

River Basin Management in Namibia

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Abstract: The present trend in water resources management is to work on a basin level, the reasons being the need to devolve information sharing, co-ordinating and decision making level down from a centralised system and the fact that water resources are shared within a basin. In Namibia, the water sector is being reformed, also, to introduce the concept of integrated water resources management on basin level. An important aspect is the establishment of Basin Management Committees to manage water along hydrological boundaries and to involve the local communities more actively in the planning, operation and management of their water supplies and resources. As such it compliments Community Based Management (CBM) program government is implementing. To this end, basins have been demarcated using several set criteria and piloting of the stressed basin, regarding availability of water and environmental degradation, started. This paper will look at the introduction of Basin Management concept in Namibia and how the communities in piloted basin are embracing it. So far the communities have shown willingness to manage their own water resources as compared to the past when everything was dictated to them from centrally located decision-makers. The question however is what are the challenges this task will present to them in managing this scarce and vulnerable resource, with regard to the capacity available.

Key Words: basin management, catchment management, community based management, decision making, water resources management.

1. Introduction

The identification and integration of all issues relating to the resource base is essential both for reasons of efficiency, and to address the socio-economic and environmental challenges Namibia faces. For this reason, Namibia is moving towards the adoption of an integrated, basin-scale framework for water resources assessment and management. Such a framework will take into account all the variables - physical, climatic, ecological and human - which affect both the quantity and quality of the resource.

Developments in Namibia with regards to changes in the institutions involved in water resources management and the launching of a water sector reform programme has put emphasis on decentralisation of water resources management. This process, which has been initiated by government aims at devolving more power and responsibilities to the regional councils.

The reform process has developed comprehensive set of recommendations. These recommendations involve new approaches within the institutional framework e.g. separation of functions (management from regulation and service provider), establishing new laws, and putting in place a coherent training strategy. The new water policy and water law support the issues like integrated water resources management, and management along hydrological boundaries. This involves the setting up of basin management committees to manage water at a lowest appropriate level and supports the government initiative of Community based Management (CBM).

In Namibia water is most of the time the most constraining natural resource and development of water infrastructure for specific purpose in an area of the basin may affect alternative expansion in other areas. Development of water and other natural resources is therefore preferably done at basin level, and it is necessary to carefully introduce this new concept for the specific conditions of Namibia, which is the driest sub-Saharan country in Africa. Already, some basins are under stress regarding availability of water and environmental degradation, and basin management should be piloted without delay, in order to deal with these challenges and also to build up competence in the field. The most sensitive area in Namibia is the Cuvelai Basin which covers the central northern parts of the country and where more than half of the population lives, mostly under conditions of subsistence farming, because the area lacks other natural resources or industry.

2. A basin framework to integrate water resource issues

The complexities of Namibia's surface and groundwater circulation system make the application of conventional water resource management approaches, that have largely been developed in temperate climates with predictable rainfall regimes and perennial flows, a difficult task. Equally, the identification of trends requires good quality historical data with high temporal and spatial resolution to be combined with accurate and relevant abstraction data from all major users.

Such an accurate understanding of Namibia's climate as well as the interaction between climatic and physical determinants is at the heart of the water environment, especially as these relate to the availability of fresh water resources. The quantity of flow in an ephemeral stream depends on the frequency and intensity of rainfall as well as the condition of the catchment. In turn, infiltration and recharge depend on the quantity of rainfall falling directly on the ground and the quantity of water entering aquifers from flowing streams and perennial rivers. However, infiltration rates are also related to soil types and levels of silt load in the stream. The latter of these is, in turn, also related to catchment condition, including vegetation cover. An understanding of these processes is essential for developing and managing the resource base. A failure to address any of the issues related to knowing and understanding both physical and climatic determinants and their interaction will inevitably result in socio-economic and environmental degradation.

The primary challenge for resource managers is to anticipate and manage system behaviour and abstractions during prolonged periods of drought. Not only does drought mean reduced rainfall, it also generally leads to a shortage of grazing, overgrazing and hence catchment degradation and ultimately the erosion of topsoil. High sediment loads in the river result in a reduction of aquifer recharge. Under these circumstances, a holistic approach to basin management is essential.

Namibia's surface and ground water resources can be divided broadly into two types, those derived from ephemeral (seasonal, non-permanent systems) and those derived from perennial systems. With the exception of short lengths of the Okavango and Kwando Rivers in the north-east of Namibia, all the rivers in Namibia's interior are ephemeral. They therefore represent an important lifeline for many people throughout the country either directly in the form of surface water, or indirectly as the groundwater sources, which they recharge. At the same time, the perennial rivers along Namibia's northern borders support many people living in relatively large numbers along their banks or close to them. The identification and integration of water resource issues across these broad physiographic limits is essential if water resource management is to address root causes of the socio-economic and environmental problems Namibia faces. For these reasons a broad basin-scale framework can be established for Namibia. Such a framework takes into account all the variables, physical, climatic and human, which can affect both the quantity and quality of the water resource base (Mawrd-1).

3. Definitions

A river basin sometimes referred to as a watershed, catchment or drainage basin is the area contributing to the drainage or discharge at a particular river cross-section (ref.). Water basins are separated by topographic features such as ridges or hills that determine the direction of the flow. In areas with negligible surface runoff water basins must be defined in a broader way by considering the underlying groundwater systems. Other factors such as interbasin transfers may also have to be considered. It is therefore thought to be more appropriate to refer to a "manageable" water basin.

4. Management on basin level

Basins are the appropriate units for operational management. River basin management refers to management of all activities aimed at better function of the river basin (Savenije). The soils, geology, water and vegetation within a catchment are all interrelated; actions in one part of the basin can affect other parts of the basin.

There is very little human activity that does not have an effect on the basin in some way.

Any use and development related to the abstraction, supply or discharge of water affects the health of the ecosystem, the well being of the people elsewhere and the quality and quantity of water environment.

- In a direct manner because it determines the quantity and quality of water available for other activities.
- In an indirect manner because any development activity has socio-economic and environmental impacts.

All land use, natural processes and environmental disturbances interact in either direction with the hydrological cycle and balance within a water basin. Environmental problems are not confined to particular features or areas. If, like in Namibia's case, water is the most constraining natural resource for development, then a decentralized development and management policy is logically to be organized on a water basin basis. Natural resource development and management strategies are more effective if implemented over a whole water basin, reflecting the relation between water, land, vegetation and fauna, and the water basin's ecosystems (Van Langenhove et. al.).

5. Community based management

In Namibia Community Based Management (CBM) refers to communities and the government being partners in the process of planning, construction and/or rehabilitation and managing of the water points and water supply systems. CBM is about the way which communities and government will run rural water supply in the communal areas of Namibia. The principle of CBM has been introduced in the Water Supply and Sanitation Policy (WASP) and been broadened by the Water and Sanitation Co-ordination Committee (WASCO).

Other components of CBM include, cost recovery of rural water supply, both the financial side of managing water points and water supply systems and also the replacement of equipment when it is worn out. The new aspect to this is also paying for the water itself. Coverage component refers to access to water points as well as the quality and quantity of the resource. Within CBM, community structures are made up of different institutions with different function and powers and consequently different composition. These are either advisory institutions (Water Point Associations) who facilitate the implementation of CBM or executive institutions (Local Water Point Committees) who have the authority to carry out their decisions (Mawrd-2). These institutions and other existing local related committees have to be considered when the BMC are set-up as to be included in membership.

6. Demarcation of manageable units

The fact that water is shared and integrated, the country has been divided into manageable units through which Basin Management Committees will be established. Certain criteria have been developed and used to demarcate the basin in such units.

In the beginning, 24 basins have been delimited and these are grouped under 7 main groupings. It should be emphasised, and this is clear from the map, that the basins do not cover all of Namibia. The areas not included are grouped together as the low potential western desert basins and this can be considered as basin # 25. For management purposes 24 basin were seen too many for a small country as Namibia. Therefore a technical workshop was held to:

- Review existing water basins and propose new ones.
- Discuss and get consensus on the framework or criteria for delimitation of water basins.
- Formulate proposals for water basins including both surface and groundwater.

The outcome of the workshop included the consensus on the principles or criteria for delimitation and 13 preliminary basins have been proposed and delimited (Figure 1).

These criteria are:

- **Bio-physical Conditions & Characteristics**
- (Geographical Units-both surface and ground water, Nature of the catchments, river links, Size of the basin, soil types.)
- **Sharing of Water**
- (Transfer of water from water rich area to poor area, impact upon down stream users, who will benefit?)
- **Demand for Water**
- (Population density, type of users, economic value)
- **The availability of water**
- (Amount of rainfall, reliability of water resource, availability of surface & ground water, water quality in the area)
- **The involvement of Stakeholders**
- (Consider needs of poor, local/community involvement, realistic partners, equitable representation, cultural relationship)
- **The Future Development**
- (National development strategy, long term plans, industrial/economic development)

- **Sources of Water**
- **Existing Infrastructure**
 - (Development of Water Resources, existing infrastructure)
- **Policy Framework**
- **Ecological Units**
 - (Appropriate unit to determine ecological reserve, ecological integrity, environment)
- **Economic viability**
 - (Financial resources)

7. Basin Management Committees

The draft Water Resources Management Bill provide for the establishment of the Basin Management Committees by the Minister may, upon his or her own initiative, or upon the application of stakeholders within a basin. This will facilitate better management of water resources of the basins within Namibia. The basin management committees provide the opportunity for communities and government to work together to assure that total water basin management is achieved. Their main function will be to advise on the way water, soil, flora, fauna and land is used, by integrating the interests of the direct stakeholders, the development plans of decentralised government institutions, the expertise of technical specialists, and the concerns for the environment.

Their **objectives** are:

- To oversee and co-ordinate natural resource management activities at the water/river basin level
- To plan for achieving sustainable natural resource management for the water basin in partnership with Government at all levels
- To encourage the most beneficial use with a view to maximising social and economic benefits
- To embody full consultation and participation by local committees and stakeholders
- To incorporate wide sectoral involvement in relation to the impact of development on the natural resource base in a river basin (Mawrd 3.)

Their main **functions**, are:

- to promote community participation in the protection, use, development, conservation, management and control of water resources, including groundwater in its water management area through education and other appropriate activities;
- to prepare a water resources plan for the basin which plan shall be submitted to the Minister for consideration in the development of the National Water Master Plan provided for in Chapter 6 of Water Act;
- to make recommendations regarding the issuance of licenses and permits under this Act;
- to promote community self-reliance, including the recovery of costs for the operation and maintenance and replacement of waterworks;
- to facilitate the establishment of an operation and maintenance system of waterworks and the accessing of technical support for associations within its water management area;
- to monitor and report on the effectiveness of policies and action in achieving sustainable management of the water management area;
- to collect, manage and share such data as are necessary to properly manage the basin in co-ordination with the agency provided for in section 17 Water Act;
- to develop a water research agenda, together with the Water Resources Management Agency, appropriate to the needs of water management institutions and water users within its water management area;
- to assist with conflict resolution within its water management area; and
- to exercise any such additional functions as the Minister may delegate under sections 14(1)(d) and 15 of Water Act.(Mawrd 4)
- The **membership** will include:
 - The direct stakeholders, i.e. the land and water users and other people who are dependent on, or affecting the availability and quality of water within the water basin area. To be included are representatives of the private sector.
 - Officials of government departments or authorities being competent in and responsible for natural resource management within the water basin area.
 - Representatives of regional and local authorities within the water basin area.
 - Persons with an interest in environmental matters, in the broader sense, within the water basin area.

Members should have the full competence and mandate to represent broad groups of stakeholders and should keep effective liaison with them.

Management committees should be limited to maximum 12 full members, with the provision that associated members are identified who may be called to attend meetings to discuss specific matters where their expertise or input is required, or who may be asked to perform particular activities in their field.

The Water Resources Management Agency within MAWRD should be the leading agency and will be responsible to ensure that all required responsibilities are duly executed. This will include the regular supervision of environmental monitoring and remedial activities and implementing of basin plans.

Their **operating criteria** are:

- The Committee shall administer the development by the leading agency of a suite of natural resource policies and strategies for the basin that will be the guideposts upon which development proposals will be evaluated to ensure basin sustainability.
- Any development plans or other envisaged action by responsible authorities that have a significant impact on the natural resources of a basin will be forwarded to the Committee for review. The Committee's role will be advisory.
- These plans should be discussed during regular and /or ad-hoc committee meetings with members present, either being full members or being associated members called upon to report on specific issues.
- The purpose of the discussions should be to establish whether additional information is required and whether the proposed plans will contribute to the sustainable development of the water basin, or whether the plans will be contrary to this.
- Proposed environmental and other monitoring and remedial action should be given due attention.
- During the meetings, the committee should also discuss any development or potential development within the water basin, as well as the reports on monitoring and remedial action, and other relevant activities within the water basin.
- The committee should attempt to arrive at consensus, but in case this is not possible make use of normal majority-vote procedures, and accordingly make recommendations to the Water Board or, if applicable, to another responsible institution. In this process the committee should closely liaise and harmonise its position with the other institutions involved, such as the proposed Environmental commission and Land Board.
- The committee should also forward the annual assessment of the ecological health of the water basin to the same institution, together with its comments and recommendations for additional activities.
- The committee may have sub-committees.
- The members of the committee are responsible to provide funding for their own operational activities (Mawrd 3).

8. Discussions

Iterating, water resources must to be managed along hydrological boundaries and on an integrated manner. The main objective is to take water resources management and decision making to lowest possible level (subsidiary). However the type of institutions they are must be specified. The objectives and functions have already been stipulated. The BMC will initially be advisory statutory bodies, whose main roles are to carry out strategic planning, co-ordinating, assessment and advising on management of natural resources of the basin.

As statutory bodies, endorsed in the Water Act, will report to the minister. They will develop plans in accordance with all other national plans, policies and legislation. Because of their wide range of expertise in membership, it is expected that thorough and integrated planning is carried out. These plans are co-ordinated by the PSU (Policy and Strategy Unit) which will be in charge of overall national master planning and policies, and also come up with a template to be followed by all BMC when it comes to planning. This will help with consistency, although each basin has it own unique issues of concern. The plans should indicate the budget for each project and implementing agency and order of priorities. As mentioned the aim is to manage on hydrological basis and on an integrated manner.

The plans are forwarded to the minister of water for approval. On approval, they are given to the water resources management agency for implementation. Therefore, BMC will not do the actual work but identify issues for urgent implementation and monitor progress. Regional projects are included in the basin plans to avoid duplications and ensure better use of funds. The Agency will budget for the projects in the basins as

indicated in the plans, and make sure they are carried out properly. Committees can solicit funds when necessary and contract out some work, in collaboration with the Agency.

So far the linkages are around the BMC (strategic Planning), Water Agency (implementing plans), Regional Council (planning section as members of BMC), PSU (overall national planning and co-ordinate basin plans) and the Minister. Most of them are represent in the BMC except for the last two, but are informed at all time on what is going on. With regard to other government institutions they can be involved in carrying out some activities as indicated in the Plan of actions.

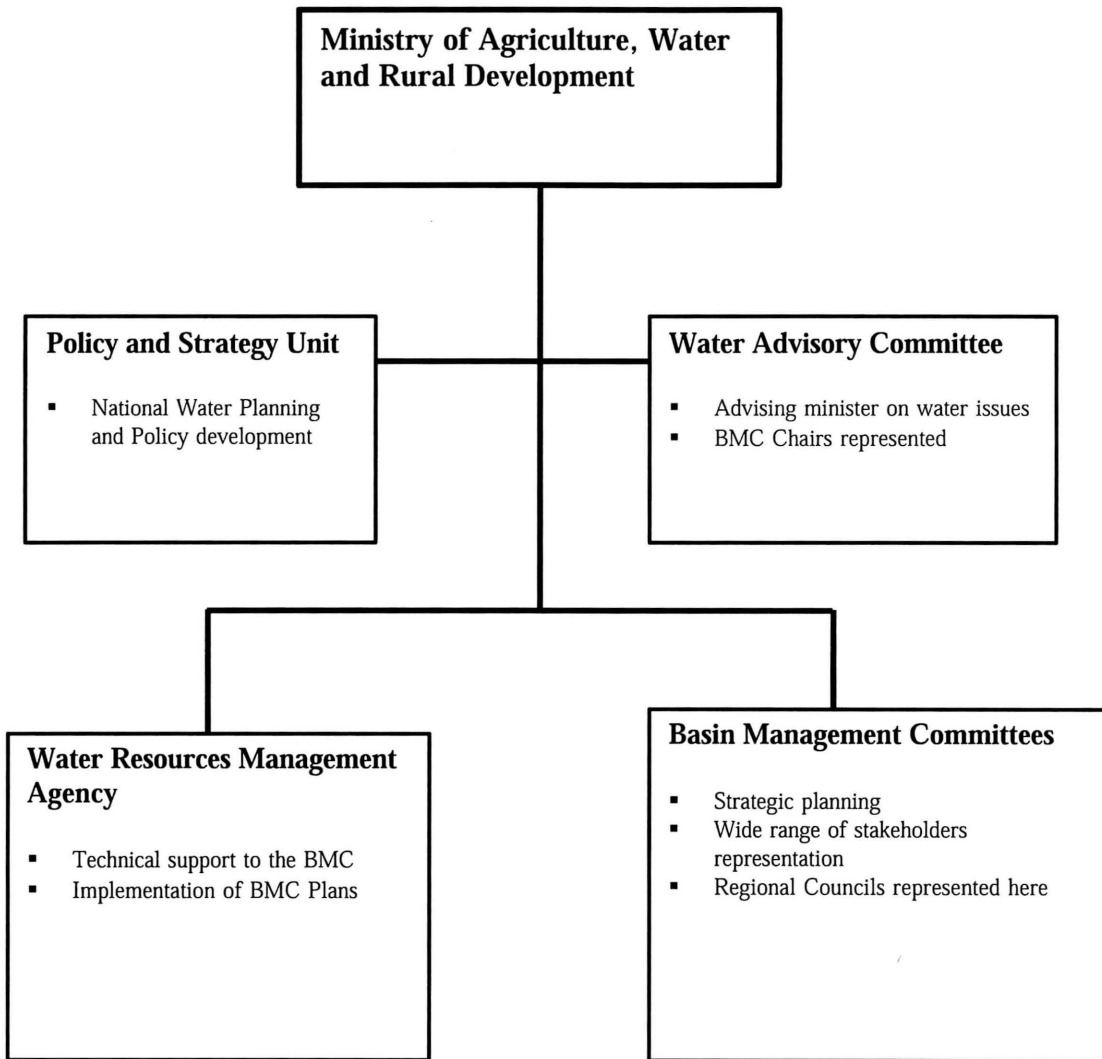
The most critical issue is to make sure that these institutions are properly regulated. What needs to be addressed is the separation of regulatory and operational functions. The functions have to be clearly defined with respect to constitutional, organisational, and operational tasks and institutional arrangements. The draft Water Bill should empower the organisations in the basin to establish effective regulations and administrative and financial procedures and enforce them in line with their authority and responsibility function level. Addressing the legal issues in itself is not sufficient. Regulations, administrative rules and enforcement of powers have to be acknowledged, and accepted by all stakeholders, lawyers, and courts. For this reason, public awareness campaigns and experience exchange forums are considered important for integrated water resources management.

The Draft Water Bill calls for the establishment of BMC and its functions and membership set out. However, some of details such as funding, reporting line, power of the BMC and structure has not been stipulated. Looking at the two Australian approaches, the BMC can be either planning and advisory (NSW) or implementing (Victoria) bodies. Funding can be allocated from government, through the Agency or Regional Council. Committees can be given power to generate and retain own funds. It is important that a link between the BMC and Water Resources Agency is there not only to give technical support but also for accounting purposes as the Agency is the custodian for water resources data. For planning purpose the link with Regional Council Planning committee has been clearly stipulated in the Bill to avoid duplication. The concept of Basin Management is based on integrated management of the resources, therefore, other related ministries and department should be involved, mainly through stakeholders participation.

Capacity needs to be developed especially for the day-to-day functioning of the BMC's. This can be by launching an effective human resources development program, and by upgrading organisational, financial and asset management. Incentives should be given to retain and attract experienced members. Funding may come from government but also from own revenue like user fees and charges from users. BMC's must be given mandate to generate and retain own funds. However, it is essential that transparent financial procedures are used, and that committees should be held accountable to stakeholders and the public at large for the management of the assets of the water sector.

It is important that the process should not be rushed but that the implementation should proceed cautiously bearing in mind the lack of resources and capacity to effectively devolve responsibilities to the local communities.

9. Proposed structure



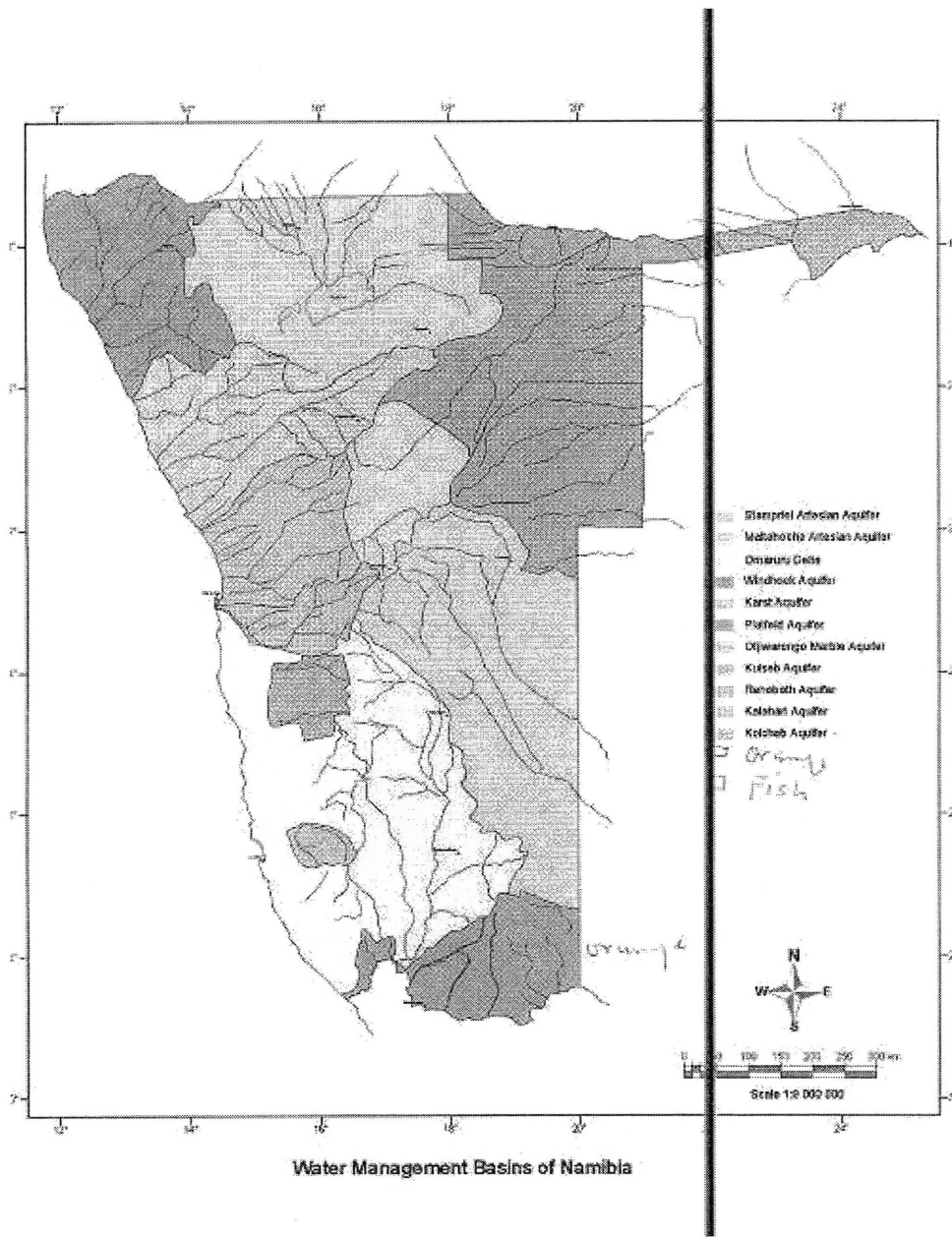


Figure 1: Preliminary Demarcated Management Basins

10. Conclusions

From the foregoing it is clear that, Namibia, like many other countries is making an effort to decentralise public services. This is because there is a need for improved services, economic reform and democratisation. There is also a growing need to manage water resources on hydrological basin level and to involve users and other stakeholders at the lowest possible level.

The current water sector reform initiative has produced various recommendations for an improved institutional set-up aimed at separating functions and involving stakeholders. The main one is the set up of Basin Management Committees to carry out the management at that level. However much remains to be defined for instance how the duties and responsibilities will be shared, and how co-ordination will be arranged among institutions.

Furthermore the Water Law or bylaws are still to be passed, and implementation of management strategies, is sadly missing. Technical and financial support and capacity must be present at the regions, then at the communities. Other requirement of a decentralisation strategy, such as joint involvement of stakeholders in planning process, allocation of resources, autonomy to generate funds is missing.

On piloting of the Cuvelai basin Management Committee, most of them welcome the concept and because some people have already been aware of it from the consultations on the bill, it was not hard for them to understand what they have to do. Since they are the people who live and depend on the basin resources it was important that they be in charge of its management as well. Gone are the days when decisions are made for them.

11. Recommendations

It has been stressed that the reason for managing water on basin level is to manage water resources better, on integrated manner and involving all stakeholders at lowest possible level. The Australian experience has revealed two possible ways to involve stakeholders. They either have full decision-making power and implementation role or simply an advisory role where they are involved in planning activities of the basins. Because of low capacity level and pending situation, the later is more suitable to Namibia. However, before progress is made to set-up such advisory committees, the followings are recommended.

- Reporting - for the reasons of empowering the BMC and as by provision of the bill and their membership to WAC, they will report directly to the Minister of Water. The main things to report on should be, their Plans as they develop them for approval, finding of the basin status through continuous monitoring and achievement as progress as they come.
- Funding – Government through the budget of the agency must provide funds to the basin. Each BMC should be allocated funds to run their everyday activities and meetings. The BMC should also be allowed to generate own funds through different means.
- Structure – The structure should allow access to the Minister. The Regional Councils are represented and present their water plans and problems. The Chairs of BMC will also be members of WAC that will meet twice a year.
- Mechanism to introduce integrated water resources management – The membership of the BMC should allow for intersectoral representation. Integrated planning has to be practised and all development within the basin has to be approved by the BMC. BMC should have power to demand plans from other sectors as they affect water resources.
- Finalise the demarcation process – This is necessary to see whether some more groupings can be made as not to have too many BMC, but still using the criteria as already specified.
- Pilot – The piloting of the Cuvelai and Kuiseb basin should continue. Awareness creation through existing structure for the targeted stakeholders, either through formal meetings, informal consultations, media (radio and newspapers)
- Establishment of sub-basin committees
- Establishment of main BMC consisting of chairs from sub-basin committees.
- Implementation (to cover possibility to work together with Angolan counterparts).
- Monitoring.

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APPENDIX

CASE STUDY 1: CUVELAI BASIN

Background

The Cuvelai basin is located on the northern central part of Namibia. It forms a delta that drains the southern Angola and brings water to Namibia, and gradually converges into the Etosha Pan. On average, high floods of four in every ten years occurs. Local rains also contribute to surface flow in the basin.

The climate in the basin is that of semi-arid, which is characterised by variable rainfall. Summer rains occurs the most. The eastern part receives more and reliable rains compared to the western part. People had settled in area where there is plenty of water and still continue to do so. In past years they relied mostly on water drawn from shallow wells during the periods. Recently, an extensive network of pipelines supplying water from the Kunene River provides large proportion of the population with water, while other people get it from boreholes.

Almost half of the Namibian people reside in the rural part of this basin. Rapid population growth, currently at 2% p.a., is the biggest threat to achieving sustainable development in the area. Growing number of people will place severe stress on already strained natural resources base of the region.

Most of the people in the basin are communal farmers and rely on land and vegetation for their livelihood. The most important crops are pearl millet and sorghum, while cattle, goats, donkeys and poultry dominate livestock numbers.

Drought is frequent in the basin, causing lack of food, water and grazing. Although floods occur, water in the bigger part of the basin is saline and fresh water is deeper and expensive to draw. Proper management of the resources is very important to remove the stress and sustainable development of the basin.

It was these problems and nature of stresses that prompted the piloting of Basin management committees for this basin. As provided in the Water law, the minister on his own initiative has indicated the need to establish such committees, to better manage the water resources on an integrated manner. The consultation with stakeholders has started at the regions that are part of the Cuvelai basin to introduce the concept and the wish to begin the pilot of the Cuvelai Basin Management Committees.

Regional stakeholders meeting (13-17 May 2002)

Introduction

The NWRMR has been conducting workshops and consultations with stakeholders on the water management issues addressed in the National Water Policy and the Draft Water Resources Management Bill. The Policy calls for the adoption of an integrated basin scale framework for water resources assessment and management and the Bill provides for the establishment of Basin Management Committees (BMC). The concept of water resources management on basin level and the intention to pilot the idea of basin committees has already been highlighted during those consultations.

The Cuvelai together with the Kunene and Kavango basins have been identified by the Honourable Minister of Agriculture Water and Rural Development as stressed and vulnerable in urgent need of attention. The Cuvelai basin covers most of the area in the four north central regions of Oshikoto, Oshana, Ohangwena and Omusati.. Although coincidentally, the entire four regions have different natural characteristic as the basin can be divided into sub-basins. The northeastern part of the basin has the Ohangwena region and represents the upstream of the two major streams of Gwashigambo and Gwaniipele and a little branch of the Cuvelai River in its west. The Oshikoto has the other two major rivers, Omuramba Omuthiya and Omuramba Owambo. Oshana and Omusati region is made up of the Cuvelai delta and characterised by a lot of Oshanas. These northern rivers originate in Angola and flows towards Etosha Pan and depending on the

magnitude of the flood it could reach the Pan. The groundwater quality also differs in each region or the different part of the basin. It ranges from brackish to fresh in the easterly direction. Although in the delta area, fresh water can be found at shallow depth. In other areas especially the east, groundwater of good quality can be found.

The objectives of the meetings was to start the piloting of the Cuvelai Basin Committee; to get the ideas and issues of concerns from the people on the ground and to get ideas of who should be included in the BMC membership. Most of the stakeholders have already been introduced to the concept of water management at basin level, during the consultation on the water resources management bill. The short overview, objectives, and functions of the BMC was presented and explained. All stakeholders liked the idea of being in charge of their resources management, instead of being told what is to be done for them without giving their own input.

Most of the issues raised were crosscutting the regions. The main ones being keeping water in the basin, either by harvesting it before it disappear to the Etosha Pan and being used mainly for human consumption and agricultural development. And getting the people in Angola to open up the dams so that water can flow towards Namibia (the Government is urged to intervene in this issue). The quality of groundwater is saline in most area, and the some Oshanas, due to infrastructure development.

The rest of the issues of concerns and questions raised during the meetings are elaborated below as per discussions in each region.

Oshana Region

- Disappearance of floodwaters to Etosha Pan/Park before it is utilised for different purposes (agriculture) in the basin/region.
- People shouldn't depend too much on pipeline water especially for livestock drinking and other agricultural purposes.
- Rumours that Omatala River in Angola has been blocked, therefore most of the water does not get to Namibia anymore.
- The possibility of diverting water from the Kunene River, before it reaches the sea to the Etaka Canal (an artificial channel).
- If the Angolans have blocked the rivers upstream, what are the research agenda in that issues, can the Government not do something? Someone should go there and investigate. Namwater representative mentioned that there has been a meeting in Ondjiva with the Minister and the Angolan counterparts to discuss the issue of getting clean water from Namibia. It was mentioned to them that they should investigate the issue of blocked rivers, so that Namibia can have extra water to supply to them.
- At the same time, an agreement between the two governments should be made on water sharing. Use the SADC-Protocol on water.
- MLRR-NRIS (Natural Resources Information Service) has some information on the four regions and can provide maps.
- Wastewater discharge, what is the law saying about it?
- Membership of the Committees? Suggested were Regional Councillors from each region to be represented in each sub-basin committee, especially for planning purposes. Traditional authorities, Youth, Church leaders, disabled, women etc.
- How about training of the Committee members?
- Global warming/El Nino. Recent low rainfall in the country contributes to lack of water in the region. How about the old tradition of fetching rain from Evale (passing comment), but more about rain inducing techniques (cloud seeding) should be investigated.
- New ploughing methods in the region also contribute to the flooding of the fields. When people used hoes it was not that bad. Maybe Department of Agriculture can recommend or give training.
- Conservation of the environment, more trees are still being chopped, resulting in desertification. Communities need to be sensitised and educated towards that issue.
- Funding for research and development should be sought for the whole basin. Set political boundaries aside and work together.
- Population is growing and water demand is on increase. If there is no water, there will be no job and no basin committee.
- Cost of water is high, should be considered. There are poor people in the basin and should be subsidised.

Oshikoto region

- Overgrazing at the water points.
- Broken infrastructures, such as boreholes and pumps/taps.
- Registration of boreholes and some of the nicely done hand-dug wells. Who and when should it be done.
- Environmental issues – overgrazing – desertification – conservation.
- How will the existing committees be included in the BMC?
- Who will facilitate the establishment of BMC?
- Membership should be traditional authorities, regional councillors, farmers (communal and commercial), NGOs – Nolidep, Urban Trust, Church leaders, Etosha Ecological Unit.

Omusati Region

- They would like to see better maps of the basin.
- Would management include surface and groundwater?
- WAD (Women's Action For Development) will sent their issues after discussion with other colleagues in the office.
- Farmers are concerned about floodwaters that pass without being harvested. They have ideas of pointing out good location for building a dam without jeopardising access to downstream users.
- Because of high salinity, deeper dams seems impossible- new techniques should be investigated to allow larger quantity storage of water with no threat to salt water intrusion.
- Will small-scale desalination for saline water be possible?
- Some of the farmers in this region have their cattle in the Omutsegwonime/Oshivelo area. They seem to experience shortage of water. Pipeline does not go near the cattle posts.
- Olushandja/Etaka dam area poses a problem with birds – they come to drink and live there during the summer season. In the process they feed on people's crops, they have no rights.
- How is BMC different from CBM water point committees?
- There seem to be lots of water in the region but the quality is poor especially if one digs deep. They want more surface dams.
- Membership – the fear is that, language problem may pose threat to limiting wider representation.

Ohangwena Region

- They mentioned that the council has some information on rainfall.
- Northeast of Eenhana at Onakalunga is a good catchment for water harvesting as well as Northwest of Ohangwena. They want a feasibility study into potential of building large dams.
- A monitoring network for the whole basin should be established.
- Epembe and Omundaungilo have a problem of high seepage due to sandy area – even wells are hard to dig without collapsing.
- Location of graveyards and wastewater discharge from hostels and hospitals may pose problem of water pollution if not properly planned. Village/town plans should be done in conjunction with water resources planning and aim to protect the water sources.
- There has been a misunderstanding that rainwater harvested from roofs is polluted and not fit for human consumption.
- More feasibility should be done on building large dams – get input from local people.
- Groundwater quality – where can it get tested if one finds suspicious looking water in the well?
- Environmental requirement - most people seem to think that letting water to go all the way to Etosha Pan/Park is a waste.
- Water rights – conflicts between users – with Angola as well as internal – Ohangwena is upstream of some of the rivers.

CASE STUDY 2: CATCHMENT MANAGEMENT IN AUSTRALIA

Catchment Management in New South Wales

Catchment Management Boards

In December 1999, the Minister for Land and Water Conservation announced that the community-government partnership in natural resource management would be strengthened by the establishment of 18 new Catchment Management Boards across New South Wales. The new boards now replace 43 of the 45 catchment management committees and the five regional catchment committees.

The new boards (listed below) are established under the Catchment Management Act 1989 and the Catchment Management Regulation 1999:

- Border Rivers Catchment Management Board
- Central Coast Catchment Management Board
- Central West Catchment Management Board
- Gwydir Catchment Management Board
- Lachlan Catchment Management Board
- Lower Murray Darling Catchment Management Board
- Lower North Coast Catchment Management Board
- Mid North Coast Catchment Management Board
- Murray Catchment Management Board
- Murrumbidgee Catchment Management Board
- Namoi Catchment Management Board
- Northern Rivers Catchment Management Board
- South East Catchment Management Board
- Southern Catchment Management Board
- Southern Sydney Catchment Management Board
- Sydney Harbour Catchment Management Board
- Upper North Coast Catchment Management Board
- Western Catchment Management Board.

The Hunter Catchment Management Trust and the Upper Parramatta River Catchment Trust will continue. The Coxs and Wollondilly Catchment Management Committees will remain at this stage, as they are within the Sydney Catchment Authority (SCA) area. The SCA has clear, wide-ranging responsibility for the health of the Sydney water catchments, which feed Warragamba, and Sydney's other dams.

Objective

The objective of the establishment of the Catchment Management Boards is to enhance the capacity of total catchment management to substantially improve the quality and sustainability of our state's natural resources and environment.

The department's staff, along with other government agency staff and local government, will be working with communities and industry groups to implement strategies developed by the new boards.

Membership

On 31 May 2000, the Minister announced the appointment of members to the boards. Board members are drawn from representatives from the community, industry and government:

- Nature conservation interests
- Primary producers/natural resource users
- Local government
- Aboriginal interests
- State government.

Role of the Boards

The boards will focus on five specific tasks:

1. Identify the opportunities, problems and threats associated with the use of natural resources to support rural production and protection and enhancement of the environment.
2. Identify the first order objectives and targets, within the overall legislative and policy framework, for the use and management of the region's natural resources.
3. Develop management options, strategies and actions to address the identified objectives and targets.
4. Assist in developing a greater understanding within the community of the issues identified and action required to support rural production and enhance the environment.
5. Initiate proposals for projects and assess against the targets, all projects submitted for funding under Commonwealth and State natural resource management grant programs.

Catchment Blueprints

The Minister has requested that each Board produces a draft Catchment Blueprint as represented by the first three of the above tasks.

The purpose of the draft Blueprint is to ensure the health of the landscape is improved by meeting key targets. Once finalised, the Blueprints will provide focus and direction to individual and community initiatives, help co-ordinate government investment, such as extension work and grant funding, and contribute to the implementation of legislation such as the Native Vegetation Conservation Act 1997 and the Water Management Act.

Catchment Management in Victoria

Catchment Management Authorities

The Catchment Management Authorities (CMAs) were established on 1 July 1997 with the aim of creating a whole of catchment approach to natural resource management in the state. The new CMAs combined the roles of the former, River Management Boards and Catchment and Land Protection Boards, and community based advisory groups such as salinity plan implementation groups and water quality working groups.

Objective

The primary goal of each CMA is to ensure the protection and restoration of land and water resources, the sustainable development of natural resources-based industries and the conservation of our natural and cultural heritage. The five principles that govern the way catchment management is implemented throughout the State are:

1. Community Empowerment

Catchment management is a partnership between community and Government. Planning and implementation of natural resource management programs should maximise opportunities for community involvement.

2. Integrated Management

Management of natural resources should recognise the linkages between land and water and that the management of one element can impact on the other.

3. Targeted Investment

Government and community need to ensure that resources are targeted to address priorities and deliver maximum on-ground benefits.

4. Accountability

Those making decisions on natural resource management should be clearly accountable to Government and the community, both in a financial sense and for outcomes.

5. Administrative Efficiency

To maximise on ground results catchment management structures should facilitate more efficient procedures and protocols.

Core Functions

- To promote co-operation in the management of land and water resources
- To advice on regional priorities and resource allocation
- To advice on matters relating to catchment and land protection
- To advice on the condition of land and water resources
- To promote community awareness and understanding of the importance of land and water resources, their sustainable use, conservation and rehabilitation.

The CMA Structure

The basic structure of a CMA is designed to maximise community involvement in decision-making. This structure comprises:

1. The Board - who are directly responsible for the development of strategic direction for land and water management in the Region. They set priorities, evaluate the effectiveness of outcomes, monitor the external and internal environment and identify opportunities.

2. The Implementation Committees (ICs) are the conduits for local community input, and are responsible for the development of detailed work programs and the oversight of on-ground program delivery for specific issues or sub-catchments.

3. The Staff are there to support the Board and ICs, oversee development and implementation of programs and liaise with the community, government and other catchment-focused organisations.

Port Phillip Catchment and Land Protection Board

The Port Phillip Catchment and Land Protection Board manage the catchments of the Melbourne metropolitan region and its rural fringe.

Currently, the role of the Port Phillip CaLP Board includes:

- review of the Regional Catchment Strategy and provide advice to the Government on its implementation;
- advising the Minister on
 - (i) regional priorities;
 - (ii) matters relating to catchment management and land protection; and
 - (iii) the condition of land and water resources in the region;
- promoting co-operation in the management of land and water resources in the region; and
- promoting community awareness and understanding of catchment management;

Unlike the CMAs, the Port Phillip CaLP does not have operational responsibility for provision of waterway and floodplain management activities and programs.

Victorian Regional Catchment Strategies

Regional Catchment Strategies are developed by the Catchment & Land Protection Boards. The strategies provide the blueprint for Catchment Management and Sustainable Agriculture into the 21st Century. They set out the vision, objectives and high priority actions for implementation. The strategies are developed by Catchment and Land Protection Board in consultation with the regional community.

The State Government is committed to working in partnership with catchment communities in implementing these strategies to enhance the prosperity and environmental quality of rural Victoria and the State as a whole.