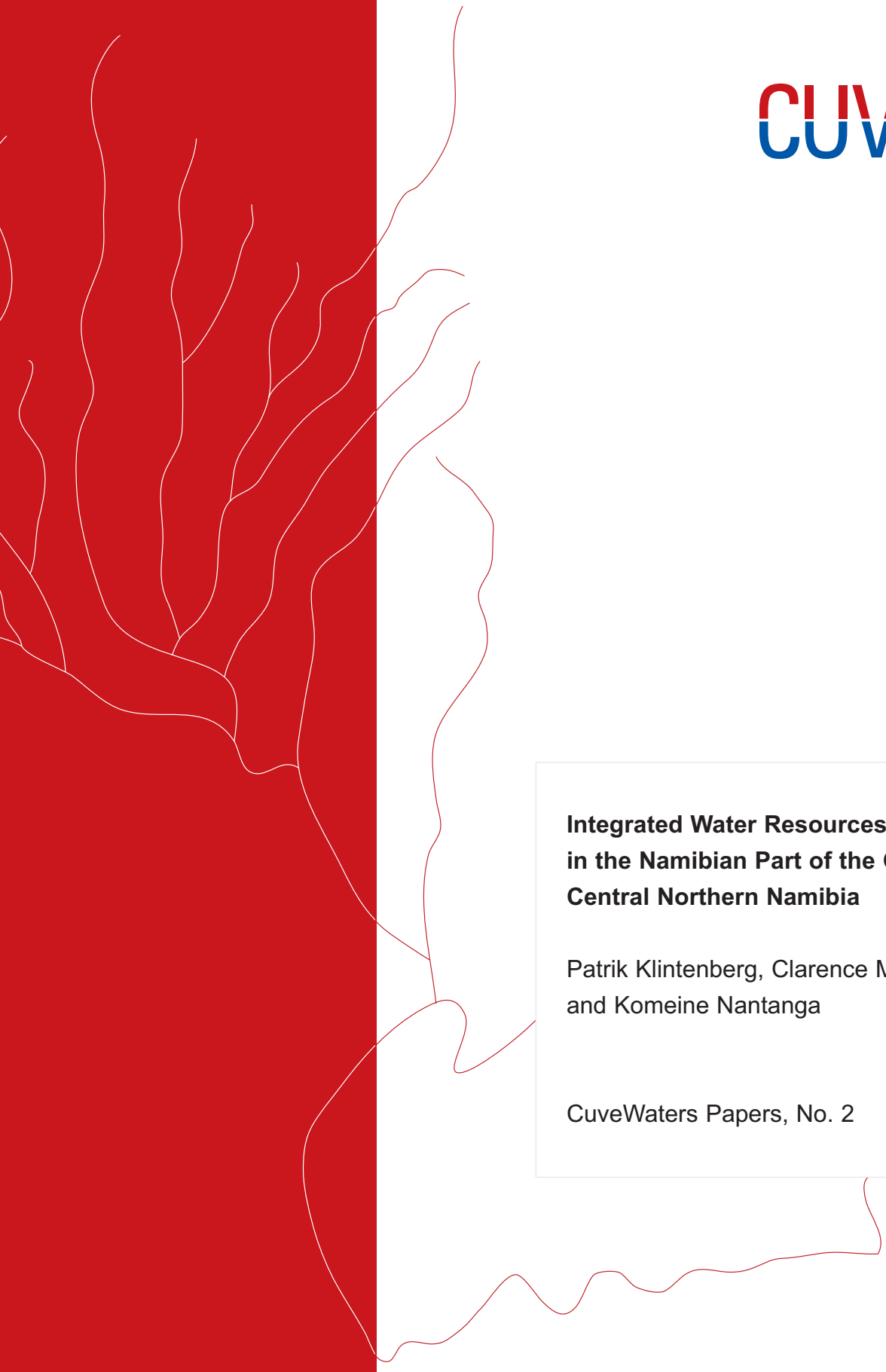

CUVE integrated water resources management waters

Integrated Water Resources Management in the Namibian Part of the Cuvelai Basin, Central Northern Namibia

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1 Introduction

About 600 years ago people settled in the Cuvelai area because of the ephemeral oshanas (shallow water courses). Taking advantage of the abundant woody vegetation, with water infrastructure introduced by the missionaries and colonists, the population soared. The oshanas that were once one of the main reasons for people to settle in the area are increasingly becoming a challenge. Due to the rapid population increase and associated demands for more land, more and more people build their houses in the oshanas during the dry period when there is no water in these shallow water bodies. However, when the rainfall season comes and the oshanas fill with water, these houses are flooded and it even happens that people drown.

This illustrates that the use of oshanas as a source of water is less important in these highly populated areas, as people have become more dependant on purified water delivered at water taps. This is of course an improvement of peoples' livelihoods, but it has also resulted in people not knowing how to deal with oshanas as permanent natural features. Instead of sustaining the life of the people, the oshanas are now threatening the health of the people living close to them as they are breeding grounds for, *inter alia*, mosquitoes, accelerating the spread of malaria in these areas. On the other hand, the ponds are still a useful water resource as they continue to provide fish, water and grazing for livestock and natural foods such as water lilies. Key issues to be discussed in this paper are

1) Payment for water and technological development: a discussion of the present intentions of Rural Water Supply to hand over the basic maintenance of water points to the communities using the infrastructure, and the cost recovery approach requiring users to pay for the water delivery service provided.

2) the history and present status of IWRM in the Cuvelai basin: presentation of the background to water supply in the basin, the process of establishing a basin management committee in the Iishana sub basin and the present status of this initiative.

3) Previous initiatives that provided technology to the rural areas in central northern Namibia: improved access to water, an example from the construction of water pipelines in the Ombuga saline grassland, Oshana region.

When applicable, the process towards implementing IWRM in Cuvelai basin will be discussed in the light of the Dublin principles, which forms the core of IWRM:

1) Fresh water is a finite resource, sustaining life and should be managed using a holistic approach

2) Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels

3) Women play a central part in the provision, management and safeguarding of water and should be empowered to participate at all levels in water resources programmes

4) Water has an economic value in all its competing uses and all human beings have a right to access clean water and sanitation at an affordable price.

2 Water and land use in the Cuvelai basin

2.1 Natural and artificial water sources in the Cuvelai basin

In the past most people and livestock in central northern Namibia relied on surface water accumulated from rainfall, collected in earth dams and in shallow hand dug wells as their main water source (Table 1) (Klintenberg and Christiansson, 2005; Marsh and Seely, 1992; Quan et al., 1994). Today, hand dug wells mainly occur in the western, southern and eastern parts of the area, where the salinity of the ground water is sufficiently low for cattle to drink. Water from these hand dug wells is collected by use of ropes and buckets, or by climbing down to the water table on steps dug into the side walls of the well. Other water sources are excavated dams and natural pans.

The use of excavated dams was only introduced with colonisation. These water supply systems are still in use in rural areas of central northern Namibia (Klintenberg and Christiansson, 2005). However, in response to increasing population and generally very saline ground water, a bulk water supply system was developed in 1960s and 70s (Mendelsohn et al., 2000; Niemann, 2002; Quan et al., 1994).

According to Marsh and Seely (1992) construction of the first canal from east to west between Ombalantu and Oshakati began in 1959. The purpose of the canal was to capture water flowing southward into the oshanas and channel it to the population centres that were developing around Oshakati at that time. In 1970 the canal was extended westward to transport water pumped from the Kunene river into the canal system. In 1975 this development was followed by the construction of a pipeline transporting purified water from Ogongo to Oshakati. Importantly, taps and livestock water points were established along the pipeline. From this first pipeline an extensive pipeline system has then been developed, providing purified water to settlements and water points for cattle to areas where previously, the lack of fresh water prevented extensive grazing (Klintenberg et al., 2007; Klintenberg and Verlinden, 2006; Niemann, 2002; Quan et al., 1994). The water in the pipeline system comes from the Kunene river, via the Calueque dam in Angola and an open canal, to Olushandja balancing dam on the Namibian side of the border, transferred in a canal to treatment works at Olushandja, Outapi, Ogongo and Oshakati where the surface water is purified, before it is pumped through the pipeline system to the consumers (Amakali, 2003).

The complex network of dams, canals, pipelines and purification plants serving thousands of water points throughout the most densely populated areas is about 2,600 km long. In 1991, 60% of the water supply was dependent on dug wells, 10% on drilled wells, and 30% on a pipeline system. A number of drilling programmes, especially for emergency drought relief, were conducted during the 1990s (Amakali, 2003). Another 2,000 km of pipeline is planned in the Oshivelo-Omuthiya, Engela-Endola, Ondobe-Eenhana-Okankolo-Oshigambo and Outapi areas and also back into Angola. Current pumping rates from the Kunene vary between 47 and 63 Mm^3/a, which is much less than the rate of 180 Mm^3/a agreed to between Namibia and Angola (Directorate of Rural Water Supply, 2004). However, it is know that the Kunene flood plain is an ideal place for irrigation, and if Angolan decides to use more of their water for irrigation, then less would be available to be distributed to Namibia. The present agreement between Angola and Namibia dates back to 1964 (Water Use Agreement, 1964), and according to M. Amakali (pers. Comm., 2007) Angola is now asking to renegotiate the terms of this agreement, an indication that the amount of water distributed to Namibia might change in a near future.

2.2 Water quality

Traditional water sources differ from artificial water supply in both availability and quality. Water from local sources is seldom perennial and water quality generally declines with time (Shanyengana et al., 2004). Artificial water supply, on the other hand, is purified and is in most cases available all year around. Table 2 presents the number of water points per region, including water taps along the pipelines, boreholes and hand dug wells in 2006, according to Rural Water Supply in the four regions. Even though the quality of water from traditional sources often is poor, it is common that during the rainy season humans also use water from oshanas or dams or other sources of surface water. The main reasons are that the quality of the water is best at that time of the year and the source may be nearer than a particular water point.

Another important factor to consider is that many farmers prefer to use water from oshanas to avoid paying for water. In some areas it is even common to close water taps when it has rained and "free drinkable water" is accessible. The water quality in excavated dams depends to a large extent on the depth to the saline water table. Normally excavated dams are open on the side so that local water from the oshana can fill them. In some areas the water table is as shallow as 2 m, but in some favourable places the water table is as deep as 5 m (Amakali, 2003). Dams supplying water for human consumption are normally fenced off while dams for livestock are unfenced and have less steep slopes. However, the fences surrounding the dams are often broken or taken down to allow cattle to drink the water.

The sharing of open water sources between livestock and humans poses a health risk. Dams for livestock were designed to provide a supply of water for two years, which includes evaporation losses. However, the high evaporation losses make these dams uneconomical. Therefore the concept of pumped storage dams was introduced. Before Independence, 1990, there were at least 17 pump storage dams constructed in the Cuvelai basin to supply water to hospitals, schools and community centres. Water was sand filtered but because of problems with fine sand, simple purification system works were introduce to treat water for human consumption (Directorate of Rural Water Supply, 1991). However, these dams are also a health risk to the population as the water can easily be contaminated.

Table 1. *Different traditional water sources in the Cuvelai basin and their name in Oshiwambo. (Nantanga and Moses, pers. comm., Marsh and Seely, 1992).*

Types of water sources	Oshiwambo names	Supplied to
Hand dug well/ Steps broad entrance (conical hand-dug pits)	*Omuthima*	Mostly for Livestock
Excavated dams	*Omatale/Oondama*	Mostly for Livestock
Hand dug well/wells with ropes and buckets	*Ondungu*	Humans and livestock
Water tap (along pipelines)	*Okapomba komeya*	Human and livestock
Shallow depression	*Ondombe*	Mostly livestock
Pan	*Ekango*	Mostly livestock
River	*Omulonga*	Mostly livestock
Canal	*Okanaala*	Human and livestock

Table 2. *Number of water points per region in central northern Namibia in 2006 (RWS, pers. comm.)*

Name of Region	Number of Water Points
Oshana	505
Omusati	1096
Ohangwena	686
Oshikoto	856
Total	3143

2.3 Access to water in central northern Namibia

According to the Directorate of Rural Water Supply (2004), the Namibian government has committed itself to provide safe water to all citizens within a maximum distance of 2.5 km walking distance from their homestead. Table 3 presents the number of inhabitants and % of the total population that have access to safe water in each of the four regions in central northern Namibia, based on information from the national census conducted in 2001.

Kluge et al. (2006) repeatedly refers to water use conflicts in the Cuvelai basin. However, no direct examples of these conflicts are given in the text. Results from investigations conducted in the area have not revealed any obvious conflicts of that kind. The closest to a water conflict that has so far been identified through research in the area under consideration is the fact that not everyone is paying for water. For instance people using water from pipelines that have not been upgraded since independence are still enjoying free water, while people using water provided from the modern pipeline system are supposed to pay for their water. This has caused confusion and irritation among the water users.

In addition, not everyone pays the same price for the water, something that will be further discussed below. Another area of conflict related to water supply is the effect of introducing the water pipeline to former grazing reserves in central Cuvelai (Box 1). However, this conflict is not so much about water use but about the loss of productivity of the rangeland, caused by the increased numbers of livestock grazing in the area, as a consequence of freely accessible water.

Even though there are no serious water use conflicts in the Cuvelai basin at this point of time, this does not mean that there is no potential for such conflicts to occur in the future. As has been pointed out both here and in Kluge et al. (2006), the fresh water distributed in the extensive pipeline system, supporting large parts of Cuvelai basin originates in Angola. Should Angola decide to use their water themselves, (which is a likely scenario, given the high potential for irrigation on the Kunene floodplain), then that might lead to a serious conflict, both between water users in the Cuvelai basin and between Namibia and Angola on a government-to-government level.

Table 3. *% of households in central northern Namibia, per region, with access to safe water within 2.5 km from homestead (NPC, 2002).*

Region	% of households with access to safe water in central northern Namibia	Total number of private households	Number of households with no access to safe water within 2.5 km
Oshana	93	29557	2069
Oshikoto	88	28419	3410
Omusati	83	38202	6494
Ohangwena	78	35958	7911

To fulfil its goals to provide safe water to everyone in central northern Namibia, the Community Based Management project of the Directorate of Rural Water Supply in the Ministry of Agriculture, Water and Forestry is extending the pipeline system and drilling new boreholes (Amakali, 2003). The main target area for expansion of the water supply system is the Oshivelo Artesian Aquifer that is presently tapped by production wells supplying some 2.5 Mm^3/a of fresh groundwater via a pipeline to the Oshivelo-Omutsegwonime-Okankolo area. In 1999 the Oshivelo scheme supplies 0.3 Mm^3/a to the local population while the total abstraction amounted to 0.75 Mm^3/a.

According to Christelis and Struckmeier (2001) there is a risk of saltwater intrusion into the fresh-water horizons, especially from the west and from underlying strata. Therefore, the aquifer must be investigated in detail, before its full potential can be used. So far there has been no detailed assessment of the water quality of these aquifers, however, there is a new EU funded project, the Cuvelai ACP, which most likely will have the resources to carry out this assessment (M. Amakali, pers. Comm., 2007).

BOX 1. Improved access to water: an enemy in disguise? An example of technological development in a rural part of the Cuvelai basin (Klintenberg and Christiansson, 2005)

In the Ombuga grasslands in northern Namibia land for cultivation and grazing is becoming scarce. Ground water is saline which in the past limited permanent settlement in the area. The first permanent settlements were established in 1968. Population numbers remained low until the beginning of the 1990s, when a rapid increase led to the present population density. The population increase coincides with an effort to improve the access to water by the construction of water pipelines into the grasslands in 1992. In response the number of livestock increased dramatically. There are no reliable livestock figures for the area, but according to the national population census that was conducted in 2001, the annual population increase between 1991 and 2001 was over 5%. It is reasonable to assume that livestock numbers increased in a similar rate during that period.

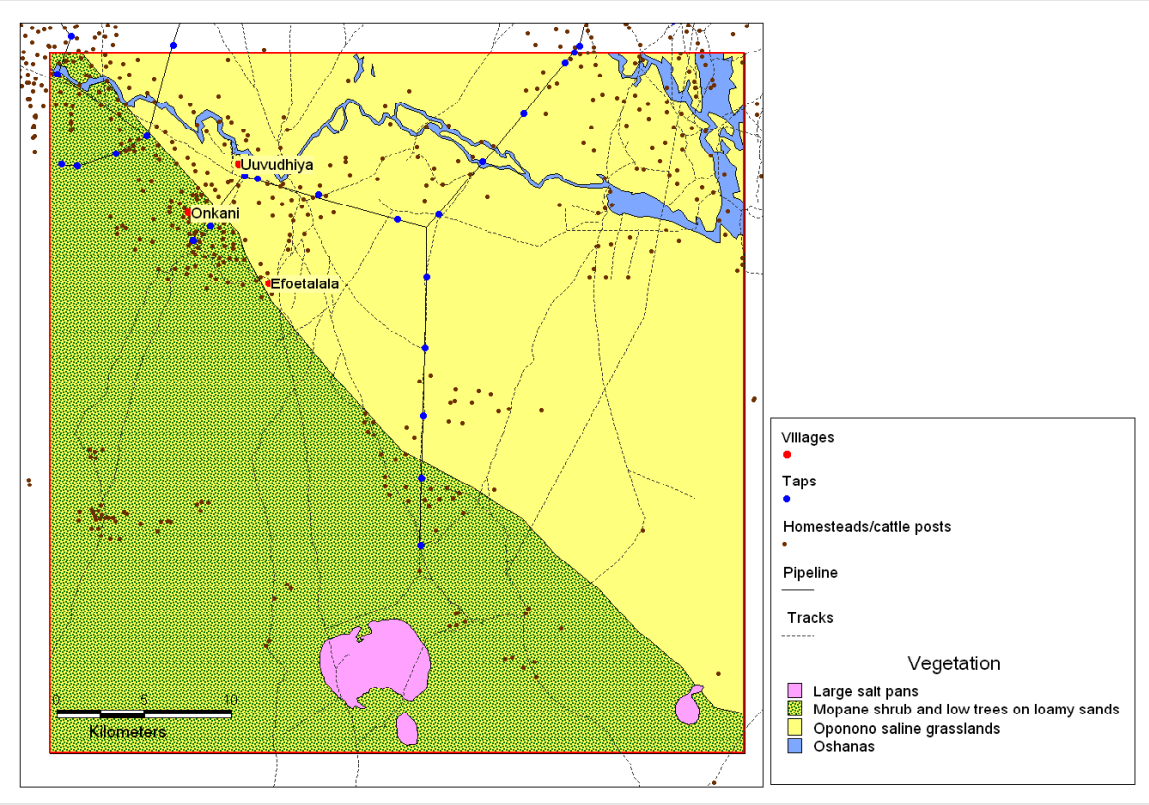
In 2004 and 2005 individual semi-structured interviews were conducted with 45 representatives of households in Onkani, Efoetalala and Uuvudhiya, three villages located on the edge of the Ombuga grasslands.

The interviews show that:

- The most common reason for interviewees to come to the Ombuga grasslands was to find grazing for the livestock and land to cultivate
- When the respondents first arrived there was much grass, tall trees and shrubs and plenty of wildlife in the area
- The most significant difference today is lower quality and a reduced availability of grazing
- Some farmers claim that they have noticed a shift in grass species composition, i.e. palatable perennial grasses have decreased or completely disappeared from the area

The villagers' explanation for the observed changes is that when availability of water no longer limited access, large numbers of livestock were brought into the area from other parts of northern Namibia, resulting in an unsustainably high grazing pressure on the land. This migration of farmers from the 'outside' resulting in decreased access to grazing has led some of the inhabitants to move their cattle southwards, towards the northern boundary of the Etosha National Park.

This study emphasizes the contradiction in development efforts. Farmers/cattle owners admit that the intention with the pipelines, i.e. to improve access to water for the inhabitants of the area, was desired and met. However, the overall situation for many households has not improved. In response to the deteriorating grazing resources along the pipelines, they are now forced to move their cattle to areas served only by traditional, less reliable water sources.



The above figure shows the extent of the area where the investigation of the impact of the fresh water pipeline was carried out.

The case study presented in Box 1 not only illustrates the issues related to access to water but also the problems associated to introducing new technologies without involving all stakeholders from the start. The various difficulties related to providing new technology as part of development and improved conditions for the receivers of this technology is a well known issue. Already in the 70s, the negative effects of large scale development projects, initiated in collaboration between governments in developed and developing countries, and implemented by donor agencies were apparent. The lack of involvement of the recipients of these initiatives often led to catastrophic results, manifested by infrastructural decay and collapse after the project funding came to an end (Leach and Mearns, 1996).

CuveWaters is a modern project, also aimed at providing modern technical solutions to rural and urban communities in parts of the Cuvelai basin. These interventions are intended to be undertaken in the light of IWRM, and should therefore be firmly in line with the four Dublin principles. Holistic management, participation, gender equality and cost recovery with affordable pricing must be central in the planning and implementation of the technical solutions provided by the German project team.

The case study in Box 1 presents a Namibian initiative, which did not take the Dublin principles into consideration. The development initiative described, which came about shortly after Namibia's independence, at a time when the area was experiencing drought conditions and a rapid increase of both human and livestock numbers, did not involve local water users in the planning or future maintenance of the provided infrastructure. The example clearly illustrates the risks associated with introducing new technology and infrastructure into an area. In the case of the pipeline system in the Ombuga grassland, the main cause of the negative outcome of the initiative is most likely the failure to involve the local community in the project from the beginning. This was exacerbated by the lack of a management plan developed by the local users, together with the service providers involved in construction and maintenance, controlling the use and access of the water points along the pipelines. The lack of management procedures of these open access water points has led to overuse of the resources, causing degradation of the rangeland. As shown in Box 1, this is now forcing farmers to move away from the pipeline and revert to using traditional water sources.

2.4 Role of livestock in the livelihoods of people in the Cuvelai basin

Livestock plays a central role in the livelihoods of both the rural and urban populations of the Cuvelai basin. It is therefore essential that the members of the project team have a good understanding of the rationale behind keeping livestock, how livestock and rangelands are managed, and what financial benefits farmers receive from their animals.

In central northern Namibia, livestock is generally seen as a cultural asset and a sign of wealth. Many people are of the opinion that livestock is an essential part of subsistence farming and that livestock provides security during droughts when crops fail or other extreme circumstances cause hardship to the people. Many use livestock to generate cash for school or clinic fees, for weddings and funerals and for ploughing their fields.

One major factor limiting the sale of livestock is that livestock north of the veterinary cordon fence (VCF) cannot be marketed to the south due to Foot and Mouth Disease (FMD) and Contagious Bovine Pleuro-pneumonia (CBBP) restrictions. This does however not mean that farmers north of the VCF have no opportunity to market their livestock. By placing their animals in quarantine, meat from animals from the north can be sold to South Africa. However, formal

marketing of livestock in the northern communal areas nevertheless remains very low. Even though many initiatives to inform local farmers about the benefits of using the formal markets, the local informal market seems to be the preferred way of selling livestock in central northern Namibia (Richarz, 2006).

A recent project, the Oshikoto Livestock Development project (OLDeP), contributed significantly to informing farmers about the benefits of marketing their livestock (DRFN, 2004). The project even facilitated an auction, where farmers from north of the VCF could sell their animals. The results from the auction show that there is a willingness to sell livestock if the opportunity is given, and of course, if the price is right.

On the other hand it is important to note that not everyone owns livestock. The majority of farmers in the Cuvelai basin have too few cattle to be able to market them regularly. To be able to sell animals a herd size of at least 30 animals is generally required and only few families own such numbers of animals.

Introduction of new technology comes at a price. One possibility to increase people's ability to pay for these innovations might be to encourage farmers to market more livestock more regularly. However, if that is done only the members of the community with sufficiently large herds would benefit from such initiatives, as they are the ones that can afford to sell their animals.

Regardless of where the farmers market their livestock, the selling of livestock takes place on a needs-basis. Interviews with farmers in central northern Namibia show that decisions about when to sell or buy livestock are made by the head of the household, who also decides how such money, will be used. Most of the sales and purchases are cash transactions and do not involve formal banks, loan schemes or savings clubs (Richarz, 2006; Verlinden, 2005). Very few if any of the sales or purchases are undertaken in the context of an overall management plan (DRFN, 2004). People with employment elsewhere commonly invest their earnings in livestock, which are kept in the Cuvelai and are looked after by family members or employed herders (Richarz, 2006).

2.5 Livestock numbers

In central northern Namibia accurate livestock numbers are difficult to obtain, as becomes obvious when looking at the different livestock figures provided below, which were collected from various sources. Farmers are normally reluctant to provide figures when asked, and information from the Directorate of Veterinary Services (DVS) are based on counts done during annual vaccination campaigns, figures that have been shown to be of rather poor quality (Richarz, 2006). However, based on information provided by Mendelsohn et al. (2000), approximately 25% of all cattle in Namibia are found in central northern Namibia. According to the same source, there were about 580 000 heads of cattle in central northern Namibia in 1998.

Historically, the earliest figures of livestock numbers in central Northern Namibia are from 1935, when a total of 150 000 cattle were estimated to have been there. It is assumed that cattle numbers then increased relatively rapidly until the 1960s. Based on information collected during livestock censuses and annual vaccination campaigns started in the 1960s, it was shown that the total numbers reached a plateau during the 1960s and early 1970s, perhaps between 400 000 and 600 000 heads of cattle. These numbers seem to have been more or less maintained since then.

The records also show that the numbers have fluctuated between 300 000 and 550 000 during the last 40-50 years. Some of the variation might be due to errors in estimating the size of the cattle population but others have been due to severe droughts when large numbers of cattle died.

For example, the most recent drought in 1992-93 resulted in the loss of about a quarter of all cattle (Mendelsohn et al., 2000). According to data provided by the Directorate of Veterinary Services, the total number of cattle in central northern Namibia was 685 285 in 2004 (Table 4).

Table 4. *Livestock numbers in the central northern regions of Namibia in 2004 (DVS, 2004). Note that the figures for Oshikoto exclude the commercial area around Tsumeb.*

Specie/Type	Oshikoto	Ohangwena	Omusati	Oshana	Total
Cattle	191 412	175 981	233 655	84 237	685 285
Goats	175 290	160 474	243 618	67 402	646 784
Sheep	3 688	387	16 916	4 689	25 680
Donkeys	20 017	15 345	34 303	9 113	78 778
Horses	1 041	804	751	89	2 685
Total	391 448	352 991	529 243	165 530	1 439 212

Given the importance of livestock to the livelihoods of the people living in the Cuvelai basin, the condition of livestock is a factor that has to be taken into account when implementing IWRM (or, the now commonly used term Integrated Land and Water Resources Management, ILWRM). Several recent studies have been undertaken in central northern Namibia investigating the relationship between livestock numbers and rangeland condition (Klintenberg and Christiansson, 2005; Klintenberg et al., 2007; Klintenberg and Verlinden, in press; Nangula, 2001; Nangula and Oba, 2004; Niemann, 2002; Verlinden and Dayot, 2005).

2.6 Water consumption of livestock in the Cuvelai basin

One aspect of livestock in the Cuvelai basin that is directly related to IWRM is the amount of water consumed by livestock. The importance of livestock is evident in the WASSP (Republic of Namibia, 1993), where provision of water for domestic use and livestock are prioritized. Given that a large stock unit (a head of cattle) requires approximately 45 litres of water per day, and there are about 685 000 heads of cattle in the area, some 30 million litres are consumed every day. Further, if one adds the water consumed by small stock (1 LSU = 6 SSU), the daily consumption of water from domestic stock is over 35 million litres per day, excluding horses and donkeys. This figure is interesting as much of the water provided to livestock is purified and distributed by pipeline. The large volume of water consumed by livestock per day suggests that total numbers and distribution of livestock in the Cuvelai basin is central when managing water demands there.

3 Integrated Water Resources Management in Namibia

Integrated Water Resources Management (IWRM) refers to "meaningful participation of all stakeholders in the development, planning and management of water resources, institutions and mechanisms put in place and legislation enacted within the context of local, regional, national and international policies".

The need for forming institutions to manage the water and other resources within a basin has been identified in the Water Resources Management Act (Republic of Namibia, 2004). In Namibia, the concept of managing water resources at basin level was introduced to and accepted by stakeholders during the water sector review process in the late 1990's. Regional consultations with various stakeholders indicated that they are interested in being involved in the management of their natural resources. Functional responsibilities for integrated management are given to Basin Management Committees, which are intended to be established in major basins in the country (DRFN, 2005b). It is assumed that Basin Management Committees provide an opportunity for government and communities to work together to assure that integrated water basin management is achieved (Republic of Namibia, 2000).

The concept of basin management has been implemented in Namibia since the 1990s. Today, two groundwater basin management committees have been established by water users themselves in order to manage their scarce resources. These are located in the Tsumeb area, focused on what is known as the Karst Aquifer (Mazambani et al., submitted), and in southern Namibia focusing on the Stampriet Artesian Aquifer. These committees are supported by the Geohydrology Division of the Department of Water Affairs (DWA). A third basin management committee was established in the Kuiseb River basin supported by donor funding (EU) (Botes et al., 2003; Manning and Seely, 2005). This development was supported by the Hydrology Division of the DWA. Recently, attention has been turned to the Cuvelai basin in central northern Namibia. All these initiatives were undertaken before the Water Resources Management Act was in place and they used the Theme Papers developed during the water sector review (NWRMR, 2000a; NWRMR, 2000b; NWRMR, 2000c; NWRMR, 2000d; NWRMR, 2000e; NWRMR, 2000f; NWRMR, 2000g), the National Water Policy White Paper and the evolving draft Bill for guidance (DRFN, 2005b).

3.1 Community Based Management and payment for water

NamWater, the national bulk water supplier, supplies water directly to the Directorate of Rural Water Supply (DRWS) for further distribution to rural communities. DWRS was established in 1993 in response to the Water Supply and Sanitation Policy (WASSP) (Republic of Namibia, 1993), and is responsible for rural water supply infrastructure and planning. The main goal is to support Community Based Management (CBM) of water supply while directly ensuring that the resource itself is used in a sustainable manner.

Since 1993, the Government's policy is to involve communities in the supply of their water services, with the main objective to recover cost and encourage stakeholder participation. Community Based Management is administered by water point associations that include all users of water points, managed by elected water point committees being in charge of their water points. The linkages between the various committees, Rural Water Supply and the Iishana Basin Management Committee are presented in Fig. 1. A Water point Association comprised all users of a specific water point. Of these, eight representatives are elected to form a Water Point Committee.

All households using water points along the same branch from NamWater's main pipeline forms a Local Water Association. Representatives from the Local Water Association are elected to serve on the Local Water Committee. Extension officers from Rural Water Supply interact with both Water Point Committees and Local Water Committees, and report to the respective Regional Offices of Rural Water Supply, who represent both the water users (WPA/WPC and LWA/LWC) and the service providers in the Basin Management Committee. An assessment conducted by a group of students investigating the function of water point committees in the Cuvelai basin has shown that in a typical case eight members of the committee were originally trained (SDP13, 2004). However, as people often move around looking for jobs elsewhere, there is often just a Caretaker (usually male), a treasurer and a secretary (usually both females) actively working for the committee. In future the water point associations will be fully liable for the operation and maintenance and payments of all the cost related to water use, except major repairs.

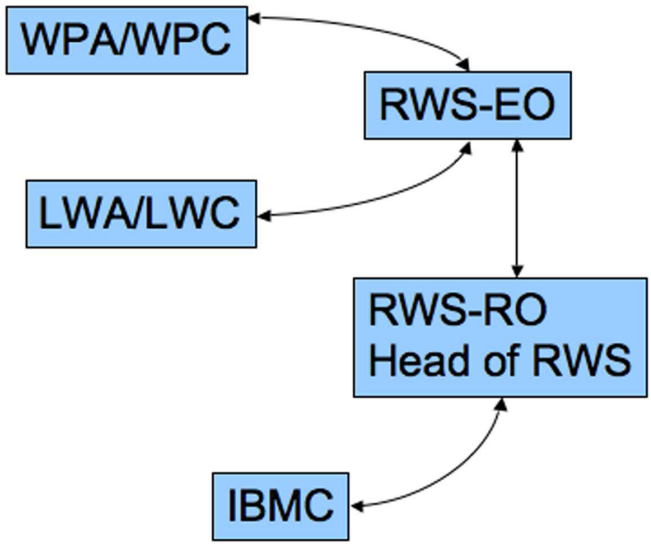


Figure 1. *The diagramme illustrates the relationship between water point associations (WPA), water point committees (WPC), Local Water Associations (LWA), Local Water Committees (LWC), Rural Water Supply Extension officers (RWS-EO), Rural Water Supply Regional offices (RWS-RO) and the Iishana Basin Management Committee (IBMC), after SDP13 (2004).*

According to the Summer Desertification Programme (SDP) 13 (2004) there are different forms of payment in place. Some water point committees have water users pay a flat rate, e.g. N$10/month, while others ask for payment according to the volume of water actually consumed. In many cases, all users of a specific water point pay the same amount, irrespective of whether they have many livestock or not.

SDP13 (2004) also showed that some Water Associations, at least in the Olukonda area close to Ondangwa, are supplied from old pipelines that have not been rehabilitated. The water supplied by such pipelines is free of charge. Other Associations get water directly from the main pipes and pay NamWater directly. Other Associations get water from branch lines and pay RWS. This often results in confusion among the water users, especially when these different schemes are located close to one another (SDP13, 2004).

In Namibia, water users don't pay for water per se but they pay for the supply services (Directorate of Rural Water Supply, 2004). This practice means that anyone, anywhere can take a bucket and fill it with water for free; but if they want clean water delivered to their village or into their house they must pay for the supply service. However, investigations in central northern Namibia regarding people's perceptions about payment for water services have shown that many people in the rural parts of the Cuvelai basin have difficulties understanding the concept of cost recovery, and why and for what they are supposed to pay. For instance, many people think that water should be free as it is provided by God (Mazambani et al., 2006). A common argument is: 'the government supplied free water before independence, why must people pay for water in a free Namibia?'.

Much of the confusion seems to stem from the fact that many people don't understand what it takes to supply water; and therefore an effort must be made to explain the difference between purified, piped water and water that is freely available in the oshanas. One step towards improving this understanding among the water users has been to arrange tours of influential people to the NamWater facility in Oshakati, which have clearly improved understanding among water users. An important lesson to learn for the CuveWaters project team is that if payment is expected for new infrastructure and/or new technology, training of recipients of these innovations is essential in order to ensure that they understand why they have to pay for such technologies and services. Another issue that has emerged from the discussions with water users in central northern Namibia is that in general, people think 'appropriate technology' is inferior technology. This commonly results in low acceptance rates of initiatives that are different from what people are used to or what they see other people having.

Several gender issues associated to the implementation of water point committees were revealed by SDP13 (2004). These issues are of particular importance as they relate to the third Dublin principle, i.e. 'Women play a central part in the provision, management and safeguarding of water and should be empowered to participate at all levels in water resources programmes'. The results show that the treasurer of a water point committee is often a female, who has to collect and record the money, and often has to travel for 50+ km to pay the money to Rural Water Supply or NamWater. During interviews women frequently commented on their discomfort at carrying this money as people know they are the treasurer of the WPC, which makes them an easy target to be robbed.

Furthermore, in central northern Namibia women tend to stay at their homestead taking care of home and children, while the men leave the area in search of work elsewhere. The fact that women are the ones being around makes them the natural water point committee members. On the other hand, men often considered women to be too 'weak' to be Caretakers.

Gender imbalance was revealed in relation to the ownership of water resources. Men are often said to be the 'owners' of the water when they are responsible for the infrastructure while women are responsible to 'provide' water to the family whenever it is needed, e.g. for cooking, washing and cleaning. Furthermore, men sometimes claim to be the 'owners' of the water because it is their incomes that pay for the monthly water account.

The above issues are of critical importance and have to be taken into consideration when implementing a project aimed at contributing to the water provision to rural central northern Namibia.

Results presented here indicate that women have to be firmly involved in these initiatives as they are the ones managing the water resources in the area, however, often not receiving an acknowledgment for it. In line with the Dublin principles, focused efforts should be made

within the CuveWaters project to strengthen women in their various positions related to water point committees and water point associations.

3.2 Status of IWRM development in the Cuvelai basin

3.2.1 Bi-lateral issues

In the preliminary study by Kluge et al. (2006) reference is made to the bi-national Cuvelai River Basin Commission (CuveCom) between Angola and Namibia, a body that was intended to oversee the implementation of IWRM in the entire Cuvelai basin. However, CuveCom was never initiated, so currently there is no trans-boundary committee for the Cuvelai basin. Instead, according to M. Amakali and G. van Langenhove, both at Directorate of Water Affairs and Forestry in the MAWF, it has been decided that the Cuvelai is part of the Kunene Basin.

There is an international commission for the Kunene, the Permanent Joint Technical Committee (PJTC), under which Cuvelai issues are handled. Currently there is a Kunene basin IWRM plan being developed for PJTC, in which the Cuvelai basin should be included. However, Angola has not agreed to this, saying that Cuvelai is a separate basin and needs its own IWRM plan. The unwillingness of Angola to include Cuvelai in the plan means there is no joint management of the Cuvelai basin between Namibia and Angola, resulting in the two countries carrying out their own management decisions without consulting each other (M. Amakali, pers. com.).

3.2.2 National issues

The process to establish the Cuvelai Basin Management Committee started with stakeholders meetings in 2003. The objective of these meetings was to understand those issues of concern from the people living in the basin, and to get ideas of who should be included in the BMC membership. Most of the stakeholders were introduced to the concept of water management at basin level during the consultation that took place during the formulation of the water resources management bill (Amakali, 2003).

During the consultations, issues relevant for the establishment of basin wide management, identified by local stakeholders, were recorded. Most of the issues raised were inter-regional issues, i.e. cross-cutting the regions. According to Amakali (2003) water shortage in the Cuvelai basin is of greatest concern to local stakeholders. The main issues identified were:

1) *Keeping water in the basin* by harvesting it before it disappears into the Etosha Pan, and prioritise the use for human consumption and agricultural development. Referring to some stakeholders, sufficient water comes into the basin but this is not properly utilised or harvested. It was said that most floodwaters disappear a few days after a flood, leaving the area dry again. According to local stakeholders, the water is lost due to evaporation and surface flow into Etosha. However, it should be emphasised that surface flow into Etosha pan is a rare phenomena, occurring only in about 8 years out of 20. Stakeholders suggested the construction of dams to capture water before it leaves the area. Related issues, for instance, what would happen if water was prevented from flowing freely into the wetlands towards Etosha and into the pan itself, and how that would influence protected areas, e.g. Ramsar sites and tourism in the area, were raised.

2) *Ensuring that Angola opens up the dams so that water can flow towards Namibia*. According to some stakeholders water does not flow as freely from Angola as it used to. Some people claim that the rivers have been blocked upstream on the Angolan side. As this is an international

basin, research and investigations were requested to substantiate the matter, e.g. by use of satellite imagery or aerial photography of the Angolan part of the basin.

3) *The high salinity of groundwater in the central parts of the basin, which prevents infrastructural development*. It was suggested to establish a desalination plant to improve the water quality, or at least make it drinkable for livestock, in areas where groundwater is brackish. If this is pursued, the experiences in desalinisation of Rössing Foundation at Okashana, shortly after independence, ought to be taken into account.

4) *Deepening the Etaka canal*. Many stakeholders believe that the Etaka canal can be deepened so that water from Olushandja dam can be diverted into the channel to flow to the downstream users, or another artificial channel (SDP10, 2001).

5) Water pollution and water sharing was stated to be a problem especially in the southern part of the basin. It is not clear what water sharing the stakeholders referred to, but it is likely that it has to do with the increased number of people moving towards the southern parts of the Cuvelai basin in search for grazing, which has led to more people and livestock making use of the water provided by pipelines there.

At the onset of the process of establishing the Cuvelai Basin Management Committee, the high numbers of people living in the basin were concerns believed to complicate the process (Amakali and Mazambani, 2007). In order to simplify the pilot phase of the establishment of the committee, it was suggested that a smaller sub-area be selected to test the process. A meeting with stakeholders was held to start the process of dividing the Cuvelai basin into sub-basins and to decide which of the sub-basins will be piloted in the future.

Stakeholders agreed to divide the Cuvelai basin into four sub-basins, namely: Olushandja, Iishana, Niipele and Tsumeb sub-basins. Iishana sub-basin was selected to be the first pilot basin in Cuvelai where basin management would be tested. Between June 2004 and October 2005, the Iishana Basin Management Forum prepared itself to form a committee. Once the demarcation of the sub-basin was agreed upon, the list of potential stakeholders was revised and the organisations within the Iishana sub-basin were identified and invited to attend forum meetings.

The establishment of the BMC used the following steps: 1) Start-up phase: basin identification and preliminary demarcation, stakeholder identification, information dissemination, meetings, 2) Stakeholders forum development, build up information base amongst stakeholders, build capacity, and 3) Basin Management Committee phase development, i.e. establish and implement the BMC. Throughout the process, information sharing, presentations and fieldtrips were included to enhance the capacity of stakeholders and increase the knowledge of their basin. Minutes of meeting were also recorded. The Committee also developed an operational plan and a constitution. By the end of October 2005, the Minister of Agriculture, Water and Forestry officially launched the Iishana Basin Management Committee (Amakali and Mazambani, 2007).

3.2.3 What has the Iishana BMC achieved since it was initiated?

The vision of the Iishana Basin Management Committee (IBMC) is that "*natural resources are sustainably managed and utilized with equitable access and participation by all stakeholders by 2015*".

So far the IBMC has carried out the following activities:

1) Identified and established an office. The IBMC was provided with an office at Directorate of Rural Water Supply (DRWS) offices in Oshakati. To allow operations of the office, electronic equipment and reading materials were provided with support from the GTZ, who has provided most of the funding through their Integrated Land and Water Management in Basin project. The office was run by one person with support from the IBMC and DWAF staff based in Windhoek.

2) An information database has been established and water management institutions and users have been consulted. According to the plan of action, various water management institutions and users were consulted for clarification on their roles and responsibilities in water management, supply and use with the purpose to provide the IBMC members with clear information on the roles and responsibilities of different institution. The information collected will assist the IBMC to address relevant issues intended to raise awareness of IWRM in the sub-basin.

3) Information gaps identified and awareness-raising plan developed for Iishana sub-basin. During the consultation of various water management institutions and users, information gaps were identified. Based on the information gaps, an awareness-raising plan for Iishana sub-basin was drafted.

4) At an Integrated Land and Water Management (ILWM) Planning Workshop held March 2006, and the committee presented its annual work-plan for 2006 which comprises mainly awareness raising activities.

5) In April 2006, IBMC organised and facilitated the first awareness raising workshop with some 71 participants. In this workshop, all governing bodies such as regional councils from various constituencies, representatives from traditional authorities, local water associations and other stakeholders took part.

6) In February 2006, the IBMC submitted articles to various newsletters on water supply and water payment. The targeted media was newsletters of Town Councils within the basin. The IBMC also disseminated books, posters and brochures. Books distributed for further understanding are ‘Managing Water Points and Grazing Areas in Namibia, the Cuvelai’’ by T. F. Irving, as well as ‘’Basin Management Approach: A Guidebook’’ (DRFN, 2005a). Posters on water quality and people’s health were also disseminated, and made available in both English and Oshiwambo. In addition, brochures on IBMC as a basin management approach, its vision, roles and functions, composition were distributed and are available in both English and Oshiwambo.

7) In May 2006, the IBMC chairperson, programme officer for awareness raising and the secretariat participated in an awareness raising talk show on a local radio station, which focused on the functions and roles of IBMC, and listeners were given the opportunity to air their views.

8) In June 2006, five IBMC executive members and the secretariat went on an exposure trip to Calueque Dam in Angola and Ruacana hydro power station.

9) In September 2006, the IBMC attended a Kuiseb Basin Management Committee (KBMC) meeting during which the committee had a chance to see how KBMC operates and discuss natural resources management issues in the two basins.

10) In August 2006, 11 members attended a one-week management training aimed at progressively developing and enhancing participants’ skills.

4 Conclusions

4.1 Biophysical issues

One of the key constraining biophysical issues in the model region is the *salinity of the groundwater*. There are three different aquifers in the area, with varying salinity. This is a problem as the area cannot sustain its water needs, but depends on water provided from Angola, which is purified in Namibia, and then distributed to the rural areas via an extensive pipeline system.

An example was given, clearly illustrates the *risks associated with introducing new technology and infrastructure into an area* that previously only was used when surface water was available, during and shortly after the rainfall season. The main cause of the negative outcome of the initiative is most likely the failure to involve the local community in the project from the beginning. This was exacerbated by the lack of a management plan developed by the local users, together with the service providers involved in construction and maintenance, controlling the use and access of the water points along the pipelines. *Plans to ensure participation of all major stakeholders, and sustainable management plans should be in place before technological solutions are provided to the inhabitants of the model region*.

4.2 Socio-cultural issues

It was shown that *livestock has a central role in the livelihoods of both the rural and urban population of the model region*. However, it was also shown that not everyone owns cattle, and that many households have too few animals to be able to sell regularly.

Introduction of new technology comes at a price. *Before we start introducing new technology a clear plan towards how local users of the technology will pay for the services rendered has to be in place*. As was shown here, selling livestock might not always be the solution to increase people's ability to pay, as only the members of the community with sufficiently large herds would benefit from such initiatives, as they are the ones that can afford to sell their animals.

4.3 Institutional issues

It was shown that *there are presently no serious water use conflicts in the Cuvelai basin*. However, the fresh water distributed in the extensive pipeline system, supporting large parts of Cuvelai basin originates in Angola. The present agreement between Angola and Namibia dates back to 1964 (Water Use Agreement, 1964), an agreement that Angola now is asking to renegotiate. *Should Angola decide to use their water themselves*, (which is a likely scenario, given the high potential for irrigation on the Kunene floodplain), *then that might lead to a serious conflict*, both between water users *in the Cuvelai basin and between Namibia and Angola on a government-to-government level*.

The CuveWaters project will be carried out in the Iishana sub-basin. The IBMC is central to the management structure presented in Figure 1, and will therefore most likely be one of the key stakeholders in this project. It is therefore important to know on what level the IBMC presently operates. The detailed account given of activities undertaken by the IBMC shows that most of the efforts have so far been aimed at building capacity of the Basin Management Committee. Most likely this is a good start. However, it also shows that very little has been done by the IBMC towards actual management of the sub-basin. This implies that the project team might

have to contribute to the capacity building of the IBMC before the committee can become a strong counterpart in the implementation of the project. Given that the IBMC is still in its initial stage of development, it is advisable to *involve the existing Water Point Committees and Local Water Committees on an early stage in the project planning and implementation* to ensure local participation in the project.

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