

Final Report 'In the shadows of a conflict' programme, Mozambique, 2007-2010

Dr. Alex Bolding, principal researcher, October 2010

TABLE OF CONTENTS

PREAMBLE	2
1 RESEARCH OBJECTIVES, SITES, STAFF AND EXECUTED ACTIVITIES	2
1.1 <i>Research objectives and scope</i>	2
1.2 <i>Research sites and activities</i>	3
1.3 <i>Research staff</i>	5
2 RESEARCH OUTPUT	6
2.1 <i>Thesis work by students</i>	6
2.2 <i>Conference and seminar papers</i>	6
2.3 <i>Presentation of study results to policy makers, local communities and international research networks</i>	7
2.4 <i>Book chapters</i>	7
ANNEX 1: ABSTRACTS OF SELECTED RESEARCH OUTPUTS	9



(Rock art close to Vila de Manica, picture taken by the author in 2007)

PREAMBLE

This report provides an overview of the activities undertaken by the Norwegian funded research programme, called: 'In the shadow of a conflict: Impacts of Zimbabwe's Land Reform on rural poverty and development in Mozambique, South Africa and Zambia'. In this final report, which covers the period June 2007-October 2010, only the research effort hosted by the Universidade Católica de Moçambique in Beira, will be treated. The report consists of two main sections. In the first section the research scope, research activities and involved staff are presented. In the second section the different types of outputs produced by the research programme are highlighted. In annex 1 the abstracts of some of the published outputs are listed.

1 RESEARCH OBJECTIVES, SITES, STAFF AND EXECUTED ACTIVITIES

1.1 Research objectives and scope

The research objectives for the UCM tied Mozambican part of the overall research programme were limited spatially, temporally and in terms of kind of migrants from Zimbabwe. At the Lusaka planning workshop (7-8 June 2007) it was agreed in principle to limit the spatial focus in Mozambique on Manica Province, particularly the border zone. In terms of time horizon, it was agreed to study effects precipitated by changes in Zimbabwe since the year 2000. This did not preclude data collection on events that have taken place before 2000, but it did define the frame and historical context. As result the research focused on what is specific about migration since the year 2000 in comparison with previous patterns/practices. Lastly, my part of the research focused mainly on smallholders, former farm and estate labourers that were based in Zimbabwe but of different nationalities (predominantly Mozambican, but also Zimbabwean and Malawian), and other types of recent migrants seeking a livelihood in Mozambique (e.g. gold panners, seasonal labourers, hawkers, traders, money changers). Within the Mozambique country team of researchers Amanda Hammar focused on the large scale commercial farmers, their work force and other white Zimbabweans that have ended up in the agro-industry and mining sector in Manica Province, as well as new inhabitants of Chimoio city. Randi Kaarhus originally had a specific focus on agrarian and land debates and policies, both in Maputo and Manica Province, but later switched to the study of new urban residents in Chimoio city that hail from Zimbabwe.

My research objectives tie in with the following overall objectives:

1. To record and analyse the narratives of migrant farmers and farm workers in order to understand how they view the events that led them to leave Zimbabwe and why they chose their particular destinations. This objective includes new considerations of how they view themselves in terms of citizenship and levels of identity.
2. To assess how they entered their new communities, how they established themselves, and how they have been treated and regarded by their new hosts at various levels including national, regional and local ones.
3. To assess changes in patterns of use and ownership from a gender perspective.
4. To determine and analyse impacts of the migration on recipient communities with respect to agricultural production, labour markets, access to land, and community conflicts.

The final two objectives (5 & 6) of the overall programme did not pertain to my research effort, but to that of Amanda and Randi.

1.2 Research sites and activities

Basically, four field research sites were selected, two rural sites directly located on the Mozambican end of the mountainous border zone with Zimbabwe, one rural site on the Mozambique-Malawi border which supposedly is not affected by the Zimbabwe crisis, and one urban setting:

- Pandagoma in Phanze, Messambize river valley, Bárúè district
- Penhalonga & Msambuži in Machipanda, upper Revue river, Manica district
- Tsangano, Ngombi river, Tsangano District
- Chimoio city.

The two key rural research sites contrast in terms of population density, proximity to urban markets, history of settlement and intensity of conflicts on leadership, access to land and access to forest resources. Yet both sites have witnessed a steady influx of people from Zimbabwe, mostly returning Mozambican labour migrants with previous experiences in irrigated agriculture and the production of commercial crops (tea, coffee, tobacco) at invaded white commercial farms and tea plantations in Zimbabwe. Amongst these former farm labourers are people of other nationalities as well (Malawian, Zimbabwean). In addition to these new settlers who open up new irrigation furrows and dry land (often on steep mountain sides, investing in bench terraces), there was an increasing flood of destitute Zimbabweans arriving illegally on a daily basis, as Zimbabwe's economic and politically crisis deepened. The majority of these daily immigrants were hawkers, selling anything they could carry (from food to complete bed sets) in exchange for meticals. They also offered their labour for agricultural activities or gold digging, often in exchange for a meal or some mealies and sugarcane. In Vila de Manica, there was a veritable flood of hawkers selling their commodities on overcrowded roadside markets, young girls engaging in sex work, and young men plying the main road to Zimbabwe as money changers. This pattern changed after the abolishment of the Zimbabwe dollar and introduction of the US dollar in Zimbabwe itself (2009). Since then the number of daily border jumpers has gradually but steadily decreased to virtually zero (apart from the normal stream of border crossers who visit family).

Whereas the Penhalonga area is characterised by a long history of settlement and exchange with Zimbabwe, Pandagoma shares all the characteristics of a frontier area, with pioneer settlement starting only in 1969. In Pandagoma, returning Mozambican labour migrants have been at the forefront of opening up new (irrigated) land, in three subsequent waves of settlement of increasing magnitude: (a) around Independence (1969-1978); (b) after the 1992 Peace deal between Frelimo and Renamo (1994-1998); and (c) since the outbreak of the Zimbabwe crisis (2001-now). Some of the new settlers took up commercial production of crops like tea, coffee, tobacco and paprika. Whilst there is still plenty of unexplored forest land and a great potential for taking out more irrigation furrows, agricultural production in the area was initially negatively affected by the Zimbabwe crisis. The collapse of the Zimbabwe dollar and agro-industry across the border robbed the Pandagoma community of easy input supply and product markets. Yet, the community of Pandagoma is far removed from the weakly developed agro-industry in Chimoio, with bad access roads, no access to credit and high transport costs. As a result a process of increasing socio-economic differentiation took off, whereby a group of entrepreneurial

smallholders has taken the lead in mobilising organisational and political networks to acquire access to investment funds and other forms of marketing support.

In contrast, the Penhalonga and Msambuzi area in Manica district is characterised by a high population density, heavy pressure on natural resources, proximity to urban markets, and an age-old exchange of people between Mozambique and Zimbabwe. The latter sea-saw dynamic of population movement has been instigated by various drivers such as restrictive conservationist land use policies in Zimbabwe (1940s & 1950s), forced labour policies in Mozambique (1950s & 1960s), droughts, and wars. Many families who reside in Penhalonga or Msambuzi have relatives who stay in Zimbabwe and vice versa. Chief Nhacuanicua, traditional ruler of the Penhalonga area, resorts under the paramount Chief Mutasa, who resides in Zimbabwe. During the Frelimo-Renamo civil war many internally displaced people and refugees flocked to the relatively safe Beira corridor, which included the Msambuzi and Penhalonga valleys.

A study that was undertaken in 1991 by GTZ, towards the end of the war, found that population pressures were extremely high in the upper Revue and Msambuzi valleys. Both valleys harboured some 169 irrigation furrows commanding some 410 hectares of irrigated land, used by 806 farming households. Since then population densities have further increased, despite serious limitations in available land, due to the prevalence of the IFLOMA forestry estate and foreign investors developing commercial farm land. Preliminary findings from a re-study of the 1991 GTZ study reveal that despite the existing pressure on land and water resources, many more irrigation furrows have been opened up in Penhalonga. Also many young households are opening up land on steep hillsides, using bench terraces. Since the outbreak of the Zimbabwe crisis, gold panning has taken a tremendous flight in the area, negatively affecting fish ponds supplied by irrigation furrows and silting up canals. Yet the money generated with gold panning has provided a further impetus for the intensification and commercialisation of irrigated production in Manica District. The availability of cheap labour from Zimbabwe has played a pivotal role in the intensification of irrigated production.

This study comprised a number of research activities, in order to acquire the necessary information associated with the above mentioned 4 objectives:

- On the basis of the detailed GTZ study undertaken in 1991, a re-study was done covering all members of irrigation furrows in Penhalonga valley as well as some in the Msambuzi valley. In this way a unique picture of the dynamics of irrigated agriculture was obtained, including background information on the origins, settlement patterns, and life histories of its members. A similar survey had already been undertaken in Pandagoma, whereby sporadic re-visits kept a tap on new developments;
- Almost all irrigation furrows and irrigated plots, on both research sites, were mapped by means of a GPS. The latter was initially done on a site specific basis connected to student research, but ultimately the PROIRRI study (2010) provided the opportunity to go for a thorough assessment of existing irrigation furrows in three of the four border Districts along the central Mozambican-Zimbabwe frontier (i.e. Bárúè, Manica and Sussundenga Districts). Thus a rich picture emerges of who has got access to irrigated land. At the time of writing these results still have to be transformed into a reviewed journal article;

- Targeted qualitative research (life histories, migrant narratives) was undertaken focused on particular groups of immigrants from Zimbabwe (e.g. day labourers, gold panners, hawkers, money exchangers).

To contextualize the results from the furrow irrigation studies in Manica Province and the effects produced by the Zimbabwe crisis, a 'control' area has been selected in Tsangano district, Tete Province, in the mountainous border zone between Mozambique and Malawi. A separate study on furrow irrigation in Tsangano district, that is unaffected by the Zimbabwe crisis, has born out the specificity of observations made in Manica and Bárúè districts.

Finally, in Chimoio city the focus of the research efforts has been on the provision of drinking water in a number of townships (bairros). The aim here was to establish how different groups of drinking water users (including temporary dwellers) acquire access to this vital resource.

1.3 Research staff

The possibilities for hiring capable Mozambican staff were limited, since almost none had been sufficiently qualified to undertake the kind of qualitative field work required by the programme. For that reason the research has relied heavily on students of various academic levels to execute the field work. In addition, consultancy work funded by outside agencies such as the Challenge Programme and the World Bank funded PROIRRI programme, has been used for some of the quantitative aspects of data collection. Below the different types of student enrolled in some aspect of the research programme are listed:

- UCM BSc(hon) thesis students from Cuamba (agriculture), Beira and Chimoio (economics)
- MSc students from Wageningen University (WUR- irrigation and/or rural development sociology)
- Internship students from the Instituto Agrario de Chimoio (IAC)
- Contracted graduate students from the Instituto Superior Polytecnico de Chimoio (ISPM)

Since its start in July 2007, the programme has facilitated student research by 2 Mozambican Licenciatura (BSc-honours) students from the UCM in Cuamba, and 3 MSc students enrolled in the Masters Programme on International Land and Water Management of Wageningen University (2 Dutch students, 1 Malawian student). Another two internship students from the *Instituto Agrario de Chimoio* (IAC) undertook research work in Manica in 2009. In 2010, four more graduate students from the ISPM assisted in the quantitative work (GPS) on the spread of irrigation furrows in three border Districts. Two more Mozambican MSc students from the UCM registered programme on District Planning and Rural Development were supposed to execute their MSc thesis work for the programme in July-October 2010, but an unfortunate car accident and resulting prison term precluded further engagement.

In addition to the student research, field work has been undertaken by both the principal researcher, Dr Alex Bolding, and the Chimoio-based research coordinator, Rodriguez Piloto. Field research was undertaken by Alex Bolding in June 2007, April-May 2008, September 2008, February 2009, May 2009 and July 2010. The research coordinator, Mr Piloto, has been continuously accompanying students and visiting researchers in the field to assist with introductions, interviews and GPS measurements.

2 RESEARCH OUTPUT

The research output so far consists of academic theses; conference and seminar papers; study reports disseminated amongst policy makers, researchers and practitioners in Mozambique and the region; and chapters in books.

2.1 Thesis work by students

By December 2009, seven students had completed their thesis work, whilst another two would start in 2010 but could not do so due to circumstances beyond their control. The list below highlights the research topics addressed by these four Mozambican, two Dutch and one Malawian student.

Internship theses, defended at the Agricultural Institute of Chimoio (IAC):

Severino, F.E., 2009, 'Análise da eficiência de rega nas hortícolas no povoado de Chazuca, Manica', Internship thesis, especialidade Agro-Pecuária, Instituto Agrário de Chimoio, Chimoio.

Fulede, Anabela, F., 2009, 'Comercialização dos produtos agrícolas dos beneficiários do esquema de irrigação de pequena escala em Chazuca, Manica', Internship thesis, especialidade Agro-Pecuária, Instituto Agrário de Chimoio, Chimoio.

BSc(hon.) theses, defended at the Faculty of Agriculture of the UCM, in Cuamba:

Silota, G. de J.L., 2007, 'Práticas do uso da terra e da água e a necessidade de reabilitação dos sistemas e esquema de irrigação dos produtores de pequena escala no distrito de Bárue', BSc(hon) thesis, Universidade Católica de Moçambique, Faculdade de Agricultura, Cuamba.

Nhamaleze, Cristóvão, E.Q., 2008, 'Estudo do desenvolvimento dos sistemas de irrigação de pequena escala utilizados pelo sector familiar no posto administrativo de Machipanda distrito de Manica', BSc(hon) thesis, Universidade Católica de Moçambique, Faculdade de Agricultura, Cuamba.

MSc theses, Irrigation and Water Engineering Group, Wageningen University:

Schippers, Jilles, 2008, 'Making the water(net) work. Towards an understanding of water management practices in farmer-managed irrigation in Manica District, Mozambique', MSc thesis, Irrigation and Water Engineering Group, Wageningen University, Wageningen, Netherlands.

Bruijne, Judith de, 2009, 'Who connects to what? Questioning the policy rationale of domestic water supply in Mozambique, Chimoio city', MSc thesis, Irrigation and Water Engineering Group, Wageningen University, Netherlands.

Nkoka, Francis, 2009, 'Locked in potato irrigation. Characteristics and evolution of farmer managed irrigation systems in Tsangano District, Mozambique', MSc thesis, Irrigation and Water Engineering Group, Wageningen University, Wageningen, Netherlands.

2.2 Conference and seminar papers

Four conference/seminar papers have been presented. These will in due time be published in internationally refereed journals.

Bolding, A., 2007, 'The dynamics of smallholder irrigation furrows along the Mozambique-Zimbabwe border: a resilient force of agrarian modernisation or a last resort for marginal communities?', paper presented at the AEGIS conference, panel 37, 'The political economies of displacement in Southern Africa', Leiden, 11-14 July (to be submitted for publication in *Journal of Southern African Studies*)

Bolding, A., 2008, 'Going for (liquid) Gold. The differentiated impact of the Zimbabwe crisis on gold panning and furrow irrigation in central Mozambique', paper presented at a CERES-IWE research seminar entitled

'Good news from Zimbabwe? Promising initiatives emerging from the crisis', 12 November 2008, Wageningen.

Bolding, A., 2009, 'Going for (liquid) Gold. The differentiated impact of the Zimbabwe crisis on gold panning and furrow irrigation in central Mozambique', paper presented at the 'In the shadows of a conflict' conference, held at Cape Town, 28 April 2009.

Bolding, A., 2010, 'The dynamics of smallholder irrigation furrows along the Mozambique-Zimbabwe borderlands: a resilient force of agrarian modernisation or a last resort for marginal communities?', paper presented at the 'International Water History' IWRA conference, held in Delft, the Netherlands, June 16-19, 2010.

2.3 Presentation of study results to policy makers, local communities and international research networks

Various opportunities have been used to disseminate results from the different studies undertaken amongst policy makers (Ministry of Agriculture of Mozambique), local communities and an international researcher network (the CGIAR challenge programme).

Report presented to NGO Kwaedza Simukai, Manica, Mozambique:

Schippers, J., 2008, 'Water management for irrigation in the area of Penhalonga, Mozambique: observations and recommendations', Internship report, Wageningen University.

Report presented to EU Review mission (reviewing 10 years of expenditure on irrigation in Mozambique, 1998-2008):

Bolding, A., 2008, 'Extent and dynamics of smallholder furrow irrigation along the Mozambique-Zimbabwe border: former Zimbabwe farm workers investing into irrigation and gold panning', report presented to EU Irrigation Expenditure Review Mission, Chimoio, 16 September 2008.

Report presented to World Bank identification mission for the Programme for Irrigation development (PROIRRI):

Beekman, W., Bolding, A., Post Uiterweer, N.C. and Veldwisch, G.J., 2009, 'IRIPO, Irrigação contra a Pobreza, Irrigation capacity building for Manica Province', summary prepared for the World Bank, May 2009.

Report presented to Challenge Programme 66 'Water rights in informal economies':

Bolding, A., Post Uiterweer, N.C. and Schippers, J., 2009, 'The fluid nature of hydraulic property: a case study of Mukudu, Maira and Penha Longa furrows in the upper Revue river, Manica District, Mozambique', Challenge Program Project 66 Water rights in informal economies in the Limpopo and Volta Basins, July 2009.

Report submitted to the Ministry of Agriculture, PROIRRI project office:

Beekman, P.W., and others, 2010, 'Identification of the Irrigation potential for smallholder agriculture in the uplands of Manica and Sofala Provinces', PROIRRI consultancy, Chimoio, October 2010.

2.4 Book chapters

In total three book chapters in two different books are in various stages of publication.

Bolding, A., Post Uiterweer, N.C. and Schippers, J., 2009, 'The fluid nature of hydraulic property: a case study of Mukudu, Maira and Penha Longa furrows in the upper Revue river, Manica District', in: Zaag, P. van der (ed.), *What role of law in promoting and protecting the productive uses of water by smallholder farmers in Mozambique?*, CGIAR Challenge Program on water and food, Water rights in informal economies in the Limpopo and Volta Basins, full advance copy, July 2009.

This book is presently being translated into Portuguese, before being published in both English and Portuguese language versions.

Two further chapters in a book emanating from the 'In the shadows' programme are presently under development. Working title of the book:

Derman, B., and R. Kaarhus (eds.), *In the shadow of a conflict: crisis in Zimbabwe and its effects in Mozambique, South Africa and Zambia*.

Bolding, A., forthcoming, 'Going for (liquid) Gold. The differentiated impact of the Zimbabwe crisis on gold panning and furrow irrigation in central Mozambique'.

Bolding, A., forthcoming, 'Doing things the Zimbabwean way: the impact of the Zimbabwe crisis on rural governance, land and livelihoods on the border of central Mozambique'.

ANNEX 1: ABSTRACTS OF SELECTED RESEARCH OUTPUTS

Bolding, A., 2007, ‘The dynamics of smallholder irrigation furrows along the Mozambique-Zimbabwe border: a resilient force of agrarian modernisation or a last resort for marginal communities?’, paper presented at the AEGIS conference, panel 37, ‘The political economies of displacement in Southern Africa’, Leiden, 11-14 July (to be submitted for publication in *Journal of Southern African Studies*)

In the course of the past century a dynamic indigenous furrow irrigation culture has emerged in the mountainous border region of eastern Zimbabwe and west-central Mozambique, inhabited by Shona speaking people. Its importance and existence has hitherto remained virtually unknown, despite the key role attributed to irrigation in the commercialisation of agrarian production, provision of food security, and poverty eradication. This paper demonstrates its importance in terms of irrigated area (10% of all irrigated land in both countries), contribution to food security and increased commercial production, and capacity to provide displaced people with a livelihood.

Studies of the ancient terracing and irrigation cultures of the Nyanga Highlands (Zimbabwe) and Engaruka (Tanzania) suggest that furrow irrigation was not primed on the need for intensified agricultural production (Sutton 1984). Rather the Nyanga terrace people are seen as ‘losers’ who turned to irrigation to survive the harsh environment they found themselves in, whilst Engaruka became the victim of its own success (conceptualised as ‘over-specialisation’). The main question addressed in this paper is whether the spread and decline of furrow irrigation based informal economies represents a drive towards agrarian modernisation or a last resort for survival of displaced smallholders, war refugees, and expelled migrant farm workers.

The paper seeks to first identify the origins and geographical spread of these furrows: are they part of a long standing indigenous irrigation culture; were they copied from white settler farmers by their African labour force; or were they spread by entrepreneurial Mission-educated agriculturists? Second, the construction, management and maintenance of these irrigation furrows is characterised and contrasted with existing literature on similar irrigation ventures in Tanzania and Kenya. Next the paper presents three contrasting case studies on irrigated valleys in the upper Revue (Manica district, Mozambique), the upper Pungwe (Báruè district, Mozambique), and the upper Nyanyadzi rivers (Chimanimani district, Zimbabwe). The case studies focus on the different, historically situated, drives behind expansion and contraction of furrow irrigation; the identity, life-histories, modes of organisation and production strategies practised by the smallholder irrigators; and the local importance and marketing linkages of the informal economies thus established.

Several waves of expansion of furrow irrigation occurred, moderated by different drives, like the promotion of furrow irrigation by labour-hungry Rhodesian settler farmers (1890s onwards); Mission induced agrarian modernisation by migrating Africans looking for land (1910-30s), and the inhibitive effects of segregationist and conservationist policies in Rhodesia (1940s & 1950s). Recent waves of furrow expansion have been fed by returning Mozambican labour migrants (after 1975 Independence and 1992 Peace Deal), internally displaced war refugees (1980s), impoverished smallholders in the wake of the 1992 Drought, and Mozambican, Malawian and Zimbabwean farm labourers after the start of the political and economic crisis in Zimbabwe (2000-).

Whilst their importance has always lain in providing a livelihood and refuge in remote mountain valleys for people on the run, some furrow irrigation based informal economies have been able to link up with urban markets or contract crop based marketing outlets, providing the impetus for agrarian intensification and modernisation.

Bolding, A., 2008, 'Going for (liquid) Gold. The differentiated impact of the Zimbabwe crisis on gold panning and furrow irrigation in central Mozambique', paper presented at a CERES-IWE research seminar entitled 'Good news from Zimbabwe? Promising initiatives emerging from the crisis', 12 November 2008, Wageningen.

This presentation reports on research work in progress in central Mozambique along the mountainous border zone with Zimbabwe, where two concurrent 'booms' have occurred since the outbreak of the Zimbabwe crisis. In the densely populated Manica district, artisanal gold panning, both along rivers and at large scale mining sites, has taken a great flight. In the remote Baruè district, a huge expansion in area under furrow irrigation has occurred. Both activities have resulted in real gains in the wealth and livelihood security of resident smallholders. However, the cases of Pandagoma (Báruè) and Penhalonga (Manica district) display very different dynamics in terms of the impact of the Zimbabwe crisis. Whereas in Pandagoma returning Mozambican, and to a lesser extent Malawian and Zimbabwean, labour migrants with work experiences on white farms and tea and coffee estates in Zimbabwe, have been at the forefront of the accelerated development of irrigation furrows and commercial production of tea, coffee, tobacco and paprika; in Penhalonga an increasing number of returning relatives and destitute Zimbabweans has created further pressure on the already intensively used natural resource base of the area (land, water, forest, gold). Thus, where Pandagoma and the wider environment of the Messambize valley offer real opportunities for new comers to take out an irrigation furrow, open up new rain-fed land and engage in cattle ranching; in Penhalonga new comers, particularly those of Zimbabwean origin without resident families in Mozambique, have been forced to engage in manual labour (tending to irrigated crops or digging for gold) for poor remuneration (a meal or some food items) or else engage in different forms of petty trading or, in the case of women, into prostitution.

Schippers, J., 2008, 'Making the water(net) work. Towards an understanding of water management practices in farmer-managed irrigation in Manica District, Mozambique', MSc thesis, Irrigation and Water Engineering Group, Wageningen University, Wageningen, Netherlands.

Farmer managed furrow irrigation in Africa has received scant attention in policy and academic circles. This stands in stark contrast to its significant contribution to livelihoods in mountainous areas and beyond. As part of the recently studied 'islands of intensification', the small scale irrigation sector in Africa has gained some interest. This study aims to increase an understanding of the performance of this small scale irrigation schemes with specific concern for the water management practices water users perform.

The functioning of farmer managed irrigation systems (FMIS) has been conceptualized by a wide array of researchers. The various concepts they have coined to explain the performance of these schemes have been analysed in this research and from them a coherent conceptual framework has been drawn up. The analysis of this 'water network' allows for a study of water resource flows that incorporates the dynamic social and physical environment in and through which actors operate. The framework has specifically been employed to study the (re)shaping of water management practices in four different situated case studies. Water management practices are understood to include the allocation of water flows, the maintenance of irrigation infrastructure and the mediation of conflicts.

From four situated case studies it was concluded that the current water management practices in furrow irrigation in de Manican hills can best be explained from four different angles. Firstly, the day-to-day practices of water organisation are elucidated by appreciating actors' hydraulic position within the hydraulic network. Secondly, the principle of 'giving everybody a chance' has been found leading the organisation of water flows. Thirdly, it is important to recognise irrigated agriculture and its related water management practices as a component of an 'African irrigation paradigm'. That is, irrigated agriculture is part of a larger livelihood portfolio available to local actors. In the highly dynamic socio-material environment multiple 'escape options' exist that render the relative importance of irrigated agriculture for livelihood purposes to fluctuate considerably over time.

The occurrence of collective action in water management was found to resemble the normal distribution curve when -following Wade 1988- collective action and water availability were contrasted on two axis. That is, both water abundance and water scarcity prompt actors to refrain from collective efforts to manage water sources. The curve does not completely explain the occurrence of collective action since actors were also found to utilize their hydraulic position to mediate downstream users into collective action.

These findings have subsequently been contrasted with some of the literature on FMIS, namely Ostrom (1990), Coward (1979, 1986) and Fleuret (1985). It was found that their conceptualisation of water management does not allow a full understanding of water management practices in the Manican hills. 'Design principles', the concept of 'hydraulic property' and the 'reflection of a social order in material ordering' have little explanatory power when contrasted with the practice of water management for irrigation in a fluid and dynamic socio-material ordering that was encountered in this study.

A final recommendation calls for joint efforts to develop a sustainable irrigated agriculture in a 'politicised' manner as it is hoped to provide an antidote to the increasing gold-mining-related environmental degradation.

Bruijne, Judith de, 2009, 'Who connects to what? Questioning the policy rationale of domestic water supply in Mozambique, Chimoio city', MSc thesis, Irrigation and Water Engineering Group, Wageningen University, Netherlands.

Since the launch of the Millennium Development Goals in 2000, donor and governmental investments on drinking water supply in developing countries have been booming. This thesis deals with the question whether in the case of Mozambique the policy rationale behind these investments connect to the water practices and water supply preferences of actual beneficiaries at the local scale.

For this analysis a conceptual framework is applied that purposely does not evaluate domestic water supply on the basis coverage rates and financial sustainability, but focuses on assessing its effects on livelihoods and health conditions for the local actors involved. It does this by studying the physical environment of water supply, use and discharge in a socio-technical framework, which considers: 1) the type of water sources and technologies in use and their performance with regard to water quantity and quality; 2) the variation in means of households to access water and water fetchers' considerations in source selection; and 3) the spatially-temporarily distributed aspects of water supply, use and discharge.

Methodologically wise, a twofold strategy was applied. Academic literature, policy papers, project documents and media articles were consulted to understand the current discourses on domestic water supply in Mozambique and how they have evolved. These discursive perspectives were contrasted with fieldwork, consisting of GPS measurements, transect walks, observations, interviews and group discussions, on the 'de facto' water practices and water fetchers' strategies in a typical *bairro* (township) of Chimoio city in central Mozambique.

The policy rationale and its historical evolution

Consulting and analysing policy documents on contemporary drinking water supply in Mozambique, one can generally observe two investment patterns. In cities, this involves the expansion of piped supply with the concomitant increase of individually paid connections, and in rural villages, the augmentation of communally managed deep wells. Communally managed connections to piped water supply are an in-between solution for peri-urban areas. Underlying this approach is the idea that two groups of domestic water users exist; those with and those without the ability to pay. For those with the ability to pay, it is perceived as logical that water should be considered an economic good and that a modern industrialised technology can be implemented for which the users contribute up to full cost-recovery. For those without the ability to pay, living in the rural and peri-urban spheres, drinking water should be guaranteed as a basic necessity and a human right. Convenient, individual connections are perceived as infeasible, because it is expected that the users cannot cover full costs. For this reason, a communally managed arrangement is promoted in which cost-recovery is limited to operational and maintenance expenses.

This dichotomy in the current policy rationale can be explained by referring to the national political history of Mozambique as well as the internationally dominant discourses on domestic water management. Already in colonial times (1890-1975), a bifurcated law system was present in which Portuguese settlers and *assimilados* were receiving privileged treatment over native Mozambicans (Mamdani, 1996; O'Laughlin, 2000). In respect to water supply, this translated itself in the development of piped water provision in urban centres, where the Portuguese lived, whereas no investments were made in the rural districts, where the indigenous population lived. After independence, when the liberation front FreLiMo took power, another imbalance in relation to development within the country evolved. FreLiMo, constituted of a highly educated elite and individuals wielding military power, promoted the collectivisation of production and consumption under the guise of a Leninist-Marxist party program (Finnegan, 1993). On the one hand, large investments were made to turn former Portuguese settler farms into modern agroindustries (O'Laughlin, 2000) and to develop the main Southern cities as important transit ports for Zimbabwe and South Africa (Cahen, 1993), whilst on the other hand, rural inhabitants were forced to live in communal villages and work in peasant cooperatives with very little governmental funding (O'Laughlin, 2000).

FreLiMo's program did not fully take root however, and was disrupted by the armed forces of the guerrilla movement ReNaMo supported by South Africa. At first FreLiMo could restrict itself to solely accepting support from countries with a similar communist vision, but increasing instability led it to agreeing to structural adjustments towards market liberalisation in the 1980's, in order to secure financial support from Western countries (Hanlon, 1996). From the moment the peace agreement between FreLiMo and ReNaMo (1992) was signed, Mozambique's water policies started to follow the international trend. The collectively drafted Water Policy of the Mozambican

government under FreLiMo's dominance and the international donor community in 1995, paved the way for the current model of privatised and centralized drinking water supply in cities, and communally managed and decentralised provision in the rural areas (República de Moçambique, 1995). Privatisation is perceived as a departure from FreLiMo's earlier ideas with regard to development, however it can be claimed that the urban-rural divide is maintained. FreLiMo's urban elite controls the newly privatised companies, enhancing their wealth, and ensuring that most investment occurs in the wealthier areas of cities, to the detriment of rural and peri-urban areas (Pitcher, 2002). This also applies to domestic water supply: for the city of Chimoio with a quarter of a million inhabitants a similar amount of money is spent on upgrading its drinking water system as for the almost two million people living in the countryside of central Mozambique.

'De facto' water practices and water supply networks

The observations, interviews and group discussions in the research area, *bairro 16 de Junho* in Chimoio city, demonstrated that urban water supply is not confined to the official domain of governmental policies. The current governmental actions in Mozambican cities are limited to a centralised piped water supply system with private connections for the prosperous and public standpipes for the poor. Although in the *bairro 16 de Junho* people cannot access this piped supply easily, they do connect to other form(s) of water supply. Over time, an array or archipelagos of "water supply networks" has evolved, influenced as much by important political events (as described in the previous section) as by demographic changes: population growth, migration of farmers to the city and refugee settlement (during Mozambican civil war and nowadays due to the political situation in Zimbabwe). Other factors influencing the water supply networks are related to the geographical features of the *bairro*: a gradually sloping terrain with at its lower border a brook, and the inaccessibility of groundwater due to rock formations at certain spots.

These water supply networks differ in relation to their technologies, from being decentralised and artisanal (e.g. shallow dug wells, open water bodies) to centralised and industrial, (e.g. connections to piped network supply). They also diverge in relation to their ownership and institutional arrangements, having individually owned and managed dug wells and yard tap connections, communally managed standpipes and boreholes, and open accessible and governmentally managed open water bodies. Along with the evolution of various water supply networks, a variety of water use networks have evolved engaging with the different sources of water supply. Water uses can be distinguished according to type of consumption, degree of safeguarding hygiene, and production purposes, each single one of them demanding another quality and quantity of water, leading to a set of water needs. These water needs are not equal to the actual water obtainment of users, but are constrained and sustained by the available water supply networks, actors' means to access them and actors' personal considerations and preferences.

Each single water supply network provides a solution to a particular water need and increases accessibility to certain users. In *bairro 16 de Junho*, piped water connections and deep wells are able to supply safe and tasty drinking water, which is appreciated for consumption purposes, but scarcity restricts supply, the use is dominated by individuals with the necessary financial resources and/or social connections. Open water bodies and shallow dug wells, are not ideal for drinking, but due to their ability to provide water in abundance to those unable to access more desirable sources (particularly in the wet season) they facilitate the pursuit of additional livelihood possibilities, such as kitchen garden cultivation, brick moulding, etc. Furthermore, these supply networks differ with regard to health risks. The first mentioned group of water supply networks, if well maintained, reduces the chance of its users suffering from water-related infectious diseases, while the second group due to its openness in the waterscape (especially in the rainy season) increases this risk. It is essential to add that in the case of *16 de Junho* with no safe sewerage system is present, solid waste is scarcely collected and non-improved pit latrines form a majority. Overall, this increases the chance that people will contract water-related infectious diseases.

Water fetchers' strategies and preferences

Besides providing an understanding of the natural and human-mediated relationships between water supply, use and discharge, this thesis highlights the criteria that determine users' selection of particular water sources. Important to mention, in this respect, is that the management of (both private and public) water sources in *bairro 16 de Junho* is dominated by men, while water fetching is perceived as the task of women. Among the studied water fetchers in *bairro 16 de Junho*, mainly women being part of households without a private water source, it appeared to be most vital that domestic water supply is reliable, available every single day during daytime hours, and that the controller(s) are trustworthy, capable of guaranteeing quick repairs and not discriminating. This in order to secure water for at least the most essential needs within their families, while allowing time to undertake other domestic tasks and

livelihood securing activities. In this sense, the women make trade-offs. For consumptive water needs they are prepared to walk further, stand in queues, constantly check sources with intermittent flows and to use more manual force. For non-consumptive uses, they tend to opt for an inferior quality of water, if this saves time and energy and avoids the necessity to bargain with source controllers. Strikingly, the price of water was not the most critical factor in source selection among the interviewed water fetchers. The intra-household division in which women are expected to deliver the necessary labour and make the purchase, and the male household heads are responsible to provide the means to pay for water provision, (as in this case study), provides an explanation for this.

Presented conclusions

Overall, this study demonstrates that the current centralised approach towards drinking water supply in combination with the implementation of private connections and public standpipes in peri-urban areas in Mozambique, just partly complies with the water fetching strategies and the wishes of the studied socio-economically disadvantaged beneficiaries (female water fetchers without a private water source). This conclusion is based on the following observations:

- 1) Piped water supply does contribute to an equally regulated drinking water quality throughout the city, agreeing with the wish of the studied water fetchers to have a guaranteed safe water source for consumptive purposes without the trouble of water treatment at home. At the same time, the Mozambican policies 'black-box' urban water provision to "drinking water supply", indirectly assuming that water requires to be completely free from micro-biological and organic contamination for all purposes of use. This underestimates the pivotal role of people's use of water of various qualities in shaping a livelihood.
- 2) The distinction of domestic water consumers in two groups, those with and those without the ability to pay, in the current Mozambican Water Policy is problematic. This differentiation puts maximum emphasis on water users as "economically rational actors" who base their water obtainment strategies on water prices and prefer to obtain the highest quality water for the lowest price. Analysing the case study, this essentially will contribute to the well-being of the water payers, most frequently males, but not to the females responsible for water fetching, who care more about the security of supply and the reduction of labour investment.
- 3) The currently promoted water supply arrangements aiming at centralised provision are characterised by relatively high operation and maintenance prerequisites and energy demands. They are thus sensitive to unreliable supply on a day-to-day basis in comparison to decentralised sources of provision. This does not agree to the wish of the interviewed water fetchers, who perceive the security of supply as essential.
- 4) With the augmentation of connections, both private and public ones, walking distances and queue formation will be reduced, freeing up time for water fetchers to undertake other jobs. However, the crucial role of the management of these sources is neglected. The rules set by source operators and the social relationships between controllers and water fetchers are actually determining whether fetchers can access particular water supply networks and indirectly whether they can reduce their labour investments.
- 5) No precautions have been included in Mozambican project proposals so far to deal with the rise in wastewater discharge and associated health risks when piped water supply is augmented in urban environment.
- 6) The current policy division between urban and rural water supply neglects a significant group of underprivileged water users living at the fringes of the city; those who are able to access neither the piped water circuit from the city centre nor considered as the target group of the rural water supply programs.

Overall, it can be concluded that water supply investments will be most successful in reducing health risks and improving livelihood opportunities for socio-economically disadvantaged groups in peri-urban areas of Chimoio when they are able to reduce women's time and energy investments in water fetching for all purposes, whilst simultaneously include measures to create a safer sanitary environment.

Nkoka, Francis, 2009, 'Locked in potato irrigation. Characteristics and evolution of farmer managed irrigation systems in Tsangano District, Mozambique', MSc thesis, Irrigation and Water Engineering Group, Wageningen University, Wageningen, Netherlands.

Farmer managed irrigation in Sub Saharan Africa has been responsible for the biggest expansion of irrigated areas in the past decade (Lankford, 2005). Yet, little is known about the 'secret of their success': why do they emerge and last in some places and not in others? How can outside agencies (whether public or private) contribute to their spread and improve their productivity, equity and sustainability, without falling into the trap of creating new dependencies on those very same outside agencies? This thesis unlocks the 'secret of success' of farmer managed irrigation systems (FMIS) in Tsangano District, Mozambique. It uses the hydraulic property concept (Coward, 1986b) as a prism to understand the functioning of these irrigation systems. The thesis shows that the organisational set up and the collective action surrounding water management and maintenance is a function of prior investment in the system, which determines both people-to-object and people-to-people relations. Different hydraulic property regimes are assessed to explain how productivity, equity and sustainability have been achieved in Tsangano FMIS without outside interference. These findings are contrasted with the central tenets of Irrigation Management Transfer programmes, *viz.* the need to establish a formal Water Users Association; creation of a sense of ownership through user participation in infrastructural rehabilitation; and the emphasis on financial accountability relations. The Tsangano case study suggests that rather than uncritically assuming the merits of neo-institutional policy prescriptions (cf Ostrom, 1992, 2005), interveners should investigate prior investment patterns and context specific, cultural logics that inform the sustainability of FMIS's.

Bolding, A., forthcoming, 'Going for (liquid) Gold. The differentiated impact of the Zimbabwe crisis on gold panning and furrow irrigation in central Mozambique', in: B. Derman, and R. Kaarhus (eds.), *In the shadow of a conflict: crisis in Zimbabwe and its effects in Mozambique, South Africa and Zambia*.

This chapter reports on research work in central Mozambique along the mountainous border zone with Zimbabwe, where two concurrent 'booms' have occurred since the outbreak of the Zimbabwe crisis around the turn of the century. In the densely populated Manica district, artisanal gold panning, both along rivers and at large scale mining sites, has taken a great flight. In the remote Barué district, a huge expansion in area under furrow irrigation has occurred. Both activities have resulted in real gains in the wealth and livelihood security of resident smallholders. However, the cases of Pandagoma (Báruè District) and Penhalonga (Manica District) display very different dynamics in terms of the impact of the Zimbabwe crisis. Whereas in Pandagoma returning Mozambican, and to a lesser extent Malawian and Zimbabwean, labour migrants with work experiences on white farms and tea and coffee estates in Zimbabwe, have been at the forefront of the accelerated development of irrigation furrows and commercial production of tea, coffee, tobacco and paprika; in Penhalonga an increasing number of returning relatives and destitute Zimbabweans has created further pressure on the already intensively used natural resource base of the area (land, water, forest, gold). Thus, where Pandagoma and the wider environment of the Messambize valley offer real opportunities for new comers to take out an irrigation furrow, open up new rain-fed land and engage in cattle ranching; in Penhalonga new comers, particularly those of Zimbabwean origin without resident families in Mozambique, have been forced to engage in manual labour (tending to irrigated crops or digging for gold) for poor remuneration or else engage in different forms of hawking and petty trading or, in the case of women, into prostitution.

Bolding, A., forthcoming, 'Doing things the Zimbabwean way: the impact of the Zimbabwe crisis on rural governance, land and livelihoods on the border of central Mozambique', in: B. Derman, and R. Kaarhus (eds.), *In the shadow of a conflict: crisis in Zimbabwe and its effects in Mozambique, South Africa and Zambia*.

The massive influx of crisis-driven immigrants from Zimbabwe profoundly affected and transformed local forms of governance, land allocation, and the mobilisation of external assistance, producing new forms of organising natural resource management and opening up new livelihood opportunities for rural Mozambican residents. In this chapter, two case study areas along the central Mozambique-Zimbabwe border are presented with the explicit aim of assessing how the immigration of Zimbabweans and the return of Mozambican farm workers that grew up on Zimbabwe's farms and tea estates has affected land and natural resource governance practices at village level in Mnaica and Bárúè Districts. More in particular it is shown how the influx of immigrants from Zimbabwe has fuelled a revival of territorial claims on land by the traditional leadership in Penhalonga, Manica District. In contrast, in the Pandagoma area of southern Bárúè District, the Mozambican 'chief' for the area has been marginalised by prior appropriation claims on land by early Zimbabwean immigrants and the entrepreneurial ethos exerted by returning labour migrants from Zimbabwe, who have organised themselves into a donor-funded farming association. The continued expansion of irrigated production as well as closure of Zimbabwean market outlets for tea and coffee (due to the collapse of the Zimbabwe dollar) led to a process of socio-economic differentiation in Pandagoma and a desperate search for Mozambican outlets of irrigated production. The vibrant community of smallholder irrigators in Pandagoma got embroiled in leadership conflicts, whereby an entrepreneurial section of farmers split off from the original farming association, tapping into the political networks of the FRELIMO party and the Provincial Farming Union, in order to further expand and commercialise their agricultural enterprises. In the conclusion it is shown how 'Zimbabwean ways of doing things' have affected natural resource management practices in both case study locations.