

ANALYSING STAKEHOLDERS FOR SUSTAINABLE WETLAND MANAGEMENT IN THE LIMPOPO RIVER BASIN: THE CASE OF GA-MAMPA WETLAND, SOUTH AFRICA

Younès Darradi¹, Frédéric Grelot², Sylvie Morardet*

* corresponding author

International Water Management Institute

Private Bag X813, Silverton 1027 Pretoria South Africa

Tel: +27 12 845 9100 Fax: +27 12 845 9110 s.morardet@cgiar.org

Abstract:

The Ga-Mampa wetland within the Mhlapitsi river catchment, located in the Olifants River basin in South Africa, is used by the local community as part of their livelihoods. It has been recently partly converted to agricultural land with potential threats on its ecological functions, such as the regulation of hydrology of the river. To ensure that this development does not compromise environmental security, a holistic approach is required. In particular, sustainable management of wetland cannot be achieved without active participation of all stakeholders including the local community. Therefore, a stakeholder analysis appears to be a prerequisite for any development or research intervention on wetland management, as emphasised by the Ramsar Convention.

A stakeholder analysis was conducted in 2005 in this wetland. Its objectives were to (1) consolidate the understanding of the system, with an identification of key stakeholders, (2) set their perception of the situation, the issues at stake regarding the wetland use and management, the causes of conflicts among them, and (3) identify existing and potential trade-offs between the various uses of the wetlands and its ecological functions. The approach used comprises three different types of interviews, depending on the targeted interviewees: scientists, local community members and stakeholders living outside the valley.

The results illustrate the wide range of stakeholders involved in the management of this wetland and the diversity of their perceptions. Local community members mainly consider the wetland as an agricultural resource for their livelihoods while stakeholders from outside focus more on its hydrological importance for the Mhlapitse River and further downstream for the Olifants River. The latter also consider the wetland as an opportunity to develop economically the valley using alternative livelihood activities such as craft industry and tourism. Similarly solutions proposed by the various stakeholders differ according to their perception. Three main trade-offs have been identified: between crop production, livestock grazing and natural vegetation production; between water for on-site food production and income generation and water supply downstream; and between today's livelihoods and future soil fertility.

The paper concludes on an analysis of the advantages and limits of the approach used for further application.

Target sub-theme: Water and land, oral presentation

¹ Post-graduate student of Ecole Nationale d'Ingénieurs des Travaux Agricoles de Bordeaux, IWMI intern

² Cemagref, Montpellier, France

Introduction and rationale³

In the Limpopo River Basin characterised by climatic extremes, wetlands are important aquatic systems. Because of the abundance of water in wetlands particularly in the dry season, when compared to the surrounding catchment area, they constitute important resources for rural people livelihoods and perform major environmental functions. Wetlands and their surrounding catchments support rural livelihoods through provision of a large range of natural resources including soils, water, plants and animals, that are used by rural households in a various activities (Turpie 2000; Turpie *et al.* 1999; Masiyandima *et al.* 2004; McCartney and van Koppen 2004). Uses of wetlands also include cultivation and livestock grazing and watering. When compared to dry land, the interest of wetlands for crop production lies in their residual moisture all year round and the wider range of crops that can be cultivated. Therefore wetlands take an essential part in food security, especially during the dry season or in drought years, and dietary variety (Masiyandima *et al.* 2004).

The benefits rural people derive from wetlands are supported by the variety of environmental functions performed by these complex and sensitive environments. These functions benefit not only people living on or nearby wetlands but have also effects on people living downstream. The type and intensity of wetlands uses have potential impacts on these functions. Increasing population and a higher frequency of drought, that drives farmers to extend wetlands area under cultivation, have put a high pressure on wetlands ecological processes.

Acknowledging the important role of wetlands for local communities but in the same time the necessity to preserve their crucial ecological functions, the research project “*Wetlands-based livelihoods in the Limpopo basin: balancing social welfare and environmental security*” under the Challenge Program Water and Food⁴ aims at enhancing food security and improving the livelihoods of wetland-dependent communities by increasing productivity of water and optimising and maintaining wetland ecosystem services. More specifically, the project proposes to analyse the mix of wetland uses and the trade-offs among them, to develop guidelines and tools to assist decision-making at various levels (local community, local governments, policy-makers) and to enhance capacity of wetland users, managers and policy makers. Research is conducted in three sites in the Limpopo river basin: the Intunjambili wetland in the Tuli river catchment in Zimbabwe, the Chibuto wetland in the floodplain of the Changane river, a tributary of the lower Limpopo, in Mozambique; and the Ga-Mampa wetland in South Africa.

The Ga-Mampa wetland is a riverine wetland located in the bottom of the steep sided valley of the Mohlapetsi river, a tributary of the Olifants River, in the middle part of the Limpopo basin (Figure 1). Although only a small tributary, it seems that the Mohlapetsi River makes a significant contribution to the flow of the lower Olifants particularly in the dry season (McCartney 2005). The wetland covers approximately 1 km² of the catchment of a total area of 490 km². The catchment is predominantly rural, with a low population density. The upper catchment comprises relatively natural grassland vegetation, contained within two natural reserves (Sarron 2005). It is assumed that wetland hydrology is affected by the upstream flow

³ This paper is based on the Master thesis of Younès Darradi (Darradi 2005).

⁴ This research project associates National Agricultural Research Institutions from Zimbabwe, Mozambique and South Africa (University of Zimbabwe, University Eduardo Mondlane, Institute of Water and Sanitation Development, University of Pretoria, Witswaterand and Limpopo), French research institutions (Cemagref, IRD, Cirad), and the International Water Management Institute (IWMI).

and possibly underground water connections that may link with lateral inputs from small streams and 'side-swamps' (McCartney 2005). The contribution of the wetland to the hydrology of the Mochlapetsi and more largely to the Olifants River is not well understood. The local communities of four villages, located close to the valley bottom, use the wetland for various purposes including among others crop cultivation, livestock grazing and wild plant harvesting for crafts and building. The wetland area has been converted to agriculture over the last decade following the collapse of irrigation schemes after the floods in 2000, to the extent that more than half of the wetland has been converted to agriculture (Chiron 2005; Ferrand 2004). It is also modified through grazing activities and probably road and irrigation infrastructures. The impact this has had on the hydrological and ecological functioning is not fully understood so far.

In each of the three sites, the first step of the research framework (presented in Masiyandima *et al.* 2005) consists in a stakeholder analysis, so as to define the system physical and social boundaries, the main characteristics of its functioning, and the relevant time and spatial scales for further research. As wetlands perform a wide range of functions and provide various services to people, the stakeholders' interests about wetland are likely to be multiple and possibly conflicting. Therefore a specific approach is needed to analyze the complexity of relationships between various stakeholders. This paper presents the approach developed and the results of the stakeholder analysis conducted in the Ga-Mampa wetland. The objectives of the stakeholder analysis were to (1) consolidate the understanding of the system, with an identification of key stakeholders, (2) set their perception of the situation, the issues at stake regarding the wetland use and management, the causes of conflicts among them, and (3) identify existing and potential trade-offs between the various uses of the wetlands and its ecological functions.

The paper is organized as follows: the next section presents the main concepts of the stakeholder analysis as reported in the literature. Then the approach developed in this research project is described and the results of the analysis for Ga-Mampa wetlands presented. The paper concludes on a feedback on the method used and the lessons of the analysis for further research on the site.

Concepts and approaches for stakeholder analysis

It is generally acknowledged that the community involvement and participation in the management of natural resources is a condition of their sustainable use. In the case of wetlands, they are recognized as fundamental principles of wise use by the Ramsar Convention (Ramsar Convention Secretariat 2004b; Ramsar Convention Secretariat 2004a).

Stakeholders can be defined as the people who either (i) will be potentially affected by the management of wetlands; (ii) will be involved by one way or another in the implementation of management activities; or (iii) who are likely to support or oppose the research or development project or the policy at stake.

Usually, the expected outcomes of stakeholder involvement in natural resources management are (i) a better understanding of people concerns leading to solutions more adapted to their needs; (ii) an assessment of their knowledge about the wetland system, the integration of this knowledge in management options, and a better targeting of awareness and education activities; (iii) ownership of the project and support to its implementation; (iv) reduction of potential conflicts among stakeholders; and finally (v) improved communication and coordination of actions and stronger working relationships among stakeholders.

Grimble and Wellard define stakeholder analysis as “*holistic approach or procedure for gaining an understanding of a system, and assessing the impact of changes to that system, by means of identifying the key actors or stakeholders and assessing their respective interests in the system*” (Grimble and Wellard 1997). In the development context, stakeholder analysis is used by International Development Agencies as a project management tool to identify the consequences for stakeholders of the implementation of a particular project or policy (Grimble and Wellard 1997). In a research context, stakeholder analysis is used as an analytical tool to understand complex situations, its potential evolution and trade-offs between various objectives (Grimble *et al.* 1995; Grimble 1998). We adopted the latter point of view in this research.

Grimble and his colleagues proposed a five steps approach for the analysis (Figure 2), each of them involving specific tools (Grimble 1998; Grimble *et al.* 1995). They insisted however on the fact that the approach should remain flexible. In the case of our research project, the purpose of the stakeholder analysis would be to help formulating the project design, guide the implementation of research activities and target the research outputs. For the second step, tools used in participatory rapid appraisal (interviews of key informants, focus group discussions, time line and participatory mapping, transect walks, seasonal diagrams, preference ranking and Venn diagram) are particularly adapted. Examples of application of these tools to wetland systems are given by Masiyandima *et al.* 2004 and McCartney and van Koppen 2004, and detailed description on how to implement these tools in Wilde 2001. Interviews can also be complemented by direct observations of stakeholder practices. At this stage it is important to understand what are the uses of the wetland, the direct and indirect goods and services people derive from it, the rules of access to the resources and constraints people experience in using it, the form of management of the resources, and the context in which each stakeholder group take its decisions.

The identification of stakeholder groups is a critical and delicate step, which needs to be thought of on a case-by-case basis, as the relevant actors to include in the analysis will depend on the purpose of this analysis. However it can be useful to refer to a classification of stakeholders to avoid missing important actors. Grimble and Wellard distinguish stakeholders according to their level of intervention from global, national and regional level down to the household or even intra-household level. They also divide them into active stakeholders (those who affect a project or an action) and passive ones (those who are affected). Hein *et al.* (2005) refine this classification by relating the scale at which ecosystem services are provided to human beings to the institutional scale at which stakeholders take their decisions on the utilization of their different sources of capital, including natural resources (Figure 3). The difficulty resides in the fact that ecological and institutional boundaries seldom coincide. Various tools can be used to identify stakeholders: interviews of key informants, focus group discussions, and secondary data. In general the previous step of understanding the system provide a first list of actors that can be refined further.

The assessment of stakeholders’ interests and characteristics can be done through a variety of data collection method. Grimble particularly recommends informal, semi-structured interviews. More formal and quantitative approaches are proposed by supporters of multi-criteria decision approaches (e.g. analytical hierarchy process, see Herath 2004 ; Strager and Rosenberger ; De Marchi *et al.* 2000). In the context of the European Water Framework Directive, which imposes public consultation during the development of watershed management plans, Garin *et al.* propose an analysis of stakeholders’ points of view based on a semi-structured survey (Garin *et al.* 2001 ; Rinaudo and Garin 2002). Their approach aims at linking the scientific and technical knowledge of experts with the viewpoints expressed by

local actors. The questionnaire covers water uses of the interviewee, her knowledge about the water resources of the basin and their uses, her concern about water, the impacts of her activities on water, the existence of tensions and conflicts over water use in the basin, and proposed solutions to ease these tensions. In order to represent the diversity of points of view within time and budget limits, the sample of interviewees is composed of persons likely to represent an interest group in a public debate on water issues, representatives of organizations which intervene in the water sector, and individual water users that are not institutionally represented. The various sectors of activities that use water or have an impact on it are represented in the sample. Example of application of the approach to the Lère River catchment and Hérault River basin in France are given respectively in Batut 2001 and Ruhlmann 2001.

The last step of the stakeholder analysis consists in characterizing the relationships between the various stakeholder groups as conflict or cooperation and assessing the intensity of these relationships. Grimble and Wellard make a distinction between conflicts and trade-offs. They define conflicts as “*situations of competition and potential disagreement between two or more stakeholder groups over the use of one or more scarce resource*” and trade-offs as “*process of balancing conflicting objectives by a particular stakeholder group*” (Grimble and Wellard 1997, p.179). Owen et al. classify conflicts in three categories according to their intensity: “*Disputes are disagreements arising over differences in interests and positions. They tend to be over a single issue and involve low levels of emotion and little investment of group or individual identity. (...) Conflicts are disagreements that tend to involve significant levels of emotion and are enmeshed in the identity of the groups and individuals involved. Deep-rooted conflicts are those conflicts that involve basic needs which cannot be compromised or suppressed.*” (Owen et al. 2000, p.478). The type and intensity of relationships between stakeholder groups is often related to the degree of their influence and power⁵, a characterization which is often used by Development Agencies (e.g., World Bank 2003). However other factors may affect interactions between stakeholders: nature of power and authority relationships, socio-cultural relationships, historical contexts, and legal institutions. Discussion of past concrete case of conflict, using either group meetings or interviews of representatives of stakeholder groups, appears to be the most appropriate way to collect information. An example of the output of such an analysis conducted with a group discussion is presented in Figure 4.

Finally, results of steps 4 and 5 can be summarized in a stakeholder analysis matrix as in Table 1.

Method developed in this project

- *General approach*

Following Grimble’s recommendations (Grimble 1998; Grimble et al. 1995), our presentation follows the five steps identified in Figure 2. In this section, we present and argue basic assumptions made for achieving each of these steps, except the final one, which corresponds to the analysis presented in the next section.

⁵ “*importance refers to those whose needs and interests are the priorities of aid while influence refers to the power certain stakeholders have over the success of a project*” (Grimble and Wellard 1997).

As presented in the former section, the main objectives of the analysis (step 1) were threefold: (1) contributing to formalize expert knowledge, (2) identifying stakeholders perception of issues related to wetland, and (3) exploring potential trade-offs related to wetland uses⁶.

The second step consists in developing an understanding of the system with a clear identification of decision-makers in the system. One interpretation of this step is that one is supposed to have a consolidated expert knowledge on a system before making a stakeholder analysis. We should therefore give some precisions on the fact that we chose as our first objective something that may be interpreted as an intermediary mean of the overall analysis. In fact, our first intention was to make a clear distinction between expert knowledge and stakeholder perception, which allows doing analyses as proposed by Garin *et al.* (Garin *et al.* 2001 ; Rinaudo and Garin 2002). We did not consider that formalized knowledge on the site was sufficient at the beginning of our study, and then chose to follow another approach, considering that scientists involved in works related to Ga-Mampa area were special stakeholders. Applying techniques from stakeholder analysis to scientists might contribute to our understanding of the system, by extracting their expert but non-formalized knowledge about the system. This has been completed by a review of existing scientific and gray literature related to the study site. While not presented in this paper, outcome of this step is a partial understanding of the system, with hypotheses and scientific controversies.

In order to identify key stakeholders (step 3) and investigate their perception (our personal implantation of step 4), the assumption was made that non-scientific stakeholders were divided in two groups: local stakeholders and external stakeholders. The reason for this distinction was ideally based on the possibility to have a regular interaction with Ga-Mampa wetland. Thus, local stakeholders refer to people that live close to the wetland, whereas external stakeholders refer to people living outside the catchment. We have to mention that our distinction between local and external stakeholders may be ambiguous for some particular people: people living inside the catchment area but in some villages downstream of the wetland, people living outside the catchment but with a strong implication in the area.

Figure 5 summarizes the approach we used for the stakeholder analysis, and shows that a special place was given to researchers interviews, even if they were considered as “stakeholders”.

- *Methodology used for interviews*

The distinction we made between the different groups of stakeholders (researchers, local and external) had direct implications on the methodology we used to interview them.

As explained above, the objectives of the researchers’ interviews were (i) to formalize their non-formalized knowledge on the Ga-Mampa wetland system and identify knowledge gaps, (ii) to derive from this knowledge, hypotheses to be tested through interviews of local and external stakeholders and guide the elaboration of the corresponding questionnaires and samples. Five persons were interviewed from two research teams and institutions: IWMI (one economist, one geographer-agronomist, and one hydrologist) and University of Limpopo (the coordinator of the Centre for Rural Community Empowerment – CRCE - and its facilitator, also a member of the local community). Researchers were asked to draw 6 sketches along the interview in the following order:

⁶ The fact that in our case, stakeholder analysis was itself considered as a step of an overall project, with other actions deepening the understanding of potential stakeholders is to be mentioned

1. Geographical representation of the catchment, in order to identify the structuring elements of the local landscape: physical boundaries, hydrology, relief and land-use (field plots – houses – roads – natural environment).
2. Links between the site and outside, in particular the broader Olifants River basin, in terms of trade, migration of populations, hydrology, etc.
3. Functional representation of the system following the hydrological cycle, identifying the various water sources and their uses from upstream to downstream.
4. Schematic representation of the different uses⁷ and functions of the wetlands and their beneficiaries.
5. Sketch of land use dynamics, to understand the main features of land ownership and allocation in the area and the related power relations among the different actors.
6. In parallel with the previous drawings, a 6th sketch was drawn representing the relationships – power and conflicts - between the different stakeholders.

An example of outputs for each of these drawing is given in Figure 6.

For the local stakeholders, as we made the assumption that they have strong links with Ga-Mampa wetland, the objective was to get quite a precise view of their perception on several points: their conception of a wetland (which characteristics to be used; the expanse of Ga-Mampa wetland; the functions and uses linked to wetlands (in general, for Ga-Mampa wetland in particular, and their own uses); qualification of each mentioned function or use (who is concerned, how many people, how frequently, what period of the year, where precisely in the wetland, impact on the evolution of the wetland); global evolution of the wetland; concerns and tensions among users and/or other stakeholders (external included); proposed solutions to manage wetlands issues, proposed managers. These questions on perception were completed with some others on personal characteristics (age, gender, role in the community) to enable the analysis. We chose a semi-opened questionnaire with a clear formulation of questions to facilitate translation into local language. A map of the locality, with some basic indications, was used to allow people to draw geographical indications (expanse of the wetland, location of specific uses).

For external stakeholders, the assumption was that they might not have a good knowledge on Ga-Mampa wetland, but might have some general points of view on wetlands. Basically, the questions asked concerned the same topics as for local stakeholders: definition of a wetland, their functions and uses, good management of a wetland, possible tensions or conflicts, way to manage them. As we could not know what was the particular knowledge on Ga-Mampa wetland of each interviewee before starting, people were asked to answer first from a general point of view and, when possible, for Ga-Mampa wetland. We chose a completely open questionnaire, while inciting them to draw, from blank, a picture of Ga-Mampa wetland. All those interviews were conducted in English.

⁷ We remind that a “use” is defined as the utilization of a component of the wetland by people whereas a “function” is a characteristic not used directly by the communities but from which they may –or not – benefit.

Stakeholders, perceptions of and concerns about the Ga-Mampa wetland

- *A wide range of stakeholders are involved in the management of Ga-Mampa wetland*

The different stakeholders have been classified according to their role and level of intervention (Table 2). Assumptions behind this are that the degree of knowledge on Ga-Mampa wetland is dependent on the scale of intervention (the more local a stakeholder is, the more he/she is knowledgeable about the wetland); and the type of knowledge (e.g., scientific, mainly on environmental issues, etc.) depends on his/her role. It is interesting to note that even if our first assumption was to distinguish only local and external stakeholders, we finally use more gradations.

Stakeholders and their relationships are represented in Figure 7. A relation is said to be balanced when two stakeholders communicate but do not influence each other. A “has power on” relation means that one of the stakeholders can potentially influence the other. This influence can be more or less important and more or less effective. In some cases of power relationships, the influenced stakeholder communicates with the one who is influencing him (“possible feedback”).

As explained in the presentation of the method, stakeholders are divided into three groups: local stakeholders, external stakeholders and researchers. This division is visible in the network of relationships: local stakeholders, who regroup traditional authorities, the Community Development Forum (CDF) representing the communities and different groups of wetland users (cultivators and livestock breeders), are linked together by strong relationships. Some external stakeholders (the different levels of governments, from local to national, Mondi Wetland Project – MWP – an environment lobbying group, and Working for Wetlands – WfW – a governmental program) are also related by working relationships. Other external stakeholders, such as the Olifants River Forum, which regroups all the main water users⁸ in the Olifants River basin, or the Kruger National Park are more loosely linked with the others. Local stakeholders relate with the lowest levels of governments or their technical staff (e.g., ward councillor, extension officer) and with researchers (IWMI and University of Limpopo) who implement field research activities.

- *Perception of the situation differs from one stakeholder group to another*

External stakeholders define a wetland by the presence of water, its specific soils and plants, in accordance with the scientific definition. Local community members define it more by the presence of reeds and water, i.e. elements that are easily visible. However, when asked about, they also evoke some animal species and type of soil. In any case, in their definition local stakeholders focus on animals and plants they can eat or sell. This illustrates that contrarily to external stakeholders their main issue is not the preservation of the wetland but to find a way to have enough food and to earn a little money.

Wetland uses and functions perceived by each group of stakeholders are presented in Table 3, following the classification of wetland ecosystem services proposed by Millenium Ecosystem Assessment 2005 (see also Hein *et al.* 2005 and de Groot *et al.* 2002). Provisioning functions are the most often cited and acknowledged by all categories of stakeholders, and probably the most important for the local communities from a livelihood perspective. Regulating functions,

⁸ In terms of economic power: mining sector, commercial irrigated agriculture, hydropower generation and tourism.

which benefit more the downstream population than the local one are nevertheless also cited by all stakeholders, with slight differences as presented below. Stakeholders see information functions as the least important on this particular site.

From Table 3, a relation appears between the ecosystem services perceived by stakeholders and the scale at which they work or take their decision. The Ga-Mampa community mainly perceives production services and the religious function it benefit from. If local wetland users also speak about regulation services, they do not seem to give it as much importance as to production services. It can also be assumed that without various interventions from external stakeholders (extension officer, MWP, Limpopo department of Economic Development Environment and Tourism - LEDET), they would not have been aware of the existence of such services. External stakeholders do not perceive the wide range of goods local people derive from the wetland, but only some of them (cultivation, reeds and grass collection). This translates a superficial knowledge of Ga-Mampa wetland, except for few of them (MWP, extension officer) On the contrary they emphasize on the regulating functions, especially the water supply to Olifants River. They also cite tourism as a potential use. Researchers give a lot of importance to production services but are also those who are the most interested in regulating services.

As for services provided by wetland, concerns expressed by each group of stakeholders (see Table 4) are related to their interest and scale of intervention. Concerns of local stakeholders are strongly linked to their uses of the wetland and the problems they face in their daily life. They spontaneously insisted on the latent tensions between cultivators and livestock owners, although this was not proposed in the questionnaire, while external stakeholders hardly mention them. External stakeholders seem more concerned with the diminution or disappearance of the wetland, which they relate to the development of cultivation, than with the problems faced by local community. In this respect, “wetland preservation” has a different meaning for the two groups: for local community the issue is to preserve the natural resources they are using, although external stakeholders aim at protecting its environmental functions at a larger scale. Indeed, the concerns of the latter about this particular wetland reflect their concerns about wetlands in general. The only issue on which external and local stakeholders agree is erosion, which therefore may be used as a starting point to discuss about wetland management. Tensions represented on Figure 7 were identified both from stakeholder interviews and informal conversations with community members. Tensions between traditional authorities and the Community Development Forum and local municipality are originated from the new political dispensation since the end of apartheid. While the new South African Constitution (Republic of South Africa 1996) acknowledges the role of traditional authorities over natural resources management, more specifically land allocation in communal areas, their legitimacy has been weakened first because of the collaboration of some traditional leaders with the government of apartheid⁹, and more generally because “*we are now in democracy and no one can force his fellow to do something!*” (a Ga-Mampa wetland farmer quoted by Tinguery 2006). In Ga-Mampa community, the advent of democracy was translated into the creation of the Community Development Forum, a link between the local community and its elected representative to the municipality, the ward councillor.

The conflict between MWP and the community was first documented by Ferrand 2004. Local stakeholders and MWP representative again reported it during the interviews. Tensions arose after a training session organised by MWP for agricultural extension officers. The Ga-Mampa

⁹ It does not seem to be the case for Ga-Mampa.

wetland was chosen as a case study for trainees to conduct a diagnosis of wetland status. Trainees found that the wetland was degraded because of cultivation. In their meeting with the wetland committee chairperson they suggested that farmers should move out of the wetland, referring to the Conservation of Agricultural Resources Act (CARA, Republic of South Africa 1983), which formally forbid wetland cultivation. The community rejected this position, arguing that they are using the wetland for livelihood purpose. Through the mediation of the ward councillor, a meeting where each party was able to explain its position was organized. MWP suggested to write a proposal for the rehabilitation of the wetland in collaboration with the community and local municipality and to help securing some funds to implement it¹⁰. Conflict seems over now. Nevertheless, local people keep these tensions in mind and seem ready to react against any attempt to force them out of the wetland.

Only local stakeholders evoked tensions within the community. They occur between livestock breeders whose livestock graze in the wetland and farmers who cultivate plots in the wetland: because fences that are supposed to protect the plots against animal intrusion are deteriorated, cattle and donkeys which roam freely in the area can easily destroy the crops. It seems that these tensions can easily degenerate into an open conflict if no measure is taken. As opposed to researchers, external stakeholders, except the extension officer, are not aware of these internal tensions.

- *Proposed solutions for sustainable management of the wetland*

Solutions proposed by the various stakeholders to ease the tensions and preserve the wetland functions reflect their perception of and interests in the system (Table 5). Community members focus on solutions that will help their daily life and improve their livelihoods: the adoption of “better” agricultural practices and the fencing of wetland plots to limit the tensions between farmers and livestock owners. The range of solutions proposed by external stakeholders is wider and address both local conflicts among wetland users and preservation of wetland services at a larger scale:

- Technical solutions to limit tensions between wetland farmers and livestock owners: the objective is there to protect wetland and irrigation plots against intrusion from livestock and avoid escalation of tensions into conflict. Although rehabilitation of fences should occur quickly to allow farmers to implement their crops, their exact position may be an issue, as fencing wetland plots can be seen as a recognition of the legitimacy of wetland use for cultivation.
- Technical solutions to limit erosion of the riverbed: protection of the riverbanks by gabions or tree planting was proposed by MWP, LEDET and the extension officer as a way to limit the erosion. It must be noted that this would be efficient only in the case of moderate floods. Another aim would be to prevent cultivation close to the riverbed. A proposal for wetland rehabilitation has been informally submitted by MWP to WfW, but funds are still lacking. Many stakeholders at local and provincial levels support this proposal. The interest of trees compared to gabions is that they could provide fruits for local consumption and improve the landscape; therefore it would be easier to involve the community in their management.
- Awareness program to enhance community knowledge of wetland functioning and to improve wetland-farming practices: this solution was cited by almost all external stakeholders and is based on the understanding that sustainable use of wetlands

¹⁰ A detailed report of the origin of the conflict and its development can be found in Tinguery 2006.

requires a full participation of the community that is using it. This program should include description of wetland functioning, presentation of current legislation related to wetlands and “best agricultural practices”.

- Economic alternatives to wetland cultivation: rehabilitation of irrigation schemes and development of tourism: all external stakeholders acknowledge that wetland cultivation contribute to livelihoods of Ga-Mampa community; therefore one of the solutions to limit further alteration of the wetland or even to reverse to a lesser extend of cultivation would be to offer livelihood alternatives. Rehabilitation of irrigation schemes was the most obvious alternative for external stakeholders. Its real effect on the decrease of wetland cultivated area will depend first on the level of income that can be derived from the irrigation schemes, which is not only function of the physical rehabilitation but also on farmers collective organization to distribute water and access to market, and second on the proportion of wetland farmers that do not have access to irrigation schemes. It is the purpose of the livelihood analysis and economic valuation of wetland goods and services to assess the likelihood of these impacts. The CDDA representative also evoked the development of other wetland-based economic activity, such as craft industry in relation to tourism activities around the eco-lodge recently built in Ga-Moila. At present it is still not clear if the wetland protection was part of the motive of the construction of the facilities. It is more likely related to the presence nearby of the two nature reserves and of the location of Ga-Mampa on the African Ivory Road, a historic trail used by traders until the 19th century, which is marketed by the Limpopo Department of Economic Development, Environment and Tourism.
- The strict application of the law, which forbid cultivation in wetland (CARA), is a threat that is envisaged as a last resort by external stakeholders to force wetland users to adopt a more sustainable use. Nevertheless the credibility of the threat can be questioned, as the CARA, which was adopted during the apartheid, is not perceived as completely legitimate in the new South Africa¹¹. Furthermore it did not really target wetland subsistence farming but more commercial farming activities. Finally the Department of Agriculture, responsible for its application, lacks the human capacities and financial means to really implement it.

Discussion and conclusion

- Feedback on the approach

The method used to interview researchers aimed at analyzing scientific knowledge as one of stakeholders’ points of view on Ga-Mampa wetland. The main interest of the approach is that it allows collecting not only information on facts but also on scientific assumptions, which would be verified in the course of the research project. The range of themes addressed during the interview is quite wide, and the course of the interviews remains very vivid. Its main drawback is that it requires quite a long time to implement and analyze the interviews, more specifically to compare the perceptions. There is a need for more formalized tools and a framework to analyze stakeholder perceptions when they are expressed through little formalized interviews.

The length and repetitive character of the questionnaire used for local stakeholders was its major handicap: interviewees got easily bored and tempted to give mechanical answers or even not to answer to quickly reach the end of the interview. Nevertheless, this structure was

¹¹ There is an on-going process to revise it.

deliberately chosen to limit imprecision and misunderstanding due to translation, in a context where neither the interviewer nor the translator had a good command of English language. Furthermore, this structure facilitates the analysis of answers and comparison of points of view and is particularly recommended in the case of a large sample of stakeholders. In our case the sample was too limited to allow for quantitative analysis, as it was planned initially. Another limitation is its gender bias, as only 4 out of 15 people are women, although the proportion of women among wetland users is probably higher. It is to be noted that the interviewees particularly appreciated the use of maps as a support for the interview. The opportunity to complement this formal questionnaire with more participatory approaches was missed, due to the inexperience of the interviewer with this type of approach.

The number of external stakeholders interviewed is limited, and they belong to the same network, which probably reduces the diversity of points of view. These interviews should then be pursued with a wider range of stakeholders at different institutional levels, from local municipality to national government, and from various sectors (e.g., tourism). Representatives of downstream water users, such as the Olifants River Forum or the Kruger National Park are identified as potential stakeholders and should be interviewed. The format of this interview was very open, which can be a handicap if not well prepared and with inexperienced interviewer. The appropriateness of applying to external stakeholders the approach used for researchers, which appeared to be more structured, may be considered.

For application in other sites, a combination of participatory approaches and a semi-structured individual survey might be considered. Participatory tools give interviewed people a different role, a different relationship with the interviewer, the interviews appears to be less “extractive” and more empowering from the stakeholder perspective. The objective of a more participatory approach would be to get a more in-depth understanding of the local situation in a relatively short time. Their use in the first steps of the stakeholder analysis would help structuring and shortening the individual questionnaire, which remains necessary to really describe the diversity of perceptions and for quantitative analysis.

Finally, it appeared during the analysis of the interviews that a conceptual framework is necessary to compare the perceptions expressed by various stakeholders to go beyond a mere description. The classification of stakeholders presented in this paper is a tentative framework, which needs to be further developed.

- Identified trade-offs

The stakeholder analysis conducted in Ga-Mampa wetland allowed identifying three main trade-offs between wetland ecosystem services:

- The most obvious trade-off, which can lead to a conflict, occurs between crop production for food and commercialization and production of fibers for livestock grazing, reed and grass harvesting. This trade-off is related to land allocation process among the different uses. It concerns different groups of the local community, and also probably different individuals within the same households, when households use the wetland for several purposes. Local wetland users are fully aware of it.
- The second trade-off happens between crop cultivation and hydrological regulation. It opposes local wetland users on one hand, and downstream water users and environmental lobbyists on the other hand. The awareness of the local population but also of downstream water users of this trade-off is relatively low, while environmentalist groups and some department staff give it a high priority.

- The last trade-off has seldom been mentioned by the various stakeholders we met, although it might be the most important one for the local population (Kotze 2005). It is related to the depletion of soil organic matter associated with the artificial drainage of wetland plots and unsustainable agricultural practices. It opposes wetland cultivators today with cultivators of tomorrow. The low level of awareness regarding this trade-off can be explained by the fact that the rapid expansion of farming in the wetland is relatively recent and its impacts on soil fertility are hardly perceptible yet.
 - Further research

This identification of trade-offs and the associated stakeholders gives direction for further research on the site. Several activities are on going or planned to clarify our understanding of the system and support wetland management decisions. A livelihood analysis has been initiated in order to better quantify the contribution of wetland to the livelihood of the local community and prepare the economic valuation of wetland services. A hydrological monitoring is in place. Data will feed a hydrological model to better assess the contribution of the wetland to the hydrology of the catchment and at a larger scale to the basin. This will be the basis for evaluating the benefit of the hydrological regulation function of the wetland. In parallel, an agronomic analysis will be set up to understand the impact of present agricultural practices on the condition of the wetlands, more specifically the level of soil organic matter. Finally, on the basis of these disciplinary works, an integrated dynamic model will be developed to represent the interrelationships between the socio-economic system and the biophysical system of Ga-Mampa wetland. It will serve as a support of discussion among various groups of stakeholders on the future management of the wetland.

- Participatory management of the wetland

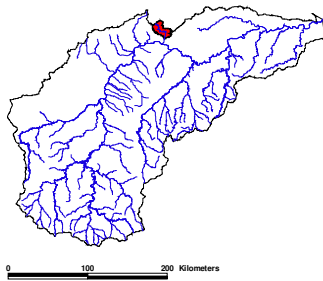
Such decision- or negotiation-support tools are increasingly used to help decision in complex natural resources management contexts involving multiple stakeholders. However, to really have an impact on stakeholders' behavior, decision-support systems need to be developed and implemented in a participatory way (Van Asselt Marjolein and Rijkens-Klomp 2002 ; Steins and Edwards 1999). This is based on the assumption that involvement of stakeholders in a project will help to define the different components of the issues and to find more sustainable solutions. Participatory approach is particularly well adapted to the resolution of complex problems encompassing a network of multidisciplinary issues. In the case of Ga-Mampa wetland the preservation of the ecosystem is entangled with rural poverty, sustainability of irrigation system and apartheid legacy. Therefore, many stakeholders at various levels and from different sectors have to be involved in the wetland management. The involvement of the local community at every step of the development of a wetland management plan will ensure that they take ownership of the proposed plan and will commit to its implementation. Participation of external stakeholders is also required as some of them are influential in policy making (e.g., MWP) and others have decision power over the use of resources, including financial ones (e.g., traditional authorities, different levels of government). The characterization of stakeholders proposed in this paper may help identifying which actors should be involved at various steps of the decision-making process.

References

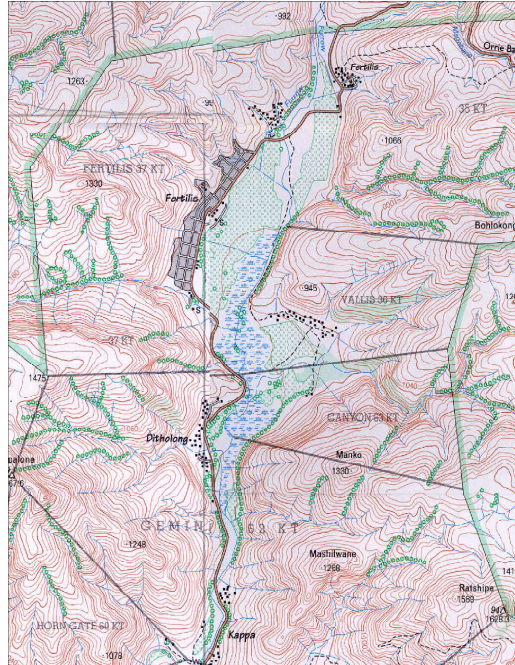
- Batut, S. 2001. *Confrontation des points de vue des acteurs de l'eau de l'Aveyron aval Lère*. Master thesis report, Ecole Nationale Supérieure Agronomique de Montpellier, Cemagref.
- Chiron, D. 2005. *Impact of the small-scale irrigated sector on household revenues of the black community of Ga Mampa Valley (Dward of Mafeke). Contribution to the irrigation management transfer study of the small-scale irrigation schemes. Limpopo Province - South Africa*. Master of Science, CNEARC.
- Darradi, Y. 2005. *Analyse de la perception des porteurs d'enjeux. Le cas de la zone humide du bassin versant de la Mohlapiitse River, Province du Limpopo, Afrique du Sud*. Mémoire de fin d'études pour l'obtention du titre d'Ingénieur des Travaux Agricoles, Ecole Nationale d'Ingénieurs des Travaux Agricoles de Bordeaux.
- de Groot, R. S.; M. A. Wilson and R. M. J. Boumans 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics* 41(3): 393-408.
- De Marchi, B.; S. O. Funtowicz; S. Lo Cascio and G. Munda 2000. Combining participative and institutional approaches with multicriteria evaluation. An empirical study for water issues in Troina, Sicily. *Ecological Economics* 34(2): 267-282.
- Ferrand, P. 2004. *Participatory diagnosis about farming systems and social management of water in the small-scale irrigation scheme of the Mashushu Community, Limpopo Province, South Africa*. Master of Science, CNEARC, University of the North, GRET.
- Garin, P.; J.-D. Rinaudo and J. Rulhman 2001. *Linking expert evaluation with public consultation to design water policy at the watershed level*. Proceedings of the World Water Congress, 15-19 October. Berlin: WWC.
- Grimble, R. 1998. *Stakeholder methodologies in natural resource management*. Socio-economic methodologies. Best Practice Guidelines. Chatham, United Kingdom: Natural Resource Institute.
- Grimble, R.; M.-K. Chan; J. Aglionby and J. Quan 1995. *Trees and trade-offs: a stakeholder approach to natural resource management*. Gatekeeper Series 52. International Institute for Environment and Development.
- Grimble, R. and K. Wellard 1997. Stakeholder Methodologies in Natural Resource Management: a Review of Principles, Contexts, Experiences and Opportunities. *Agricultural Systems* 55(2): 173-193.
- Hein, L.; K. van Koppen; R. S. de Groot and E. C. van Ierland 2005. Spatial scales, stakeholders and the valuation of ecosystem services. *Ecological Economics* In Press, Corrected Proof.

- Herath, G. 2004. Incorporating community objectives in improved wetland management: the use of the analytic hierarchy process. *Journal of Environmental Management* 70(3): 263-273.
- Kotze, D. C. 2005. *An ecological assessment of the health of the Mhlapetsi wetland, Limpopo Province*. South Africa: Centre for Environment, Agriculture and Development, University of KwaZulu-Natal.
- Masiyandima, M.; M. P. McCartney and B. van Koppen 2004. *Wetland contributions to livelihoods in Zambia*. Sustainable Development and Management of Wetlands, FAO - Netherlands Partnership Programme. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Masiyandima, M.; S. Morardet; D. Rollin; L. Nyagwambo; G. Jayasinghe and P. Thenkabail 2005. *Assessing trade-offs in wetland utilization in Limpopo River basin: a research framework*. Proceedings of the The CGIAR Challenge Program on Water and Food International workshop on "Enhancing human and ecological well-being in Africa through sustainable increases in water productivity", November 28 - December 1, 2005. Entebbe (Uganda).
- McCartney, M. P. 2005. *Technical Note: Hydrology of the Mhlapitsi catchment*. Pretoria: International Water Management Institute (IWMI).
- McCartney, M. P. and B. van Koppen 2004. *Wetland contributions to livelihoods in United Republic of Tanzania*. Sustainable Development and Management of Wetlands, FAO - Netherlands Partnership Programme. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Millenium Ecosystem Assessment 2005. *Ecosystems and human well-being: Wetlands and water. Synthesis*. Washington, D.C.: World Resources Institute.
- Owen, L.; W. Howard and M. Waldron 2000. Conflicts over farming practices in Canada : the role of interactive conflict resolution approaches. *Journal of Rural Studies* 16: 475-483.
- Ramsar Convention Secretariat 2004a. *Participatory management*. Gland, Switzerland: Ramsar Convention Secretariat.
- Ramsar Convention Secretariat 2004b. *Wise use of wetlands*. Gland, Switzerland: Ramsar Convention Secretariat.
- Republic of South Africa 1983. *Conservation of Agricultural Resources Act*.
- Republic of South Africa 1996. *Constitution of the Republic of South Africa*. Cape Town: Republic of South Africa.
- Rinaudo, J.-D. and P. Garin 2002. *Participation du public et planification de la gestion de l'eau : Nouveaux enjeux et éléments de méthode*. Proceedings of the Colloque SHF "Directive Cadre et eaux souterraines", mars 2002. Paris, France.

- Ruhlmann, J. 2001. *Confrontation du point de vue des acteurs locaux sur la gestion de l'eau dans le bassin versant de l'Hérault*. Mémoire d'Ingénieur, Ecole Nationale du Génie de l'Eau et de l'Environnement de Strasbourg.
- Sarron, C. 2005. *Effects of wetland degradation on the hydrological regime of a quaternary catchment. Mholapitse River, GaMampa valley, Limpopo Province, South Africa*. MSc Thesis, Ecole Nationale Supérieure Agronomique de Rennes.
- Steins, N. A. and V. M. Edwards 1999. Platforms for Collective Action in Multiple-Use Common-Pool Resources. *Agriculture and Human Values* 16(3): 241-255.
- Strager, M. P. and R. S. Rosenberger. Incorporating stakeholder preferences for land conservation: Weights and measures in spatial MCA. *Ecological Economics* In Press, Corrected Proof.
- Tinguey, N. 2006. *The interface between the local community - based wetland resources management and the formal wetland policies, laws and institutions. Case studies in South Africa and Zambia*. Master, Brandeis University.
- Turpie, J. K. 2000. *The use and value of natural resources of the Rufiji floodplain and delta, Tanzania*. Cape Town, South Africa: Rufiji Environmental Management Project; IUCN - Eastern Africa Regional Office; Fitzpatrick Institute, University of Capetown.
- Turpie, J. K.; B. Smith; L. Emerton and J. Barnes 1999. *Economic value of the Zambezi Basin wetlands*. Harare: Report to IUCN ROSA.
- Van Asselt Marjolein, B. A. and N. Rijkens-Klomp 2002. A look in the mirror: Reflection on participation in Integrated Assessment from a methodological perspective. *Global Environmental Change* 12(3): 167-184.
- Wilde, V. 2001. *SEAGA Field Handbook*. Rome, Italy: Food and Agriculture Organization of the United Nations, Socio-economic and Gender Analysis (SEAGA) Programme, Gender and Development Service.
- World Bank 2003. *Social analysis sourcebook: Incorporating Social Dimensions into Bank-Supported Projects*. Washington, DC: Social Development Department, The World Bank.



The Olifants river catchment



The Ga-Mampa wetland

Figure 1: Location of the Ga-Mampa wetland in the Mholapetsi river catchment, a tributary of the Olifants River

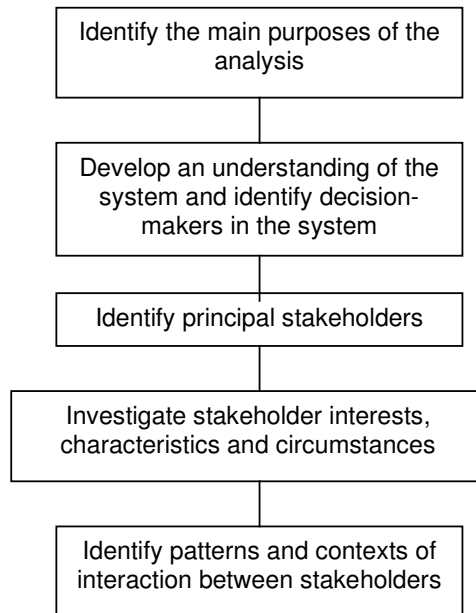


Figure 2: Different steps of the stakeholder analysis (Grimble *et al.* 1995)

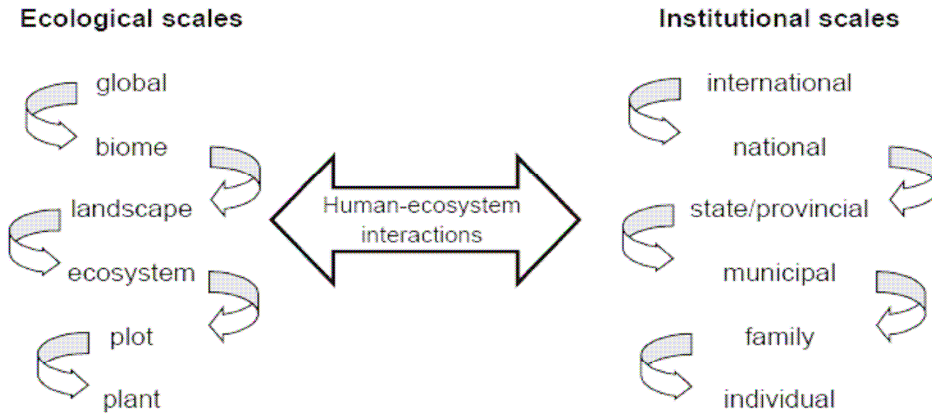


Figure 3: Selected ecological and institutional scales (Hein *et al.* 2005, adapted from Leemans 2000)

Government departments	✕ ☒				
NGOs	✕ ☒				
Wood-based industry	✕ ☒	✕			
Non-resident land owners		✕			
Local people	✕ ☒	✕ ☒	✓	✕	✕
	Government departments	NGOs	Wood-based industry	Non-resident land owners	Local people

Conflicts of interests are represented by ✕, complementarities by ✓ and co-operative action by ☒

Figure 4: Example of a conflict-partnership matrix: Park management in Phu Wiang watershed, Northeast Thailand (source: Grimble 1998 citing Chan 1995)

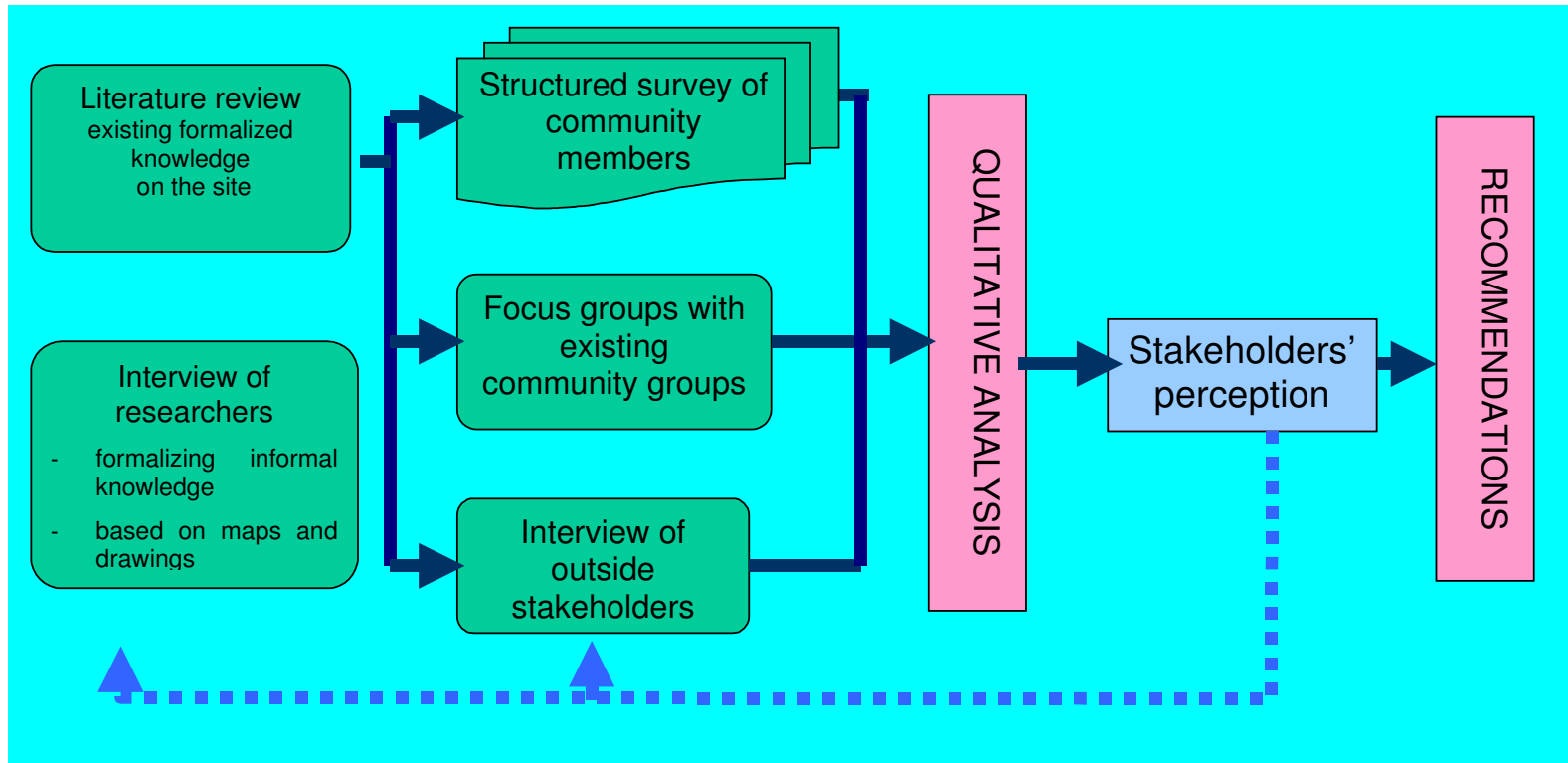
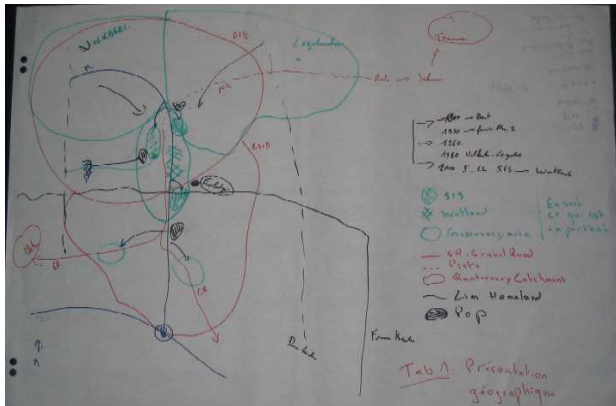
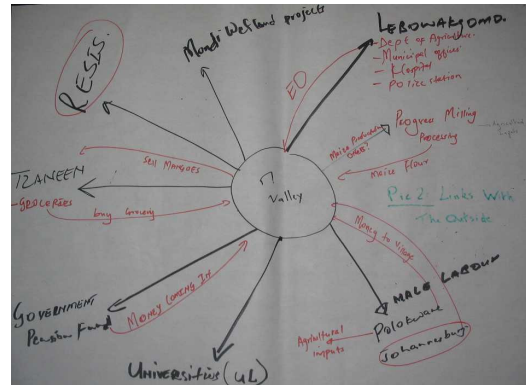


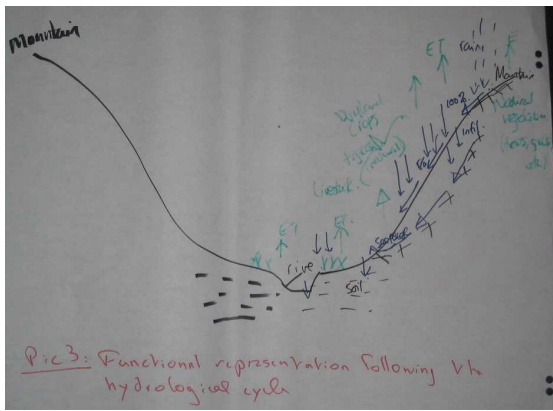
Figure 5: General approach of the stakeholder analysis



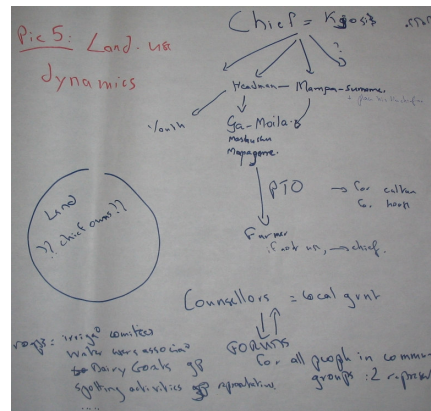
1 – Map of the system



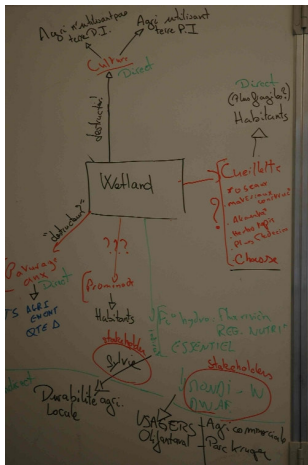
2 – Relationships with outside



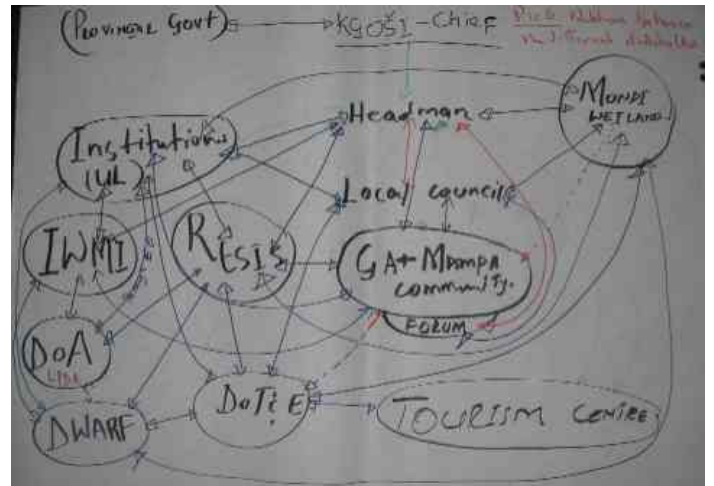
3 – the water cycle: supply and demand



4 – Land use dynamics



5 – Wetland uses and functions



6 – Stakeholders' relationships

Figure 6: Examples of outputs of researchers interviews

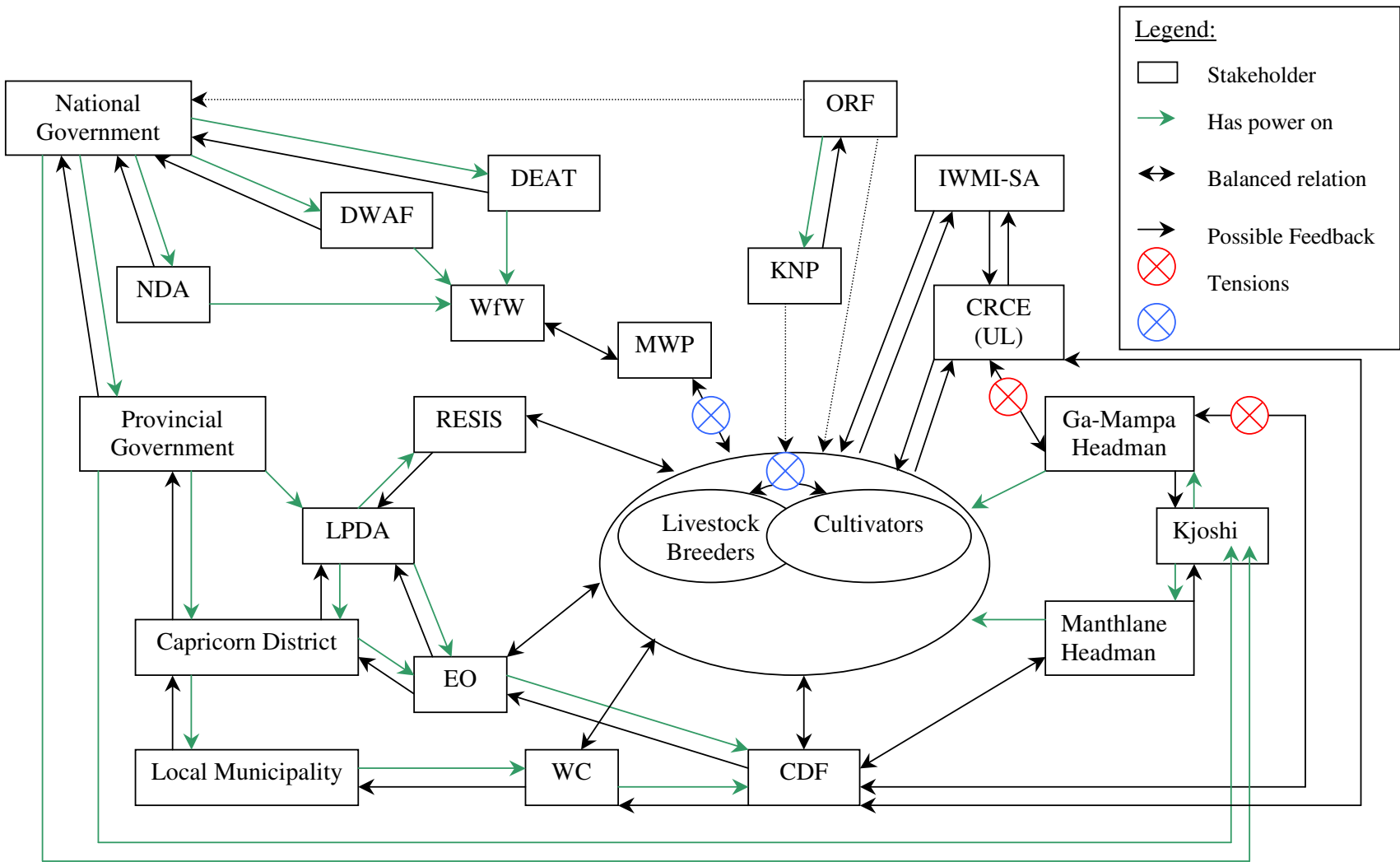


Figure 7: Network of stakeholders in Ga-Mampa wetland

Table 1: Example of a stakeholder analysis matrix (World Bank 2003)

Stakeholder categories	Relevant stakeholders	Characteristics (social, location, size, organizational capability)	Interests in relation to policy (effects on / effects of policy)	Influence on policy (H=High, M=Medium, L=Low)
Government policy-makers				
Implementing agency staffs				
Intended beneficiaries				
Adversely affected persons				
Organized interest groups (e.g., business associations, trade-unions)				
Civil society (e.g., NGOs, CBOs, religious organizations)				
Donors				
Other external / international stakeholders				

Table 2: Classification of stakeholders according to their scale of intervention and their role

	Users / beneficiaries	Traditional authorities	Governments	Agricultural sector	Environmental sector	Research sector
Local	Community CDF	Headmen Kjoshi	Ward Councillor	Extension Officer		
Local municipality			Lepelle-Nkumpi Municipality			
District municipality			Capricorn District			
Province			Limpopo	LPDA RESIS	LEDET	UL
	Limpopo Wetland Forum					
Basin	“Olifants users”				Kruger National Park (*)	
	Olifants River Forum					
National			National government	DoA	WfW MWP DWAF DEAT	
Supra-national						IWMI-SA

(*)Trans-catchment and trans-provincial structure

Xxx interviewed

LPDA: Limpopo Province Department of Agriculture

UL: University of Limpopo

DoA: National Department of Agriculture

DWAF: Department of Water Affairs

DEAT: Department of Environmental Affairs and Tourism

Table 3: Ga-Mampa wetland ecosystem services according to stakeholder groups

Ecosystem services	Scale of service provision	Scale of beneficiaries	Ga-Mampa community	External stakeholders	Researchers
Provisioning					
Food (wild edible plants)	Plot	Local Households	X		X
Food (Wild animals and fish)	Plot	Local Households	X		
Fiber (reeds and grass for craft and building)	Plot	Local Households	X	X	X
Fiber (fodder for livestock grazing)	Plot	Local Households	X		X
Water supply to Olifants River	Ecosystem	Basin		X	
Regulating					
Water purification (Filter function)	Ecosystem	Water users downstream	X		X
Hydrological regulation	Ecosystem	Water users downstream	X	X	X
Flood protection	Ecosystem	Water users downstream			X
Supporting					
Soils for cultivation	Plot	Local Households	X	X	X
Information					
Religious and cultural	Ecosystem	Local community	X		
Tourism	Landscape	Provincial / National		X	

Table 4: Stakeholders' concerns about Ga-Mampa wetland

	Ga-Mampa community	Both	External stakeholders
Concerns	Conflict cultivation / livestock Protection of wetland resources Droughts / floods	Erosion	Reduction of wetland area

Table 5: Solutions proposed by the different stakeholders

	Community	Extension officer	CDDA	DoA	LEDET	MWP	WfW
Fences to limit tensions among wetland users	X		X			X	
Limit erosion of riverbed - Gabions - Trees	X	X X			X	X X	
Awareness program on sustainable use	X	X	X	X	X		
Limit new settlements in the wetland	X	X		X	X		
Economic alternatives to wetland cultivation - Rehabilitation of irrigation schemes - Other activities (tourism, craft...)		X	X	X	X X	X	
Application of the law							

CDDA: Capricorn District Department of Agriculture