populate the plains, out of which roughly 10 000 are landowners.<sup>14</sup> The principal town is Marovoay but most people live in small interspersed villages or hamlets.

This chapter is chronologically structured. Its aim is to outline the background against which the project had to come up with a participation policy. Central to the reasoning is that the water users' associations in the plains function under adverse circumstances.

#### **3.1 A bit of history on seven-league boots**

Madagascar has been a migrant society for centuries. Most of the migratory waves came from Indonesia, but there have also been inflows of Bantus and of Indians/Arabs through Zanzibar. The last big immigration wave took place during the first half of the nineteenth century, when the Merina came from Java. They are the biggest and dominant ethnic group today. They brought an irrigation tradition and an irrigation-oriented organisation of the State with them.

France got assigned Madagascar at the Berlin Congress, and annexed it 1896, starting 'La Présence Française'. The French presence brings us to irrigation in the lower Betsiboka plains.

##### **Unparticipatory colonial society**

The lower Betsiboka plains are the heartland of the Sakalava – a tribe from Africa, now in decline.<sup>15</sup> The Sakalava were considerate vis-à-vis other groups, more interested in herds and forest products than in farming. In the nineteenth century, other groups were already welcome to farm the land. Some water control measures such as drainage had already been instituted by the Sakalava and their dependent groups, following the example of the Merina. At the beginning of this century, the French took over irrigation development for various reasons:

- The soils were suitable for the perfumed rice for which demand was high in the rest of the empire;
- Labour demands in the plains would complement demographic and economic push factors in the highlands;
- Reinforcing the position of the Sakalava aristocracy would counterbalance Merina power;
- France had dropped mercantilism in favour of a colonial strategy based on settlement.

The system was rehabilitated and extended several times, especially after the second world war. During this period, more and more people migrated to the area, to work as labourers or tenants. This was not permanent settlement. Most workers would not take their families with them, and they would leave the plains when they had amassed enough money or livestock.

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<sup>14</sup> Contin 1997 p.2

<sup>15</sup> Dubourdieu 1986

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How did colonial irrigation society in the plains work? The picture at the time leading up to independence in 1960 was as follows. Power was in the hands of a handful of French colonial companies. French settlers-employees-shareholders of the companies would own one or two thousand hectares of irrigated rice, or operate a rice mill, or be an official in the local administration.

From the point of view of the companies, irrigation activities were to be organised in a messy situation – a complex system, many ethnicities, people migrating in and out, hamlets popping up and growing. They set out to do such in a firmly top-down way. This operation and maintenance ‘en régie directe’ was carried out with military precision, which was reflected in relatively high per hectare yields. Four tons of paddy per hectare was a feasible average. The French appointed ‘corporals’ for each sector. The corporals organised operation, water application to the fields, and maintenance. Their function was also to subdue the many conflicts over water distribution.

The French, through the corporals, would provide seed to the tenants, prepare the plots with machines, and organise the canal maintenance efforts. For this, the tenants were obliged to make available an able-bodied man for three days for each hectare. This was called the ‘participation’ of the farmers. Farmers had to supply this and cultivate, not much else. At the end of the season, they would hand over one third of the paddy to the companies. Of the remaining two thirds, families would stock part and commercialise part to the companies.

### **Post-independence, some more participation**

When independence came – gently – in 1960, the French colonial companies continued their operations for a while. They were merged into a semi-public enterprise called the COMEMA in 1964. COMEMA still arranged the activities upstream and downstream of rice cultivation. Corporals still directed the everyday operations and provided conflict mitigation. But there were three significant changes:

- A quarter of production would go to COMEMA (whereas colonial companies had appropriated a third).
- A promise was made concerning land ownership. A tenant would become owner of a plot *if* he provided labour for system rehabilitation *and if* he then produced good yields for a number of years.<sup>16</sup>
- Village co-operatives were created that became shareholders of COMEMA, with farmer representatives having seats on its council. This gave farmers indirect influence over COMEMA policy.

Because of these deals, maintenance and soil preparation executed by COMEMA in an orderly way, and the still high yields, the early seventies feature in farmers’ memories as the golden years.

The Ratsiraka regime

As it turned out in the seventies, the farmers never became owners of the land, the funds they invested in COMEMA disappeared, the performance of services declined and the coercion and lack of a say intensified.

In 1975, a coup was staged by naval officer Didier Ratsiraka and his Supreme Revolutionary Council. Ratsiraka would rule for nearly two decades. By then, the irrigation service had once again changed its name, to FIFABE this time. After the revolution, FIFABE became an instrument of central economic planning – a development authority rather than an irrigation service. It still had a monopoly on commercialisation, with the corporals and other FIFABE controllers now micromanaging the farmers’ economic lives. The number of personnel grew from a hundred to a thousand. As a farmer recalls it:

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<sup>16</sup> The exact number of years kept changing.

'FIFABE ruled. We were its slaves! More than in the time of the French, because then the system worked and the French, at least, kept to their words.'

A water fee in Malagasy francs was introduced instead of the paddy collection. It was kept low for reasons of political expediency. Over the years, maintenance standards fell. So did reliability of water delivery and drainage. Unsurprisingly, per hectare yields dipped. Farmers increasingly switched to a semi-local rice variety that better fitted the new circumstances.

In 1982, even the semblance of farmers having a say in things disappeared. FIFABE was turned into a socialist state enterprise. By then, the situation had regressed into economic disaster. The indicators of this are:

- The state of the irrigation and drainage system was below all standards. Yields as low as one ton per hectare were becoming frequent.
- FIFABE had to increasingly use the income from rice sales for the maintenance of itself and the system. It was getting unprofitable as an enterprise.
- The rice price was kept low by the central government.<sup>17</sup> For farmers, this meant that in the mid-eighties, an all time low was reached in terms of paddy purchasing power (60% of that of 1971).<sup>18</sup>
- Farmers stopped and left. For the first time this century, out-migration in the plains was bigger than in-migration.

### **The project**

Madagascar had to go to the donors and ask them to invest in its agricultural sector. The German development bank KfW stepped in for the Betsiboka plains. The project started in 1983, executed by AHT International. The project included rehabilitation of the system, a big new rice mill, support for FIFABE, and some extension. There was talk of institutional changes, but neither participation nor water users' associations were discussed in terms that came anywhere near concrete proposals at that time. The farmers and FIFABE remained at odds, and maintenance problems remained huge.

The agricultural markets were gradually liberalised as a result of donor pressure, although FIFABE was able to claim exceptions. In 1986, the changes applied to the plains as well. (Still, FIFABE and local politicians had all roads blocked during the first post-liberalisation harvest.<sup>19</sup>) FIFABE's monopoly on rice processing and sale disappeared, the rice mill was about to become semi-privatised, and it stopped soil preparation activities and maintenance of the distributaries and field channels.

It was clear to consultant AHT International that in a next phase, starting 1989, much more attention to institutional aspects would be necessary, and that farmer participation was to become a centerpiece. The question was how to organise participation, but the social structure (or rather the lack of it) of the plains promised to be a big obstacle. This is the subject of the next section.

## **3.2 A problematic context**

This section on the socio-political context of the Betsiboka Plains case is important for an understanding of the participatory approach. Problems of a socio-political kind partly explain the approach adopted (chapter 4) and were an important reason to introduce legal transfer to farmers' organisations (chapter 5). The issues were:

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<sup>17</sup> Barrett 1994 p.465

<sup>18</sup> BCM / INSTAT 1997 p.53

<sup>19</sup> Barrett 1994 p.453 p.467, Droy in BCM / INSTAT 1997 p.69

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- A social climate generally unfavourable to farmer group action;
- A problem posed by criss-crossing ethnic, hydraulic and residence boundaries;
- Political backlashes during implementation of the policy.

Each of these issues are treated in a subsection here.

### **An unfavourable climate for collective action by farmer groups**

By the time that Mr. Jean-Claude Rocaboy, the project's sociologist, had to design a participation policy, no farmers groups had an institutionalised role in irrigation management. Even a cursory inspection of the socio-political conditions, both with regard to State-farmer relationships and to relationships within the farmer society, points out some formidably adverse circumstances.

A big State bureaucracy dominated the Plains. Farmers had never really owned the land.<sup>20</sup> Farmers had never been held responsible for anything else than cultivation and labour input in maintenance (although their influence in water management exceeded the formal boundaries, these were the rules of the game). Only a minority remembered COMEMA times when their role seemed to expand. FIFABE had a revolutionary mandate to be top-down. If there was two-way communication between officials and farmers, it was not based on participatory arrangements but on personal contacts. Farmers lived in fear of FIFABE, but on the other hand they held it responsible for all problems that arose. They milked FIFABE, and later also the project. This was clearest in activities like credit schemes, that almost always failed because of low repayment rates.

In contrast to the concentration of State power in the hands of the FIFABE directorate, power within the farmer world was rather diffused, as many patrimonial networks existed alongside each other. Moneylenders, politicians, chiefs, FIFABE officials, catholic priests, and traditional religious men were contacted in case of trouble, but the average farmer tried to stay out of their way. This especially concerned 'Marovoay', where feuds between the big men were going on.

The Plains were an area of considerable in- an outmigration, with sometimes chaotic patterns of settlement, and with skewed demographics. Economic strategy consisted mainly of coming to the plains to grab and run, not to invest or co-operate. The symbol of the precariousness of this migration society: the absence of family tombs (because people were still buried back home on ancestral soil). It implies the absence of attachment, of ownership, of responsibility. Perhaps even the absence of a society as such, for what is a society in Madagascar without ancestors to watch over it? Arthur Randraifanomezana, a Malagasy sociologist, summarises the mentality of the plains:

*'It's anything goes. Nobody respects anybody else, and nobody is accepted as a leader by all.'*

Adds the director general of the FIFABE, who has been working in the plains for decades:

*'Yet everyone fears everyone else.'*

In this environment, trust is hard to build and rules are hard to enforce.

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<sup>20</sup> People who call themselves landowners are actually pseudo-owners, because a legal foundation for French company-COMEMA-FIFABE-revolution changes has never been made, and land titling has still not happened.

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**Ethnic, hydraulic and residence boundaries**

If the general picture and mentality was unfavourable, a specific problem was posed by the way in which land ownership pattern, settlement pattern and ethnic divisions seemed to conspire to diminish social cohesion.

There are many ethnic groups in the Plains, such as the Sakalava (an influential minority, traditionally the masters), the Merina (who control most of the State organisations), the Betsileo, The Betsirebaka, and the Indian traders. No ethnic group has obvious and accepted leadership over the others. People in the plains tend to stick to stereotypes of other groups and to their ethnic affiliations. This potentially creates some social cohesion within ethnic groups, but several ethnic groups often live in one village, and village boundaries in turn have little to do with the hydraulic boundaries.

There is another factor: the complex land ownership and tenancy situation. Since the colonial companies left, plots have become small, measured in ares rather than hectares. People often have plots in different sectors with different reliability of water supply and drainage, on different soils. This makes sense in terms of minimising economic risks, but it aggravates the boundary problem.

The project had to find a formula for farmer groups that makes sense hydraulically, while at the same time the groups are cohesive enough. The divisions and boundary problems made it difficult find such a formula.

**Contextual problems during the implementation of the policy**

The implementation of the participation policy was not easy. (The policy itself is analysed in chapters 4 and 5; some problems during implementation are dealt with here because they link with the difficult socio-political circumstances).

State disengagement has been challenged specifically by politicians in the case of Betsiboka at the beginning of the nineties. This took the form of campaign promises that FIFABE would re-engage and pay for all maintenance. An outrageous promise because there was, and still is, no money to carry out such a policy. It created setbacks, as the political will for State disengagement was apparently shallow and only the project dared to contradict the politicians' claims. Farmers became unconvinced that the State would remain disengaged. In the words of a project extension worker: 'A two month electoral campaign cost us two years of institutional development...'

Other political processes also accounted for setbacks. When Madagascar's regime changed twice in the first half of the nineties, several attempts were made to link water users' associations and the participation policy to an old regime in order to discredit people who had supported it. In point of fact, something empowering was made to look like an instrument of old regime repression or chaos. It has been impossible for the project team to deal with this kind of political factor, other than to let the facts speak for themselves, but this took a lot of time.

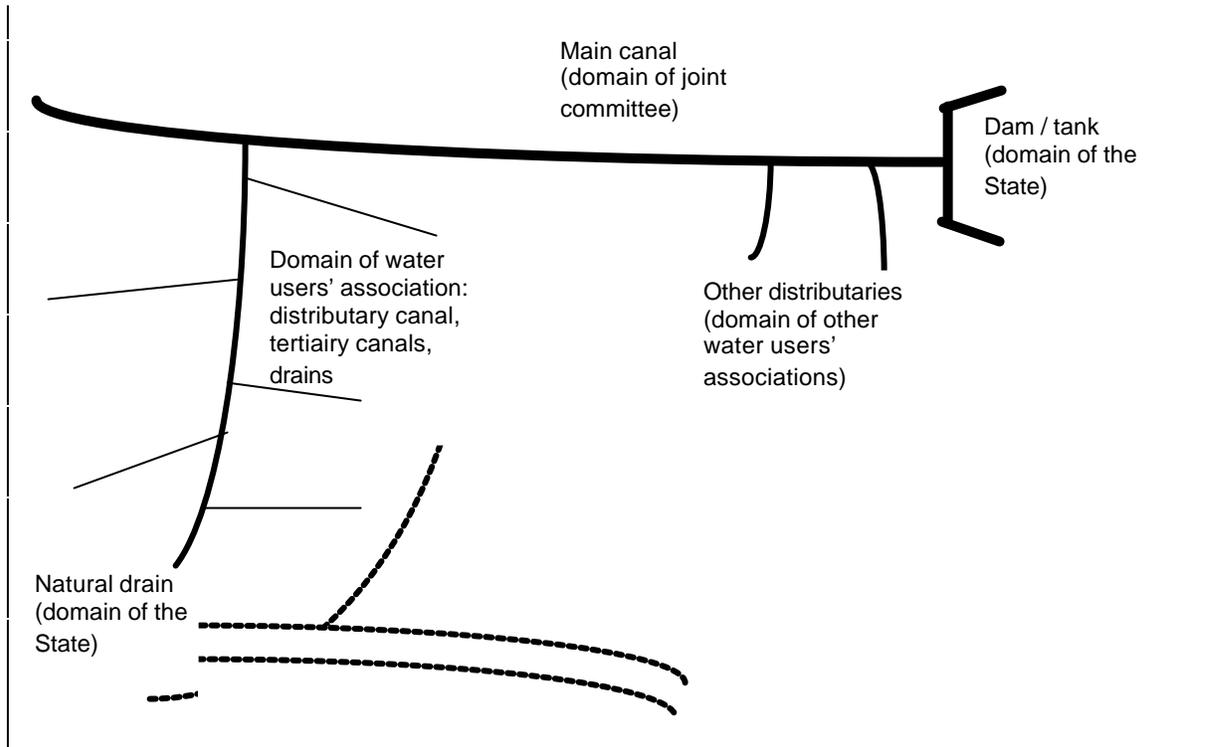
These problems during the implementation of the policy added to the already existing distrust in the plains.

### **3.3 Water management and maintenance in the Betsiboka plains**

The Betsiboka model is based on water users' associations as an organisational vehicle. This section deals with their water management and maintenance activities. Participation in system rehabilitation design is the subject of the next chapter.

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Most of the irrigation infrastructure is nowadays operated by water users' associations or their joint committees, a result of the participation policy. All farmers that own land, and many tenants as well, are represented in those water users' associations. There are more than 50 water users' associations nowadays, and 10 joint committees, and they nearly cover the total number of canals and drains of the Betsiboka system. The boundaries of the water users' associations vary in terms of membership, the number of canals they manage, and the type of canals they manage. A typical situation is drawn in figure 4.



**Fig. 4 Schematic representation of water users' association responsibilities**

#### **Operation and water application to the fields: responsibilities and process**

Water distribution here means the activity of operation of the main system and application of water to the fields through the distributary canals and the farm channels, making the rules for this, and management of the conflicts that may arise. Large changes in responsibilities have been the result of the participation strategy of the project. The responsibilities before and after 1991 are compared in the following table.

**Figure 5 Overview of water distribution responsibilities**

Water distribution responsibilities in the Betsiboka plains system				
	Before 1991		After 1991	
	Operation	Operation rules	Operation	Operation rules
Headworks / main canal intake	State appointed dam manager	State appointed 'councillor'	State appointed dam manager	State and Joint Committee
Distributary canal intakes	State appointed 'councillor' and 'corporals'	State appointed 'councillor' and 'corporals'	Joint Committee appointed water headman	Joint Committee
Tertiary (farm) canal intakes	'Corporal' and village representatives: the 'vafa'	State appointed 'Corporal' and the village's 'vafa'	water users' association appointed water headman	water users' association
Application to fields	'Vafa' and farmers under corporal supervision	State appointed 'Corporal' and the village's 'vafa'	Farmers	water users' association

Before the transfer, a FIFABE engineer and its water management officials would calculate a theoretical water demand for each sector and assess the availability of water in each tank or well. Then a top-down sector schedule would be established, on which the officials and the corporals (the State's field level water managers) would consult village representatives known as 'vafa'. The corporals and these 'vafa' would carry out most of the day-to-day operation, and problems would be discussed every two weeks, possibly resulting in a changed schedule.

Nowadays, for each main canal, a Joint Committee composed of water users' association representatives meets with the FIFABE engineer and negotiates a certain amount of water.<sup>21</sup> From then on farmers arrange the water distribution: the Joint Committee for the main canal and the water users' associations at secondary and tertiary level. The councillors and the corporals are no longer needed.

### Impact of the participation policy on water management

Historically, the farmers are used to top-down water distribution schedules. This dates back to colonial times, when the French companies that owned the system would enforce water distribution with near-military precision. When Malagasy parastatals took over three decades ago, things did not really change.

The availability of water dipped in the eighties because FIFABE would respond to financial difficulties by not implementing the whole of the maintenance programme. The water managers did the best they could, but eventually the problems forced them, during peak periods, into reactive management rather than planning and communicating distribution schedules. So water management was already becoming somewhat chaotic when water users' associations took over in 1991.

<sup>21</sup> This is the same Joint Committee that has a role in maintenance. Almost every sector of the system now has one.

**Figure 6. Example of water distribution rules**

The sector 4 main canal and another main canal take water from the small river Marovoay. In peak periods, the two Joint Committees involved meet every two weeks.

For the last few years, the following arrangement applies automatically when water gets scarce in June, July or August: 15 days for sector 4, 15 for the others, 15 for sector 4, etc. This is a reflection of the areas: both canals serve between 2 000 and 2 400 hectares. The exact area under cultivation at any moment, or the water volumes available, are of no influence on the number of days. The deal is thus clear and prevents conflicts.

Within sector 4, out of the fifteen days, the first five are dedicated to the tailend water users' associations and the second to the upstream water users' associations. The remainder are negotiated: water users' association boards that can convince their colleagues that they really need an extra day will get it.

If the needs of the entire sector 4 are served before their 15 days are completed, the Joint Committee may decide to hand over to the other Joint Committee one or two days early, a gesture that will be greatly appreciated and that may help sector 4 to get an extra day when they need it.

Since then, the water users' associations have turned that situation around. They have done a good job, given the often complex system and the low maintenance standards that some of their members prefer. Joint Committees have been created where canals are shared between water users' associations. The Joint Committees may still have problems in getting unwilling water users' associations to invest resources in maintenance, but in water management they are institutionalising fast. It shows water users' association can get together to tackle a shared water problem.

Before transfer, differences of interest over water distribution were hidden from view. It was not worthwhile for farmers to have conflicts over them, as most of the relevant decisions would be taken by FIFABE anyway. Conflicts would only give them a bad name, not a solution.

Now that the water users' associations have taken over water management, these hidden conflicts have come out into the open. For instance, accusations by ordinary members that water headmen favour the village elite are frequent. Sometimes this has a negative impact on the way water users' associations function. Nevertheless, this study found that all interviewed farmers, both the elite and the ordinary ones, are more satisfied with the present arrangement than with the previous one.

### **Maintenance and water fees: responsibilities and process**

Maintenance is central to economic viability, as tomorrow's revenues depend on today's upkeep of the infrastructure. It is also at the heart of the negotiations, and sometimes the conflicts, between the development authority FIFABE, the water users' associations, and the project team.

A particular feature of the plains should be mentioned when discussing maintenance. Every year, the plains are flooded by the rising Betsiboka river. As the waters recede in March, relatively large amounts of resources are needed to be spent on maintenance, and there is little time to execute this, as transplanting starts in April or in May.

Who is responsible for what? The maintenance arrangements have evolved through various stages, in the direction of more water users' association responsibilities. To illustrate the point, maintenance responsibilities in 1988 and 1998 are compared in the following table.

**Figure 7. Overview of maintenance responsibilities**

Maintenance responsibilities in the Betsiboka plains irrigation system						
	1988			1998		
	Who decides	Who finances	Who executes	Who decides	Who finances	Who executes
Dams, tanks and natural drains	State	State	State	State	State	State
Main canals, works for which machines are needed	State	State	State	State and water users' association reps in a joint commission	State if funds are available, else water users' associations	State
Main canals, manual works	State	Villages	Farmers (state supervision)	water users' associations sharing a canal in a joint committee	water users' associations sharing a canal	Farmers (joint committee supervision)
Distributary canals, drains and field channels	State and Villages	Villages	Farmers (village supervision)	water users' associations	water users' associations	Farmers (water users' association supervision)

The table illustrates that the water users' associations and their federal structures have gained more of a say, but that they are also required to bear more of the costs.

In 1988, corporals would go to the village and try to make the farmers pay 4 500 Malagasy Francs per hectare, plus three days manual labour per landowner for their main canal. (Farmers estimate that the water fee and total labour input per hectare was worth approximately 60 kilos of paddy at that time.) Typically, most of the farmers did the work but less than half paid. FIFABE would fill the financial gap by taking revenues from its rice mill and go on to organise manual maintenance, and maintenance with machines, in a top-down way.

Nowadays, water users' association leaders try to collect between 20 000 and 30 000 Malagasy Francs per hectare and allocate work according to the location of the farmers' plots. (Now, farmers estimate that the resources for maintenance are worth approximately 70 kilos of paddy, if people pay.) Some water users' associations have difficulties making their members pay, while others have a success rate of over 85%.

The maintenance process is as follows. In March, a Joint Commission of FIFABE and water users' association representatives assesses the resources made available by the Ministry of Agriculture, and makes a time schedule for the use of machines. The execution is left under the direction of FIFABE. Manual maintenance of main canals, and maintenance of distributaries and field channels, is organised by the water users' associations. They have Joint Committees for a main canal if several water users' associations take water from it. These make their plans in March as well. What water users' associations do on their own distributaries and field channels is their own business.

#### **Impact of the participation policy on maintenance**

Does this arrangement work? Three issues are especially important in this:

- It is difficult for water users' association boards to force people to pay water fees.
- The inflow of maintenance funds from the Ministry of Agriculture varies through the years.
- Maintenance may take place too late.

The water fees issue is an water users' association issue. It is hard for water users' association boards to make unwilling people pay water fees. And if people had low yields in the previous season, it is accepted as a reason for not paying.<sup>22</sup> If large landowners do not pay, it poses major problems, as the water users' associations will be short of a considerable slice of budget, and large landowners are hard to influence.

The impact of this on the performance of the water users' associations was clear in the 1993 evaluation of the water users' associations, as well as in this study. Implementing a maintenance plan is difficult with uncertainty over the effective availability of funds. water users' associations with low collection rates are confined to reactive maintenance strategies. They only get things done when the situation gets really bad.

Water users' association boards are conscious of the problem, and are developing strategies to make members pay, such as reading the list of debtors at general assemblies, working with the district attorney's office, and threatening to cut plots off from the system. With regard to the last instrument, it should be noted that in the cultural context of the plains it would seem unthinkable to actually carry out this threat.

The project team supports water users' association boards with legal assistance, and when institutional organisers pay attention to internal water users' association dynamics for two or three seasons, the rates of payment tend to go up. Rehabilitation of the system also helps: members who have experienced higher yields are less inclined to accept degradation because of water users' association malfunctioning.

A second issue for economic viability concerns Ministry of Agriculture funds. Before the State's disengagement, the Ministry would automatically cover maintenance costs not covered by the water fees. This is no longer the case, and the amounts water users' associations collect are not sufficient to finance the entire maintenance programme, even if all their members pay. FIFABE estimates that yearly maintenance costs are roughly 150 000 Malagasy Francs a hectare, including the monetary value of manual labour, whereas water users' associations typically collect something like 70 000. The disbursements from the Ministry of Agriculture often come too late and they are too little. The maintenance plan elaborated in March then fails. Water users' associations and FIFABE then have to scramble to get at least the priority maintenance work financed. This causes quite a few farmers and officials to hark back to the good old days, when all maintenance work was financed and done by the state.<sup>23</sup> Essentially, the extent of the financial responsibilities of the water users' associations and their Joint Committees vary each year with the availability of the Ministry of Agriculture funds.

However, more and more water users' associations are flexible enough, and have the authority vis-à-vis their members, to raise more funds when the Ministry of Agriculture fails to pay. It illustrates how they feel responsible for the system. Also, water users' associations now pay for FIFABE machines in a contractual relationship rather than a client-patron relationship, which was the idea of the participation policy from the outset.

The third issue influencing economic viability concerns the timing of maintenance works. Depending on the type of soil, farmers transplant in April or in May. This means that maintenance work has to be

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<sup>22</sup> A situation often cited by the farmers is that, due to insufficient maintenance, the water headman cannot give all plots the irrigation the owners feel they need. Owners then feel they have an excuse for not paying next season.

<sup>23</sup> However, the good old days weren't that financially viable either, as the Development Authority's maintenance activities cost huge amounts of money, which was financed by taking the revenues of the rice mill, where farmers had to commercialise their rice at low prices. So indirectly, the farmers did pay for maintenance.

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done in March and April. If maintenance work is done too late, yields fall and discontent rises, resulting in a lower payment of water fees next time.

The timing of maintenance differs in the various parts of the system. Among other reasons, maintenance works may be executed too late because the water users' associations and FIFABE prefer to wait for the Ministry of Agriculture funds, or because water users' associations refuse to pay or work on a main canal and the Joint Committee does not manage to get their co-operation. The Joint Committees are there because of this interdependency and the conflicts it causes. The first Joint Committee was installed at the request of the project's institutional organisers, but the others were installed by the water users' association themselves, as they saw the need for such an institution.

This study found that farmers of all types are well informed about the state of the system and the progress of maintenance works. They also feel it is quite easy to get a complaint or a maintenance issue on the agenda of the Joint Commission meetings. However, farmer leaders hesitate to bring bad news back to their members (typically about requested machines that will not come because other works have been given priority), as this could indicate a lack of negotiation skills on their side.

The conclusion is that the organisation of and participation in the maintenance process varies each year, but is much more participatory and flexible than before.

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## 4 The 'engineering in its social context' approach

### 4.1 Principles of the approach

Rather discouraging conditions were sketched in section 3.2. AHT sociologist Jean-Claude Rocaboy and his team of extensionists had to come up with an approach that could cope with this kind of situation. They tried to gear it to institution building: an approach to foster trust between farmers, and trust of farmers in institutional organisers.

#### Matching social and technical processes

A key idea in the approach is that responsibilities need to be *voluntarily taken up by farmers'* organisations, *not assigned to* them by somebody else.<sup>24</sup> This is preceded by reflection and negotiation within farmer communities. Reflection can be stimulated by institutional organisers, but the action follows only after these processes have been concluded by farmers themselves.<sup>25</sup>

However, farmers do not reflect and organise just because an extension worker asks them to. They need to know what to organise for. Therefore, another key idea is that the process of social organising runs parallel to, and interacts with, processes of technical design and legal transfer. In practice, it means that steps or milestones of the social organising process (such as the registration of a group) are linked to steps or milestones in the design process (such as the presentation of a proposal) and the legal transfer process (such as registering claims on land).

The milestones are negotiated with the farmers beforehand. This way of working means that one of the processes may slow down until another attains its milestone. This is cumbersome, especially for the design and construction office of FIFABE that needs to plan the deployment of machines and squads, but there is a payoff in terms of farmer trust and institutional development later.

#### Details of the social organisation process

The starting point of the approach are informal groups of landowners that can be defined on any basis, such as neighbourhood groups, gender, ethnicity or family based groups. The essence of the group composition is that people analyse future activities together without getting into conflicts. The informal groups talk, choose their leaders, and are summarily registered. They may vary a lot in size. This stage deals with the fact that farmer communities are not homogenous.

When the reflection and negotiation has simmered for some time, a dialogue group is composed on the basis of the informal groups. It consists of all farmers of a future water users' association. When the dialogue group has talked with the project and with FIFABE, and looks promising, a water users' association is established that, in principle, participates in rehabilitation design and will go on to manage one or more distributaries later.

The way a water users' association is organised (who are in it, what it does, how decisions are taken) needs to fit both the hydraulic situation and the social preferences of the farmers. The organisations are defined on the basis of hydraulics, but the principle is not strictly upheld in order to prevent

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<sup>24</sup> J.C. Rocaboy pers. comm.

<sup>25</sup> Cf. Geijer (ed.) 1995 p.8 in a FAO publication on irrigation management transfer in Asia: farmer organizations should be developed before turnover.

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conflicts. Where groups do not want to be in one water users' association, or when the groups decide to have a big water users' association that manages many canals, a practical adaptation is found after some negotiation.<sup>26</sup> A typical adaptation in the case of distrust is to have two water users' associations for one canal: one upstream and one downstream, with a negotiated deal on water distribution between the two.

### **How to judge the social organisation process?**

Farmers' reactions to the process of establishing water users' associations were understandably cautious, but very enthusiastic at the same time. In fact, it was the first time that they were really listened to, and that their conditions and time frames were accepted by outsiders.

In terms of indicators – for the sake of rigour, we will focus on disadvantaged groups like women landowners, the young, and farmers with little land here – some very encouraging signs were picked up in this study:

- The frequencies and attendance rates of formal events like general assemblies are high;
- Information levels are high: nearly everyone remembers the rules for water users' association establishment and how the particular water users' association(s) they are a member of came into being;
- Despite the general context of distrust and lots of specific complaints, water users' associations are seen as the exclusive organisation to deal with irrigation and drainage problems, and represent the farmers when outsiders are needed for this;
- Most of the social organisers are trusted parties during the process and afterwards – a major feat in a society marred by distrust.

## **4.2 A closer look at the design process**

### **The steps of the design process**

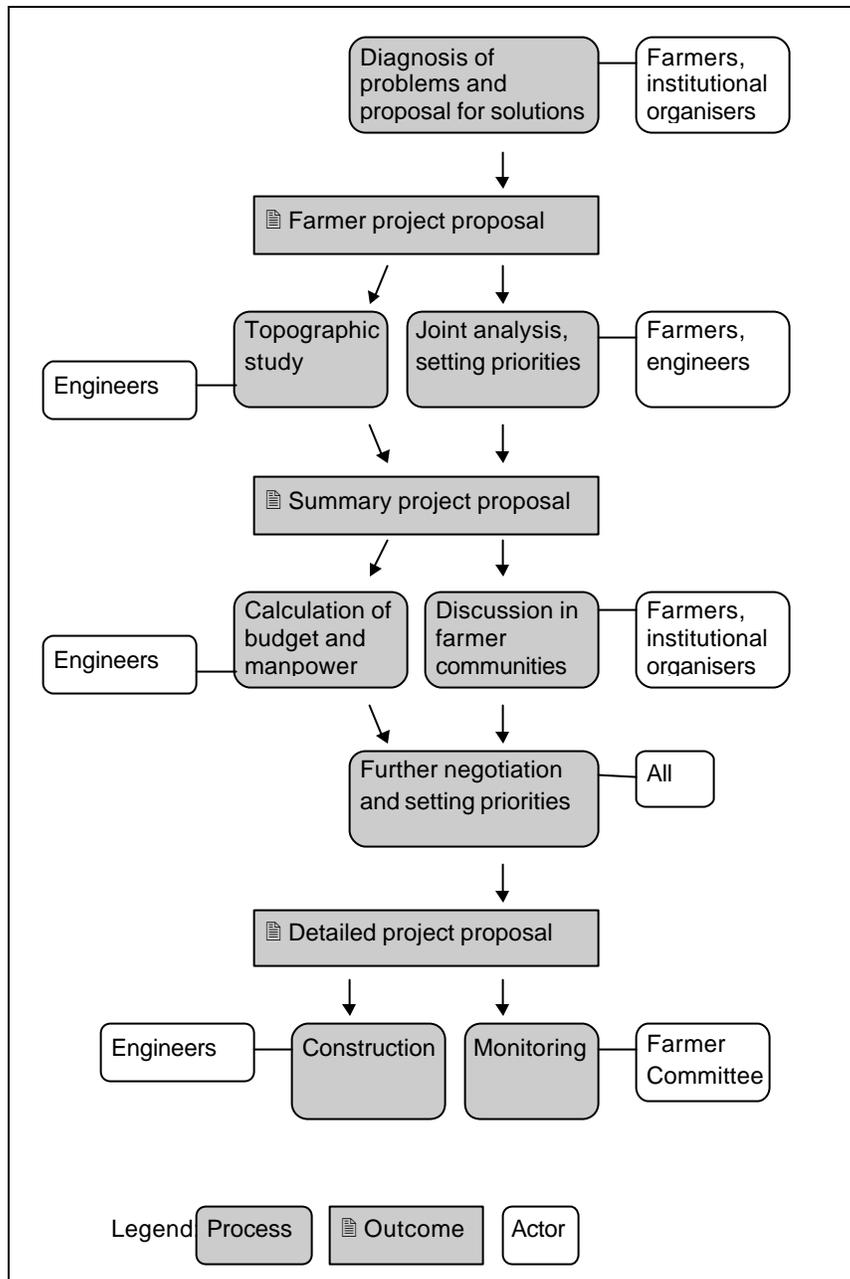
Before the approach started in 1989, the Betsiboka project was a classical rehabilitation project, where farmers were at best consulted. No care was taken to ensure that the right kind of farmers had a say in the design process, and that the needs of the non-participating farmers were taken into consideration.

This changed radically. A step-by-step design process, starting with the farmers' analysis of the system, was put in place (see figure 8). The centrepiece of this participatory design is a farmer project proposal: the solutions proposed by the farmers on the basis of their analysis of what the problems are. Every water users' association in a sector that needs rehabilitating has these discussions. An important objective of the elaborate analysis by the farmers is to get solutions that reduce conflict.

This analysis is facilitated by two institutional organisers: one for the normal facilitation process during the discussions and another to observe the discussion process and apply his or her knowledge of the farmer groups in order to understand the social problems behind the technical discussions. The facilitators try to make sure all landowners, including the young and women landowners, have an opportunity to have a say in decision making.<sup>27</sup>

<sup>26</sup> Cf Tang 1992 p.134: in Sri Lanka there was no organisational format. Here in the Betsiboka plains, there is a format (partly because of legal considerations), but it can be adapted.

<sup>27</sup> The difficulty of this task was an important reason to employ university educated Institutional Organisers with lots of experience.



**Figure 8. Steps in the design process of the Betsiboka project**

After the discussions, a farmer proposal for a sector is presented and discussed with the design engineers of FIFABE. This takes place in the field.

The engineers make suggestions and point out where they expect problems. Since not all proposed works can be executed, a priority list of works is negotiated with farmer representatives. This involves

some hard bargaining. The farmer representatives discuss the priority list with their members, back in the villages, and then a final priority list is agreed upon in a second round of negotiations.

### **The impact of the participatory design process**

When correctly applied, the design approach works, in the sense that it is a low-cost process that gives solutions that are satisfactory to all the actors involved. It is however slow because of the interaction with the social organisation process. Farmers and FIFABE engineers develop a healthy respect for each other's capacities. There is virtually no tampering with structures in the Betsiboka plains where this design approach has been applied. Of course, farmers are disappointed when proposed solutions do not get past the prioritisation stages, but this is the result of budgetary constraints, not of external actors taking decisions for them.

In terms of technical outcomes, linking with the social organisation process resulted often in design solutions that reduce interdependencies between farmer groups. Farmers actively seek this type of design solution. Furthermore, farmers tend to make proposals that include improvements of non-hydraulic infrastructure such as bridges over canals. This was initially met by resistance from FIFABE's design and construction office. But persuasive arguments of a social nature, i.e. that such interventions would reduce conflict and maintenance problems in the future, are now acknowledged (in the case of bridges, the argument is that it reduces traffic of carts and herds over dikes).

Why does this approach work? The following three things are important. The first ingredient in the success of the design approach is that it starts off with a farmer proposal, not with an official proposal, and that the water users' associations get plenty of time to prepare it. It gives them the initiative. A positive spin-off is that the water users' associations have time to resolve some internal conflicts. The second ingredient is the joint analysis in the field. This kind of approach had proven to work earlier in Madagascar.

The third ingredient for success is that the topographic survey does not take place until the first joint analysis and negotiations have been concluded. In this first joint meeting, it is anyone's guess how things will work after rehabilitation, since calculations have not yet been made. This levels the information playing field between farmers and engineers. The farmers have an intimate practical knowledge of the system, and the engineers have their professional knowledge.<sup>28</sup>

If there is any weakness in the design approach, it is that it may be empowering for only part of the farmer community, despite the efforts of the Institutional Organisers to ensure that all landowners participate. In this study, ordinary members were found that had less information than the board members about the design process and its outcomes and who were dissatisfied with this. FIFABE's design engineers confirm that during the series of meetings, people can show up and say that they did not know about solutions proposed and adopted earlier.

Furthermore, it is important that the steps of the approach are well respected, and that the results of each step are put on paper and widely distributed. Otherwise, it may become unclear what exactly will be implemented, and this may lead to conflicts.

### **After the design: the construction and the supervision of works**

For the implementation of the proposals, labour is needed. The works are divided into parts that the water users' associations can execute by themselves, and parts that need the machines or the

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<sup>28</sup> As far as the Institutional Organisers are concerned, they are not hydraulic or even rural engineers but sociologists, economists and such. They are even less likely to dominate the farmers' discussions on hydraulic problems and proposed solutions.

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masons of FIFABE. For the latter, FIFABE hires the manpower needed, which prevents conflicts over responsibilities.

Construction is supervised by a farmer supervision committee, in which all involved water users' associations have representatives. The representatives are quite knowledgeable: they are often water headmen, and invariably they have participated in the design negotiations. They tend to rapidly find FIFABE's construction office when they think mistakes are being made or works are not being executed fast enough.

After implementation, it is the water users' association boards that accept the work done in a formal reception programme. Water users' associations often object to the quality of work, sometimes justifiably and sometimes as a strategy to get structures upgraded (see interaction with legal process in 5).



## 5 Legal transfer of irrigation infrastructure

### 5.1 Mature water users' associations, legal foundation

Section 3.3 outlines the responsibilities and activities of water users' associations, and chapter 4 details the way they were created within the framework of the participatory design process. This approach has been executed in the entire system since the early nineties. Later, water users' associations got together in federative structures called joint committees to take participation in these activities to main system level. The result is that the water users' associations and their joint committees are responsible everything except tanks, headworks, and natural drains.

In the late nineties, this state of affairs has been given legal underpinnings. Out of the thirteen sectors of the Betsiboka system, five have now been legally transferred to the water users' associations. The others are scheduled for the years to come.

The legal transfer was conceptualised and initiated by AHT International, the project consultant. A lawyer was hired to analyse the details and write manuals for the staff. The many government officials and institutions involved were helped and encouraged to speed up decision making. In the process, the project found an early supporter in the Ministry of Agriculture. For the Ministry, a legal transfer to water users' associations would complement their privatisation programme. Considerable mileage was gained through the Ministry putting its weight behind the legal transfer, contributing immediately to one of the desired effects: to take away doubts that the water users' associations and their participation in irrigation management would last.

The first local transfer ceremony, in 1997, was attended to by the Minister of Agriculture. The documents were signed by the Minister and the presidents of the concerned water users' associations; a powerful expression of political backing and of the intent to take farmer management seriously.

This chapter explains the reasons and the workings of the legal transfer, and provides some *ex ante* educated guesses about its effects.

### 5.2 Why legal transfer?

There is an appealing logic to the responsibilities of the water users' associations nowadays. There is participatory design of rehabilitation. They have full responsibility for water management and maintenance of the distributaries and the field channels, they are jointly managing the main canals with their neighbours in Joint Committees, and the Joint Committees are consulted by the Irrigation Service about the management of the tanks and the headworks.

However, this sensibly-looking package of activities is the result of a decade-long process that has sometimes been erratic. Political setbacks were discussed in 3.2. These add to the difficulties that boards of water users' associations have to enforce rules with their members.<sup>29</sup>

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<sup>29</sup> An example is the impossibility for water users' association boards to fine or otherwise punish people that damage canal bunds when herding cows over them.

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The legal transfer was devised mainly as an aid to deal with this. It should provide more standing to water users' association boards, vis-à-vis the State as well as their members. Moreover, it should make clear, to everyone, that participation is there to stay. These were the practical, immediate reasons to introduce the legal transfer of irrigation infrastructure to water users' associations.

### **5.3 The form and workings of legal transfer**

The legal status of water users' associations is arranged by the 1960 Ordonnance 60-133 and its subsequent texts. This is a broad-spectrum law that governs all co-operative/membership organisations of this kind. Although it is helpful for the definition of some boundary rules and decision making processes, it does not provide any guidance for irrigation management. For irrigation management, there is the 1990 Law 90-016 and its subsequent regulations such as its 'Décret d'Application' and the mandate, the so-called 'Cahier des Charges', which is the assignment of duties and obligations that each managing organisation gets.

The first step in the legal process was to redefine the decree in such a way that water users' associations could get a mandate and stewardship over the canals they manage. This elevates their status up to the point that legally, they resemble irrigation service FIFABE and talk to them at a formally equal footing. Stewardship (in French 'gérance', which is quite distinct from 'gestion' which means management) is long term and renews automatically. It gives the water users' associations the right to improve, redraw or otherwise change the canals and drains they manage, and to be the exclusive representative of the farmers in that area regarding these matters.

The second step is to insure the water users' associations against legal ghost entities, remnants of companies from different periods or regimes that may stake claims on the land that the canals and drains are on. This is done by a Transfer Committee, composed of representatives from the Ministry of Agriculture, the local Administration, the Tribunal, the Land Office, the Development Authority and the water users' associations. The Transfer Committee investigates what (ghost-) entities could have a claim to the infrastructure, voids the claims, and assigns it to the water users' associations and their Joint Committees.

The third step of the legal transfer process is the elevation to bye-law status of the water users' associations regulations and rules (mostly part of the aggregation rules). These are called the 'Dina'. The Tribunal arranges this with the water users' associations. Several models are available for this, which the water users' associations can adapt as they see fit. The bye-laws are registered with the Tribunal.

In addition to these steps, FIFABE's mandate had to be changed. Their main job is now to provide water to water users' associations. Secondly, FIFABE can give advise/extension to the water users' associations, but they do not have a monopoly on the latter activities. Furthermore, a new structure to financing FIFABE means that water users' associations get to decide themselves what to do with the water fees they collect for maintenance of the canals and drains.<sup>30</sup> Relations with FIFABE are engaged on a contract basis.

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<sup>30</sup> The maintenance part of section 3.3 makes clear that if the Central State's funds are too little or too late, they often decide to pay FIFABE nowadays.

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## **5.4 Results and known problems during the legal transfer process**

The immediate goals of the legal transfer were to avoid political backlashes of the kind encountered in the early nineties, and to make the water users' associations (their boards especially) more legitimate and effective. In terms of our framework, the issues were to better define boundary rules, and codify recent practice of water users' associations having authority over their distributaries and farm channels, and joint authority over main canals. These issues, and some encountered problems, will be explored here.

### **Politics and legitimacy**

The political scene in the Betsiboka Plains has calmed down a bit, and several elections (notably for parliament and for regional assembly) passed by without any controversy about the water users' associations. There are still water users' association leaders push-polling for one political party or the other, but the water users' associations themselves are no political issue anymore. The legal transfer cements this by raising the level at which politicians would have to operate to change the participatory arrangement.

In Marovoay and in the villages around the system, this study found that water users' associations in transferred sectors were indeed more respected than others, by farmers and officials alike. These water users' associations also scored good on indicators like balance sheet and water fees collected. This may be a selection issue, as these three sectors were offered transfer first exactly because of their good performance. Nevertheless, the many interviewed farmers in these sectors who proved informed about the transfer regarded it as a good thing. Uninformed farmers were encountered as well. Several water users' association boards have indicated that they would like to have transfer ceremonies at village level in order to make all people aware of the new situation.

A massive impact was surely achieved through the Minister of Agriculture who signed the transfers in a ceremony. Strong indications of the legitimacy conferred by the legal transfer were identified. Farmers feel responsible even for infrastructure which, according to them, should not have been transferred to them (because of defects).

In general, the study found that the legal transfer makes good water users' associations even better, whereas little augmented legitimacy can be observed with badly performing water users' associations. Further interpretation yields that the legitimacy of water users' associations vis-à-vis external actors increases more than the legitimacy of boards vis-à-vis their members.

### **Problems during the legal transfer process**

Legal transfer depends on the rehabilitation of the infrastructure and on the social organisation process, since one should only transfer something that works adequately, to organisations that have proven capable of managing it. However, the timing of the three processes has not always been congruent.

First, following rehabilitation, water users' associations often make objections to the quality of the executed works – they refuse to accept the infrastructure. This results in delays that may hamper the transfer process, or force the water users' associations into accepting flawed infrastructure. It is important in itself that the steps of the design process are well observed, but the legal transfer lends additional importance to it. Of course, water users' associations often object in a bid to squeeze FIFABE's design and construction office. In terms of efficiency, this is a pity. In terms of empowerment, however, the equal footing on which water users' associations deal with FIFABE here is of immense importance.

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Secondly, entire sectors are transferred, but it is impossible to get all water users' associations in a sector to function equally well. Nevertheless, well-functioning water users' associations may need the legal transfer to establish their authority and to function even better. So a trade-off has to be made between the desire to enhance the legal environment on the one hand and the lack of confidence in the weakest water users' associations on the other. The project typically goes ahead with facilitating legal transfer when two thirds of the water users' associations in a sector are ready for it.

Thirdly, existing social conflicts could intensify as easily as diminish with the legal changes, as farmer groups may seize the opportunity for pressing claims, now that water users' associations become more detached from FIFABE. Whether the result is empowering or disempowering is impossible to say beforehand.

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## 6 Conclusions

How participatory is a management arrangement? This was the question with which this paper started. This concluding chapter revisits that question, with help of the concepts presented in chapter 2: participation ladders, instrumentalism (participation as a means) and empowerment (participation as an end), and the framework based on four types of rules.

The case of irrigation management in the Lower Betsiboka Plains in Madagascar was investigated. Its farmer participation policy borrows from well-known cases in Asia. Water users' associations engage in water management at low levels; later, maintenance becomes part of their activities and they federate to take participation in management and maintenance to higher levels. An overview of the details can be found in the diagrams of 3.3. The Betsiboka model adds some worthwhile aspects to it:

- Much attention and a clear structure to the stages leading up to the creation of water users' associations, dealing with farmer communities that are not homogenous (details in focus chapter 4);
- Participatory design procedures that give water users' associations the initiative and levels the playing field for farmers and engineers (details in focus chapter 4);
- Legal transfer of irrigation infrastructure to water users' associations which enhances their authority and makes clear that the participatory arrangement is there to stay (details in focus chapter 5).

When judged against a participation ladder, a good deal of upward progress has been made in the lower Betsiboka plains. Water users' associations can now decide what to do with the water fees themselves, and manage all the infrastructure except tanks, headworks, and natural drains. For high-level management and maintenance issues, they engage in joint management with the irrigation/extension service FIFABE. There is also a better balance between farmer involvement in execution, cost sharing, and participation in decision making. The first conclusion is therefore:

*The participatory arrangement in the lower Betsiboka plains system is a great step forward in terms of conventional frameworks.*

Betsiboka's adverse socio-political context offers ample opportunity for a participatory arrangement that looks good on paper, but that is emasculated in practice. In dealing with adverse circumstances, it appeared that participation policy making means responding to political processes. The experiments and the characteristics of the participatory arrangement served to achieve political credibility and legitimacy. If the Betsiboka system is any guide (and in 1.2 we argued it is), a second conclusion can be drawn:

*The issue in participatory irrigation management is not to have the most participatory arrangement, but to have a participatory arrangement that is robust in its political context.*

The project has been quite aware of and open about the political dimension of participation. This helped its practitioners to deal with the many faces of participation. They are nowadays supported by the trends in the international debate (good governance, decentralisation, and democratisation), but there was no such favourable environment in the pioneering years.

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Was participation a means or an end in Madagascar, or both? From an instrumentalist perspective, participation in the lower Betsiboka plains has been a success. Many indicators<sup>31</sup> point at progress in terms of management efficiency and viability of the irrigation enterprise, although low rice prices make any definite statement on this last point impossible. But there have been empowerment goals as well, and it was clear that farmers would not be interested in a participatory deal without empowerment.

Was the arrangement in Madagascar empowering in its political context? The indicators mark a shift in the right direction.<sup>32</sup> The participatory arrangement in Madagascar is cleverly structured, giving water users' associations a real influence on FIFABE, especially after the legal transfers. But things look different when we look within the farmer world. In that case, a mixed record arises, seen from the point of view of disadvantaged farmers like women landowners, the young, or tenants.

To assess the empowerment issue, the four types of rules of the conceptual framework are used:

- The boundary rules which define who is in the participatory process and who is not;
- The authority rules which prescribe who can take which actions and decisions;
- The information rules which establish the kind of information used in decisions;
- The aggregation rules which determine what the acceptable outcomes of the participatory process are.

The boundary rules and the authority rules are clear nowadays, especially after legal transfer. The responsibilities of FIFABE and the water users' associations, and the jointly taken decisions, are defined in a precise way in mandates and bye-laws. The participatory arrangement is about practical decisions, such as the amount of money to spend on levelling a canal, or whether unofficial tertiary inlets are dealt with in the same way as officially designed intakes. Farmers see this as a strong point: they rather have influence on these practical details than on the high-level policy.

The clear boundary rules and authority rules reduce conflict between FIFABE and the water users' associations. Both parties are satisfied about this, and favourably compare the five transferred sectors to the other sectors in this respect. The result is that water users' associations negotiate confidently with FIFABE. For instance, contracting FIFABE machines for maintenance is a common thing among the water users' associations that went through the legal transfer.

Within farmer communities, conflicts still occur because of unclear boundary rules. Farmers are not formally owners of their plots, and it is not clear whether tenants and widows are entitled to membership of water users' associations.

The participatory design procedures insert farmer knowledge into the design process. This change in the information rules has worked out well; a healthy respect for different kinds of knowledge has developed, and farmers' control over the design and construction phases has improved considerably. The principles are that the knowledge of each farmer counts, that consensus needs to be built, and that contractual relationships are forged on the basis of publicly discussed proposals. Disadvantaged groups give high marks to the participatory design of irrigation system rehabilitation. Many indicate that they have not actually joined it, but they are better informed than before and claim to be content with the representation by elite farmers.

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<sup>31</sup> Indicators in the realm of maintenance practices, design outcomes, lack of tampering with structures and water stealing, cost reduction, frequencies and attendance of social events like meetings.

<sup>32</sup> The indicators used were attitude indicators, information levels of respondents, presence at participatory decision making moments, and having real input and influence.

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All farmers know about the decisions in the maintenance cycle and consider themselves competent to participate in making them. The principles of the design phase should also apply to maintenance, but conflicts of interest make it hard to have the same consensual process there. No systematic empowerment gains for disadvantaged groups have been observed in water management.

Aggregation rules (what are acceptable decisions) are hard to observe, but the water fees issue is a good pointer. FIFABE used to control the water fees, but nowadays it is entirely up to the water users' associations to decide how to collect and spend them. FIFABE has to make concrete maintenance proposals in order to get (part of) the water fees. That makes the arrangement quite empowering. However, internal problems can be observed when water users' associations take decisions about money and manpower. Some decisions are heavily criticised, and members may accuse boards of holding back information. Payment rates of water fees then suffer. It is difficult to say to what degree these are conflicts of interest being played out, or genuine protests that indicate that members are not consulted. But the phenomenon is so widespread that there must be many decisions which are not legitimate, to sizeable groups. That in turn implies that water users' associations have a problem serving all of their constituent members.

The third conclusion is:

*The participation policy in the Betsiboka plains resulted in management performance gains and in empowerment of farmers vis-à-vis the State. It has a mixed record on empowerment of disadvantaged farmer groups vis-à-vis elite farmers.*

Empowerment and instrumentalism are uneasy bedfellows in theory and also in practice. In Madagascar, a mix of participation as a means and participation as an end has been necessary in order to keep everyone on board. Some actors are in it for the increased management performance, some for empowerment. Therefore no perspective prevails, not in policy documents and neither in extension practice. An example of management performance at the expense of empowerment is the maintenance process. Elite farmers and State officials work together in it to 'advance the file', i.e. to make sure water fees are paid and maintenance is done on time. The disempowering mechanism is that farmers may be bullied into paying the water fees, but that they remain uninformed about what happens with the money. An example of performance and empowerment reinforcing each other is the design process, where farmer knowledge enhances the quality of design according to all actors involved. Disadvantaged farmers appreciate the design process and the stage of dialogue groups most. It gives them maximum opportunity to speak out; they may even successfully negotiate to create their own water users' association.

The fourth and last conclusion therefore is:

*Instrumentalist participation and empowering participation may reinforce each other in theory, but in practice they are hard to reconcile. A balance then emerges that keeps the main players (including farmers) on board.*

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