



Local-Level Integrated Water Resource Management in Mozambique

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Improved Livelihoods in Lower Limpopo: Process Documentation

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The authors tried to reflect the process and impacts of the project as accurately as possibly, but, obviously, they take full responsibility for any misquotation or incorrect interpretation.

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LIST OF ABBREVIATIONS

ARA-Sul	Administração Regional de Águas do Sul
Barrio	Neighborhood
DANIDA	Danish International Development Agency
DNA	Direcção Nacional de Águas
HICEP	Hidraulica de Chókue Empresa Publica
IUCN	The World Conservation Union
IUCN-ROSA	The World Conservation Union - Regional Office of Southern Africa
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
SADC	Southern Africa Development Community
UDEBA	Unidade de Desenvolvimento de Educação Básica

1. BACKGROUND: PIONEERING LOCAL-LEVEL IWRM

Since 2006, the SADC Regional Water Sector Programme, supported by DANIDA, has piloted Local-Level Integrated Water Resources Management (IWRM) through IWRM Demonstration Projects in five countries: Malawi, Mozambique, Namibia, Swaziland and Zambia. In each country, the Programme invited national organizations interested in piloting this approach to become the implementing agent. This report documents the experiences in Mozambique, where the World Conservation Union – Regional Office of Southern Africa (IUCN-ROSA, abbreviated as IUCN in this report) was the implementing agent of the project ‘Improved livelihoods in Lower Limpopo Project’.

The SADC/DANIDA Regional Water Sector Programme aimed to demonstrate how principles of IWRM can be put into practice in poor rural areas. The focus was on those principles that have received limited attention as yet: water resource management at the lowest appropriate levels, users’ participation, and the inclusion of women. Through the piloting in the five countries, the IWRM Demonstration projects gradually operationalized local-level IWRM in an innovative manner. Seven innovations are summarized in a ‘Lessons Learnt’ report¹.

In short, the starting point for local-level IWRM is the recognition that people have multiple domestic and productive water needs, certainly in rural areas where agriculture-based diversified livelihoods depend in many ways upon water. Better access to water brings health and alleviates women’s and girls’ burdens of water fetching and it improves production of crops, vegetables, animals and fisheries for food and income. Thus, water contributes directly and indirectly to all Millennium Development Goals. These needs are met by using and re-using water resources from multiple inter-related water sources, both naturally and from infrastructure. Synergies from combining multiple sources reduce infrastructure costs and strengthen coping strategies to mitigate human-made and climatic and environmental shocks. Local-level IWRM recognizes that communities have managed their multiple water sources for multiple uses in an integrated manner since time immemorial, often informally and orally.

Local-level IWRM is an intervention approach for using water for poverty alleviation and gender equity, or, in other words, participatory and demand-driven multiple-use water services (MUS). Through repeated cycles of time- and budget-bound ‘projects’, it capacitates communities to solicit support from external agencies and to co-design and implement water improvements according to their own evolving needs and priorities. This contributes to environmentally, financially, and institutionally sustainable water resource management. Each project or ‘loop’ at community-level follows the typical steps of any participatory intervention: understanding the community and building trustful relationships, planning and prioritizing activities, compiling detailed action plans, implementing, and continuously monitoring and evaluating. Skipping one step may cause problems later, which warrants going back and addressing that earlier step. Moreover, as external support is easily captured by the male elite, specific targeting approaches are needed to ensure that the marginalized are included from the outset.

Local-level IWRM, understood as integrated services delivery, seeks to overcome formal sectoral boundaries within the water sector, where professionals tend to focus on one single end-use: either domestic, or irrigation,

¹ SADC/DANIDA Water Sector Support Programme. 2009. Innovations in Local-Level Integrated Water Resource Management. Lessons learnt from the Integrated Water Resource Management Demonstration Projects in Malawi, Mozambique, Swaziland and Zambia. 2009. Synthesized by Barbara van Koppen, Jonathan Chisaka, and Stalin Sibande Shaba. Pretoria: SADC/DANIDA Water Sector Support Programme, in collaboration with the International Water Management Institute. Downloadable from www.sadcwater.com.

or cattle watering etc. It creates a supporting environment, in which the range of governmental, non-governmental and private water and rural development support agencies collaborate, both horizontally and vertically, for one-window service delivery. Further, acknowledging that water is a catalyst for broader development in which water is often the limiting factor, local-level IWRM also forges integration of land tenure issues and other factors to render water use more beneficial. By holistically mobilizing support vertically and horizontally, intermediate-level agencies, in particular district government, can respond more effectively to communities' integrated needs, and national agencies can effectively support this intermediate-level response. Over-time, communities are sustainably empowered by strengthening their relationships with agencies. This is systematized around local planning processes. Local government, Traditional Authorities and other authorities, who play such pivotal role in accountable planning and implementation of incremental improvements according to people's own priorities, are the integrators of needs-based services.

The practical understanding of local-level IWRM as an iterative, step-wise intervention approach is summarized in figure 1. Annex 1 provides the detailed components of all seven steps. These steps are further elaborated in a separate document entitled 'Guidelines for local-level IWRM. Based on experiences of IWRM Demonstration projects in Malawi, Mozambique, Namibia, Swaziland, and Zambia'². The target group of these guidelines are the local authority structures in charge of water projects in SADC and elsewhere.

The present report documents the process by which IUCN and partners in Ndonga community, Mozambique, implemented these steps. The report is based on the extensive field work experiences of Rui Mirira as field assistant of IUCN; four field visits and interviews with all parties involved in Ndonga, Guijá, Maputo, Pretoria, and elsewhere, by Barbara van Koppen of IWMI; and on the project reports.

Figure 1: Overview of responsibilities, phases and steps

Responsible Organization	Phases	Steps	Steps
Creating a supportive environment			Continuous 'Step' Seven: Do participatory monitoring and evaluation and impact assessment for follow-up
Local authorities and support agencies	Initial	Step One: Mobilize support	
		Step Two: Select communities	
Participatory planning, implementation and monitoring			
Communities facilitated by local structures and support agencies	Participatory planning	Step Three: Understand the community and build capacity	
		Step Four: Create a vision and select activities to fulfil it	
		Step Five: Compile action plans	
	Implementation	Step Six: Implement the action plans	

² SADC/Danida Regional Water Sector Programme. 2009. Guidelines for Local-Level Integrated Water Resource Management. Based on experiences from Integrated Water Resource Management Demonstration Projects in Malawi, Mozambique, Namibia, Swaziland, and Zambia. Pretoria: Southern African Development Community/Danish International Development Agency, in collaboration with the International Water Management Institute. Downloadable from www.sadcwater.com.

2. THE PROJECT FRAMEWORK

For the IWRM Demonstration project in Mozambique, the implementing agent was the IUCN Regional Office of Southern Africa located in Pretoria, which acted as liaison with SADC/Danida and was supported by its Mozambique Country Office. In 2006, at the start of the IWRM Demonstration Projects, IUCN expressed interest to become an implementing agent and the following overall project framework was agreed upon.

- IUCN would operationalize the broad concept of local-level IWRM for improved livelihoods targeted at the vulnerable. For this, IUCN built on earlier work in the flood- and drought-prone Lower Limpopo basin in Mozambique, such as the compilation of an Atlas for Disaster Preparedness and Response for risk assessment and early warning and work on environmental flows, wetlands, and the GKG transboundary national park.
- Funding was made available for a maximum amount of USD250,000 for 20 months from January 2007 till August 2008 (which was later extended till December 2009). Funding earmarks were flexible and allowed for a participatory planning phase in which communities could partake in the detailed project design and budgeting and a phase in which selected activities were implemented.
- A wide range of potential appropriate technologies and interventions for sustainable land and water utilization from which communities could chose was defined through e.g. water harvesting and domestic water supplies and sanitation, but also irrigation and farming in general, enterprise development, marketing, capacity building on flood vulnerability and awareness on climate change and variability.
- As the geographical focus, the Lower Limpopo basin was chosen. In its project proposal, IUCN proposed to focus on Guijá and surrounding communities This area north of the Limpopo river is inhabited by some of the poorest population in Mozambique. Guijá mainly depends upon rainfed agriculture and livestock. Guijá District is adjacent to the Chókue District, which lies south of the Limpopo river. The main economic activity in Chókue area is large- and small-scale irrigated agriculture and horticulture (along a 96 km long irrigation canal which diverts water from the Limpopo river) and livestock rearing. Main water-related problems in both areas include flooding, lack of domestic water supply and sanitation and sustaining income generation through farming.
- Local planning processes, led by the district government of Guijá, upon which IUCN and UDEBA could build, were already under development, conforming to Mozambique's stronger emphasis on service delivery through bottom-up planned local government initiative. For example, the first strategic district development plan was finalized in 2008.

3. THE INITIAL PHASE: CREATING A SUPPORTIVE ENVIRONMENT

Step One: Mobilize support

Step Two: Select communities

In order to create a supportive environment horizontally and vertically, IUCN started by approaching the National Water Department (DNA) to consult about the main components of the project. At Limpopo basin level, IUCN established contacts with the Southern Regional Water Administration ARA-Sul, both with its head office in Maputo and its office in Chókue.

As the IUCN Mozambique Country Office is vested in Maputo about 250 km south of Guijá, a regional partner was sub-contracted to undertake baseline surveys, social mobilization and other community work. The Unidade de desenvolvimento de educação básica (UDEBA), with head office in the provincial capital of Xai-xai at 80 km distance of Guijá, took up this role as sub-contractor of IUCN. UDEBA works throughout Gaza Province and mobilizes communities and other interested groups in the participation in the development of basic education through technical, scientific and financial support in small projects proposed to UDEBA. Further, IUCN designated a project assistant, co-author of this process documentation report, for regular work on the ground.

IUCN and UDEBA put local authorities and communities in the driving seat. In March 2007, IUCN and UDEBA visited the District Council representatives of Guijá to introduce the project and to prepare for planning workshops in selected communities. This was foreseen within two-three months. The proposed IWRM Demonstration project was welcomed as being in consonance with the district programmatic set of development priorities. The District Council representatives proposed two poor villages that were dynamic, representative for the water problems in this area, and in need of external support: one suffering from regular floods (Ndonga in Mubanguene Administrative Post) at 15 km distance of Guijá and one suffering from severe drought conditions at 80 km distance. The District Council representatives presented their disposition to engage in the preliminary preparations tasks and to secure full involvement and participation of all required stakeholders. After the Guijá District Council had proposed the two communities, IUCN decided to finalize the planning process in Ndonga village first before proceeding to the other more distant village. Once that process had started, IUCN decided to concentrate all resources in Ndonga, in the expectation that the lessons learnt from this Demonstration Project could be replicated elsewhere.

In the project proposal, IUCN also envisaged establishing a vertical Project Steering Committee consisting of representatives of communities, district and provincial government, Hidraulica de Chókue (HICEP), district and national ARA-Sul, national DNA, UDEBA, IUCN, the SADC/Danida Water Sector Programme, and IWMI.

Through this constellation of partners, IUCN and UDEBA would be able to mobilize target communities and facilitate communities' identification of problems and sustainable solutions, while the required technical, financial, and institutional support could be called in through the horizontal and vertical networks of support agencies, as coordinated through the District Government.



4. THE SELECTION OF ACTIVITIES BY NDONGA COMMUNITY

Step Three: Understand the community and build capacity

Step Four: Create a vision and select activities to fulfill it

4.1. First contacts and planning meeting

After meeting the District authorities in March, contacts were established with village leaders in Ndonga to explain the project concept and the expected role of the community, which was to articulate its needs, implement the project and sustaining the interventions at long term. Then, a first planning meeting was held on 10 May in Ndonga. IUCN, UDEBA, the District Council Permanent Secretary and other representatives, the Chief of the Mubanguene Administrative Post, and 13 village authorities participated. These were the (male) village traditional leader, village secretary and village president, some (male and female) heads of a 'barrio' (neighborhood), the (male) president of the village association and some (female) members of the agricultural commission. After the repeated explanation of the project concept, this leadership expressed the problems of hunger, lack of markets and lack of mechanization and inputs for agriculture. Ndonga representatives also already expressed two concrete ideas about possible interventions, and the visitors were brought to the two already selected sites.

The first idea concerned the floodplain adjacent to the Limpopo River, which was mainly used for rainfed cropping. The main problem here was drought because of erratic rainfall. Minor flooding was seen as beneficial for soil fertility and moisture, but such floods seemed having stopped since the upstream Massingir dam was constructed in the 1970s. Major flooding, as in 2000, was rare. The Ndonga leadership present at this meeting expressed the need for a low-cost rehabilitation of a main canal and secondary canals that had been constructed in the 1970s but that had been eroded with the floods of 2000. The leadership also proposed pumps to lift water out of the Limpopo onto the irrigable flood plains. One of the participants was a private farmer irrigating with a diesel pump at the head-end of that canal. He and others argued that an electric pump would be more cost-effective and allow more farmers to irrigate. However, there was no electricity line as yet. This should be built over a distance of 4.5 kilometers.

The second need expressed was for a cattle dam at an already identified site six kilometers north of Ndonga. If cattle could graze and drink in these uncultivated areas, they would stop going to the Limpopo through the cultivated and partially irrigated floodplains and stop destroying crops there. It was realized that the identified site was near a gas line of Sasol from Inhambane Province to South Africa, but the distance was more than the national norm of 50 meters (National Land Law 19/97; Decreto 66/98; article 8).

At the end of the meeting, UDEBA asked the leadership to share the information with the entire Ndonga community and to identify champions and adequate representatives of the village groups to participate in what was called the second planning meeting within a couple of weeks. Also, they were asked to brainstorm about

additional issues that may be relevant within the framework of the current initiative. UDEBA paid some more visits to Ndonga after this first meeting to prepare the planning workshop.

4.2. Second planning meeting – visioning workshop

The second planning meeting, also called the visioning workshop, was held in Ndonga on 3 and 4 July 2007. This was facilitated by IUCN and UDEBA and attended by 35 community leaders and representatives, the District Administrator (during the closing ceremony), the Chief of the Administrative Post, two Directors of the District Council (infrastructure and economic services), and representatives of the SADC/Danida Regional Water Sector Programme and IWMI. The community representatives included again the traditional leader, village leader, village secretary, and more 'barrio' heads, members of the Consultative Council, and representatives of the Farmers Association, women's association, religious congregations, school council, and the private farmer irrigator. The aims of this second planning meeting were to define water-related problems, to propose possible solutions in order of priority, and to define needs and locally available resources.

The participants largely confirmed the opportunities and needs already raised in the May meeting: first, rehabilitation of the irrigation canal; second, a pump, preferably electric as this would be cheaper to operate and maintain and allow prepayment to avoid debts; and third, a cattle dam. Farming inputs and equipment were also mentioned. New needs concerned capacity building for infrastructure management and boreholes with hand-pumps for domestic uses. The latter came up after the facilitators probed about the situation for women's access to domestic water supplies. Ideally, each of the six 'barrios' should get one, or otherwise barrio 1, 2, 4 and 6. Boreholes were ranked as the fourth priority, before the farm inputs and capacity building.



The participants also made an inventory of locally available resources. The following skills were identified: for canal lining, house building, pump mechanics, carpenter and (district) topographer. Own labor would be provided for the earth work. Participants were encouraged to express what they wished, also for hand-outs like shovels and axes. The work groups listed boots, overalls, shovels, hoes, axes, machetes, all in quantities up to 700, and a couple of handsaws, hammers, and wooden struts. As farming inputs, hoes, cutlass and axes were

solicited, 1500 of each. As a participant mentioned later, they mentioned high numbers in order to be better able to share benefits from the project among more community members. During the workshop, the participants were unaware of any budget ceiling.

The IUCN and UDEBA facilitators concluded by emphasizing that the plan was not final but had to be improved. Further, the facilitators emphasized again, as after the meeting in May, that the participants should consult about the priorities set with their constituencies according to the 'cells of 10 houses' and the six barrios. Further, the barrio leaders should find out the number of people living in their neighborhood, whether they had a plot in the floodplain and how far it was from the canal, and how many cattle each community member has.

In sum, this initial participatory planning phase confirmed the selection of the two main activities and their sites that the leadership had already proposed from the very first contacts. The participants had listed further activities without insight in the total budget, and saw it as their responsibilities of representatives to ask a lot in order to share among many. At this stage, little was known as yet to the intervening agencies about the potential irrigation beneficiaries, land tenure and past or existing irrigation in the floodplain and, in case of strong inequities, the need and possibility of reallocation of land to allow more farmers to benefit from rehabilitation. The future management of the pump and main and secondary canals was not discussed in detail either. It also remained unclear why a diesel pump that had been given to the Farmer Association was not functioning anymore, because the reason put forward for that, the hassle and costs of the purchase of diesel in Chókue, would also have applied to the private farmer who also has a diesel pump and managed well on 15 ha.



5. DETAILED ACTION PLANS

Step Five: Detailed action plans

5.1. The Inception Report

After this second planning meeting, IUCN started translating the results into a draft inception report for the SADC/Danida Water Sector Programme in August 2007. As part of the discussion on the Inception Report, a meeting was held on 28 November, with the representative of the SADC/Danida Regional Water Sector Programme, IUCN, UDEBA, and the Guijá District Council authorities. This also served to launch the Project Steering Committee (Conselho Directivo) consisting of the support agencies, including ARA-Sul Chókue, plus representatives of Ndonga community to oversee the implementation of the project and ensure its integration in the district planning. At this meeting, the representative of the Water Sector Programme expressed its concern to ensure realistic expectations among Ndonga community about the scope of this project. Within Ndonga, a project committee was formed, chaired by the private irrigator. (With his diesel pump he lifts water from the Limpopo River and irrigates 15 hectares, part of which is owned by six adjacent farmers, who buy the water in a cost and benefit sharing arrangement).

After some rounds of further adjustments and clarifications to the SADC/Danida Water Sector Programme, an Inception Report was approved in January 2008. This Inception Report included more base line data about the population of Ndonga, for example, that their number is 4500 in 772 households. In five of the six barrios there is only one borehole³. A total of 214 households own cattle. Currently, some 600 households are cultivating a total of 500 ha of rainfed crops (maize, onion, carrots, beans, pumpkin, and cauliflower).

The Inception Report mentioned a total size of irrigable flood plain of 1000 ha, and, for that size, the low amount of USD120,000 was estimated for construction services, material, equipment, and inputs, for financing three boreholes, the cattle dam and the irrigation system. Training of management committees and marketing studies were also foreseen.

5.2. The technical design of the irrigation scheme

For the subsequent detailed technical design, IUCN procured the technical services of HICEP, the parastatal that manages the large-scale Chókue irrigation system in the neighboring district. In order to obtain information for the technical surveys the HICEP technicians interacted with a dozen of community members. In February 2008, a design report was submitted to the Water Sector Programme proposing infrastructure of a value of USD523,000. This included, first, the cattle dam of 2.25 ha (USD 61,000) and, second, the rehabilitation and expansion of a main canal and secondary canals for 1000 hectares. The report underlined the benefits of the

³ Another report mentions 14 boreholes and a piped supply, and highlights how salinity in this area leads to the abandonment of many (Manjate, C., E. Magaia, and H. Gueze. 2009. Water rights in informal economies: the case of Ndonga community. Unpublished paper. Maputo: ARA-Sul and International Water Management Institute)

considerably lower operational costs of an electric pump and longer life-span, although its installation is more expensive than a diesel pump. The report also confirmed the advantages of pre-paid electricity through the prevailing 'credilec' system. The total costs of this irrigation scheme would be USD 462 000, out of which USD130,000 was for pulling the electricity line.

After questions about this gross over-budgeting by SADC/Danida Water Sector Programme, a revised design was submitted early March, and discussed in a meeting at the SADC/Danida Water Sector Programme office in Pretoria with IUCN, UDEBA, and IWMI. It was agreed to focus on the cattle dam of a smaller size, three boreholes and the construction and rehabilitation of 250 ha irrigated area in the flood plain; secondary canals would be constructed by the farmers themselves. However, in the total absence of the electricity line and even written plans that assured a connection within the next couple of years, SADC/Danida preferred a diesel pump. This would prevent spending tax payers' money on an electric pump that would be idle for years to come, if it would be used at all. The boreholes and cattle dam were to be implemented first, also to respond quickly and visibly to the community's increasing questions about the delays.

After this meeting in Pretoria, IUCN and UDEBA held a meeting in Ndonga on 28 April, in which they reported on the meeting with the SADC/Danida Regional Water Sector Programme in Pretoria. They informed the leadership that the Programme had a budget ceiling and could not meet all the expressed needs. The participants regretted, but appreciated the available support and agreed to use it for the cattle dam, six boreholes (one for each 'barrio'), and the rehabilitation of 250 hectares and a diesel pump. The community representatives said that the farmer association and the private farmer were willing to consider expansion of the areas they irrigated, but land re-allocation was not accepted. For the much desired electricity line and electric pump, they expressed the hope that additional funding could be procured through IUCN and UDEBA and government or other donors. The proposed training of the management committees and a marketing study were welcomed.

HICEP staff then revised the technical report within the budget conditions, which was submitted in May. In this design, the pump house and head-end of the planned main canal with secondary canal bordered the land of the private irrigator who also chaired the project committee. The designers found this 'the best place with permanent existence of water close to the suction point'. There were no other canal design scenarios in the report.

Once these designs were ready, IUCN procured construction services. Two or more service providers were asked for quotes and in which the most favorable was selected and appointed after informing the community leadership about the options and obtaining their approval. For the boreholes, IUCN and UDEBA called upon ARA-Sul Chókue for advice. The locally present organization Agua Rural operating in Gaza Province was identified as the most appropriate. However, they proposed to drill five instead of six boreholes given the available budget.

The contract for the earth work for the construction of the dike and excavation of the cattle dam and for the expansion of the main canal was given to a large infrastructure construction firm in Chókue. Their quotation was cheaper than one other firm. Information about diesel and electric pumps was available with the many pump owners in the Chókue irrigation scheme. A senior civil engineer in the Provincial Department of Agriculture in Xai-xai, who was identified through HICEP, provided indispensable technical advice for both the cattle dam design and works and the siting of the boreholes in non-saline aquifers. The final detailed design report with the budgets for these selected service providers was submitted and approved in May 2008.

6. IMPLEMENTATION

Step Six: Implement the action plans

From June 2008 onwards, implementation started with the regular presence of the IUCN project assistant in the community. In July, another monitoring meeting was held between IUCN and the SADC/Regional Water Sector Programme.

Boreholes

By November 2008, Agua Rural had drilled the five boreholes. The formal justification for the site selection was that everybody should benefit and that the soil conditions should be optimal to avoid salinity of groundwater, a widespread problem in this area. The new boreholes generally had no salinity problems. However, one project and one other borehole in 'barrio' 5 and 6 broke down immediately. Claiming the guarantee period for the project borehole, IUCN followed up on this for both boreholes and ensured their repair.

For each borehole, a management structure was established, led by elder men or women with ample time and knowledge for overseeing the use of the borehole: opening and closing during the day only and keeping the keys of the lock, and to keep the place clean.

This led to a considerable reduction in time needed for water fetching. Before the project, focus group discussions and interviews of 102 households supervised by the IUCN field assistant, showed an average time of four hours for water fetching. After construction of the boreholes, this had reduced to half an hour in community members' views (Mirira and Monjane 2009).

Cattle dam

Implementation of the cattle dam started in June on the site selected by the community. This was more than 50 m distance of the gas line, as required by the National Land Law (19/97; Decreto 66/98; article 8). Supervised by the senior civil engineer, the infrastructure construction company in Chókue carried out the mechanized work. Many community members, mostly women, contributed labor for USD3.5 – 4 per day (which is higher than the minimum wage for agriculture). In order to spread the benefits of these allowances as much as possible, a system of rotation was implemented so that one person could only work for three days. For the distribution of the axes, shovels, etceteras, it was agreed that they were given first to widows, then orphans, and then other poor people.

When the embankment of the dam was finished in September 2008 and excavation was planned to start, a totally unforeseen problem arose. Sasol regularly patrolled and monitored its gas line and had seen the construction of the dam from the start. Yet, at this advanced stage of construction, it expressed the fear that the dam would pose a risk for the gas line. An accident with the gas line elsewhere might have fuelled this concern, but it implied that Sasol now wanted Ndonga community to abandon the dam and respect a distance of 200 m. The project Steering Committee met with Sasol. In September 2008 the Ndonga community wrote a letter to the District Government, asking for a solution on how to respect the distance of 200 m while not losing all

investments already made. A representative of Sasol signed that he received this letter. According to the community members and IUCN, Sasol promised to construct a new dam at a more favorable place. By October 2009 no party had taken further initiative as yet.

Land tenure and irrigation in the flood plains and canal construction

In order to inform IUCN the land tenure situation and hence the future beneficiaries, the IUCN project assistant undertook a detailed GIS mapping of the plots of 792 farmers in the flood plain. Out of these 792 farmers, 32 percent were women. The smallest plots were more concentrated in the downstream part. This land occupation had developed since the ending of the war in 1992, when many displaced people sought to settle in villages, stimulated by the government. Ndonga was one of such villages. Many inhabitants and newcomers moved into the flood plains. The traditional land chief of Ndonga area monitored this spontaneous land occupation. Recently, the 'land frontiers' had been reached in the sense that the existing cultivators did not accept newcomers anymore. The history of irrigation in this area also became clearer (see box).

The history of pump irrigation in the flood plain of Ndonga

Pump irrigation in the flood plains in Ndonga started around 1978 by one farmer called Mr David Machava, who was using an adapted diesel engine (IFA make). This village was attacked by rebels during civil war and this diesel pump was burned away around 1980. After that another farmer, Mr Nassone Novela bought a diesel pump at COMELA in Maputo. His pump lasted up to 2000 when it was submersed in the 2000 floods. Another farmer, Mr José Chavango bought a diesel pump too, at COMELA around 1987, at a price of 1.137.000 Meticaís at that time. He bought that pump with money of selling onions at the Central Market in Maputo. Another farmer who is still irrigating today is Mr Lumbela.

Around 2006 the Government gave an irrigation pump to the existing farmers association of Ndonga, led by five brothers who were also members in the Project Committee of the IWRM Demonstration project. Up till the dry season of 2009, the use of the pump by the association was limited indeed, and only benefited the five brothers.

After Mr Machava irrigation pump was burned away he left the land. Then another farmer, Mr Chipike, who had worked on South African irrigated farms before, negotiated with Mr Machava to use that land. Mr Chipike exchanged 15 cows for one pump and he was irrigating some 8 – 10 hectares with it, partly his own and partly rented in from neighbours. The total size of irrigated area allows using the full capacity of the diesel pump; smaller sizes would not be profitable. He is the chair of the IUCN/UDEBA project committee. His brother is the village secretary (the lowest-level paid representative of government but also elected by the community), and also part of the project committee.

Source: field visits and Manjate, C., E. Magaia, and H. Gueze. 2009. Water rights in informal economies: the case of Ndonga community. Report of the project on 'Water rights in informal economies in the Limpopo and Volta basins', supported by the Challenge Program on Water and Food. Maputo: ARA-Sul, Unesco-IHE Netherlands, and International Water Management Institute.

Canal rehabilitation

From September to November 2008, the designed main canal of the irrigation system was rehabilitated and expanded over a distance of 1250 meters by the same company as the cattle dam. This would irrigate 250 hectares – assuming that sufficient water would be pumped up and would reach the tails. At the end of the cropping season the secondary canals were constructed. The pump house was also finalized by early 2009 – but without pump, it remained empty.

Because of the lack of any rains in the flood plain in 2009, the new canals, and the sensitization on the benefits of irrigation under the IWRM Demonstration project, more neighboring farmers of the private irrigator became interested in irrigation. A total of 20 farmers started using the new canals on 15 hectares. The arrangement was that people buy fuel to irrigate their own plots, and also irrigate the plot of the owner during one sixth of the time. Thus, some 20 liters allows for three hours of pumping. Out of this, 2.5 hour is for the water buyer's plot, and 0.5 hour for the pump owner's plot.

With the decision to limit the construction of the new canals to 250 hectares and to have the intake at the other private farmer's plot, the plots of the five brothers of the Ndonga farmers' association fell largely outside the system. Nevertheless, during the irrigation season in 2009, the district government encouraged the farmer association to take up irrigation again by subsidizing fuel. On their own account, the farmers association rehabilitated the canals to their own fields, using some 15 meters of the newly constructed canals. This allowed 18 farmers to engage in irrigation. Out of the 38 irrigators during 2009, 18 were women. Further, farmers alongside the canals also started taking water, bringing the number of irrigators up to 121.

This uptake of irrigation had impacts on both the time spent on farming and on the crop yields of these 38 households, as estimated in surveys and focus group discussions before and after the project (Mirira and Monjane 2009). Before the project, all agricultural activities, which were mainly rainfed, took an average of three hours per day. The above-mentioned irrigation activities increased time spent on farming by the 38 households to six hours per day.

Figure 3 shows how the farm production per household changed for the beneficiary households.

Figure 3: Change in annual produce (kg) per irrigating household before and after the IWRM Demonstration project

Produced Crops	Annual crop produce per household before the project (kgs)	Annual crop produce per household after the project among beneficiaries
Maize	2500	6500
Beans	4500	7500
Tomato	5000	9500
Onion	1500	3500
Other crops	500	1500

Source: Mirira and Monjane 2009.

The electric pump and the electricity line

After the community meeting in April 2008 in which agreement was reached about the activities to undertake, the Ndonga project steering committee intensified the negotiations with the District Council and the Electricity Company EDM to pull a line to the river site. Again, an unforeseen event came up, but this time it was favorable. In September, president Guebuza of Mozambique made one of his tours into the countryside reaching out to the rural population. He visited the cattle dam under construction and talked with people from Ndonga, who expressed their hope to obtain an electricity connection for the irrigation scheme. The president

recommended sending crop seeds to Ndonga, which arrived shortly afterwards. On 26 November 2008, the president came to a meeting in Guijá, in which the Ndonga people participated and expressed the same wish.

Through the District Council Administrator and Permanent Secretary, the request for a connection was forwarded to the Electricity Company EDM in Xai-xai. They also tried to submit a financing request through the 'seven million' fund, a revolving fund that each District Government received for development loans. Few months later in 2009, a new District Permanent Secretary realized that the 'seven million' fund was not suitable for such requests and directly addressed the Provincial Department of Mineral Resources and Energy. In April 2009, EDM had visited the site and estimated the costs of pulling the line at USD90,000.

All along the implementation process, the Ndonga project steering committee, the district officials and IUCN insisted that the SADC/Danida Water Sector Program should purchase an electric pump as soon as possible, before prices would go up even further. They argued that having the pump physically present would strengthen their request. Even just raising the possibility of a diesel pump led to full rejection by the private irrigator: 'a diesel pump is like giving stones when we are asking for bread'.

The SACD/Danida Water Sector Program formulated various conditions to ensure that further spending of public donor money for the scheme would bear fruits after project closure:

- That the pump will be assigned to a responsible party, such as the district for custodianship, until the electric line is ready for connection
- That a responsible party be assigned to work with the district to drive and follow-up on the progress of the installation of the electric line and ensure the project is incorporated into the Provincial Department of Mineral Resources and Energy and EDM planning.
- That proper and efficient institutional arrangements are in place to ensure sufficient maintenance and management of the irrigation scheme including agreement on calculation of water tariffs, land tenure (ownership clear, handling of leasing arrangements and ensure benefits accrue to owners etc).

By the time of project closure, the irrigation Project Committee and the District had committed to try and implement these conditions.

Capacity building

In the meantime, UDEBA had formed three Community Water Management Units, consisting of Steering Committee members, for the boreholes, dam and irrigation system. In December 2008, UDEBA organized a 5-days management training with experts from HICEP for the village leaders, the private irrigator and the five brothers and women leaders. Issues included leadership, accountability, entrepreneurship, conflict resolution, financial management but also issues like avoiding siltation and erosion of dams because of animal trampling.

Marketing study and linkages

A researcher of Eduardo Mondlane University carried out a marketing study. IUCN also established relationships with MIA, a major maize company in Chókue, which is interested in buying the potential bulk production in Ndonga.

7. MONITORING, IMPACT ASSESSMENT AND LESSONS LEARNT

Continuous ‘Step’ Seven: Do participatory monitoring and evaluation, and livelihood impact assessment for follow-up

7.1. Livelihood impacts

The livelihood benefits achieved were the following.

- Considerable time gains of an estimated 3.5 hours in accessing water for domestic uses through the new five boreholes.
- Management training for the borehole, cattle dam and irrigation management committees
- Wages for construction work, especially for the cattle dam
- Handing out of shovels, boots, and other tools.
- Businesses created for local contractors.
- Last but not least, a revitalization of irrigation in the flood plains which expanded from the private farmer’s own and rented plots before the project to 38 irrigators using water from the private irrigator’s pump and the revitalized farmer association’s pump. Other farmers use water directly from the canals. Irrigation enabled farm households to increase their time for farming from an estimated three to six hours. Their yields increased considerably.

7.2. Lessons learnt

The experiences in Ndonga show four challenges in managing participatory planning processes. The first lesson underscores the phased nature of local-level IWRM. The implementing agent needs to clarify the project framework and budget ceiling to the community and to service providers. Poor communities’ needs are infinite. Moreover, communities tend to make the longest list possible in the endeavor to also include the legitimate needs of their many fellow community members bargaining for their share as well in a hopefully bigger pie. During the visioning process, community members were encouraged to make wish lists and define hand-outs, while the first technical design of a scheme of 1000 ha was far beyond the available budget. This may have been based on the naïve expectation that expressing more needs brings more money. However, in reality one loses precious time if one suggests that a project is still in a phase of negotiation on an overall amount with a donor, when that phase has already been passed. Moreover, such suggestion raises unrealistic expectations which are, inevitably, followed by disappointments among community members and loss of trust vis-à-vis the implementing agent and, according to the image of the donor painted by the implementing agent, also vis-à-vis the donor. Indeed, by 2008, community members told the IUCN field assistant that they had wished to know the budget frame from the outset so that they could have better matched their prioritized activities within the funding available. The lesson is that the negotiation phase about the total budget takes place during the preceding agreement on the project framework for local-level IWRM. Once this is agreed, it needs to be communicated to communities and service providers so that next steps can be taken without delay.

Second, powerful players need to be brought on board in the early stages of new plans. Sasol is such powerful agent, who after some months of being aware unexpectedly instructed to abandon an already advanced

expensive investment, even though they were in the clear interests of the community and within the formal rules of the law. In such unfortunate and unfair events, communities need backing from supporting agencies to go the extra mile to protect the efforts made by all. As far as possible, formal agreement needs to be negotiated already in the planning phase.

Third, in participatory planning processes agencies need to manage the short- and longer-term needs and ambitions. This is also related to the stepped approach. In the early visioning phases communities need to be encouraged to 'think outside the box'. However, during prioritization and selection of activities, a distinction needs to be made between activities that can, and activities that cannot be realized within the time- and budget frame of a particular project. This is a balancing act, especially because new factors may come up that justify some revision. In the case of Ndonga community, the visit of the president brought the realization of the electricity line definitely nearer – but the question remains whether it is near enough to be realized at a sufficiently short term to render an electric pump a solid purchase. It might be better to have various scenarios and to develop a parallel alternative 'Plan B'. For example, the five brothers, or even other land owners in the flood plain, at other sites along the Limpopo River, could well have been able to do more with a diesel pump. The canal lay-out could also better have catered for those other irrigators.

Fourth, it needs to be managed 'who' is participating in participatory planning. The experiences in Ndonga community show how leading community members, in collaboration with a District team, can immediately come forward with activities in their own and others' interest. Once commitments have been made with a certain group, who also made the time investments, expectations raised make it difficult to still explore other scenarios and options. Engaging with many more community groupings, such as the other irrigators in the plain, can best, if not only, be done during the steps of understanding the community and building trustful relationships with a broader group. That is the basis upon which many more groupings can then be engaged in a process of visioning, prioritization and selection of activities.

Besides these four issues in the management of participatory planning processes, another lesson learnt was that the contacts of IUCN/UDEBA with the District Council were pivotal. In spite of their considerable staff turn-over, the support by District Government appeared critical for:

- the community selection – this built the District's ownership throughout the planning and implementation process, which is the best basis for their continued engagement after hand-over
- mobilization of technical expertise, either directly through the District or other government or parastatal line agencies, in this case HICEP
- advocacy on behalf of Ndonga community's efforts with the country's president
- application for electrification with the provincial government and, most critically, pro-active follow-up after project closure, and
- follow-up on Sasol's sudden objections against the cattle dam and promises for compensation.

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ANNEX 1: PROJECT STEPS IN LOCAL LEVEL IWRM

Step One: Mobilize support

- Strengthen existing development plans.
- Compile integrated support.
- Define targeting procedures.
- Establish horizontal, integrated service delivery structures.
- Ensure vertical national support.

Step Two: Select communities

- Develop selection criteria within time and funding frames.
- Communicate widely and test for compliance.
- Select.

Step Three: Understand the community and build capacity

- Build trusting relationships and communicate the project concept.
- Do contextual profiling.
- Train the community and select community mobilizers.

Step Four: Create a vision and select activities to fulfil it

- Do participatory situational diagnosis and problem analysis.
- Create a vision of new ways to manage water.
- Rank opportunities and needs.
- Select activities for implementation.

Step Five: Compile detailed action plans

- Create and train community structures.
- Specify actions, roles and budgets.
- Sign off.

Step Six: Implement the action plans

- Construct communal infrastructure and develop the capacity to operate and maintain it.
- Create management structures and develop their capacity.
- Implement the accompanying interventions and develop the capacity to maintain them.
- Ensure sustainability when exiting.
- Operate and maintain infrastructure and continue capacity development.

Continuous 'Step' Seven: Do participatory monitoring and evaluation, and livelihood impact assessment for follow-up

- Monitor planning, implementation and use.
- Monitor the impacts on livelihoods.
- Identify follow-up plans for community-based water resource management.