

Conclusions and recommendations

The GIWA Assessment of the Lake Chad Basin aimed to identify priorities for remedial and mitigatory actions. The report investigates the ecological status, the causes of their degradation and the policy options available to improve their status. The Assessment focused on the five major problem areas of: Freshwater shortage, Global change, Habitat and community modification, Unsustainable exploitation of fish and other living resources, and Pollution.

The GIWA Assessment ranked Freshwater shortage as severe and it was considered the priority concern in the Lake Chad Basin. All the other concerns except for Pollution (rated as slight) were rated as having a moderate impact. Although there has been significant modification of habitats and significant fluctuations in fish production, these were primarily a function of freshwater shortage, rather than as a consequence of direct habitat modification or unsustainable exploitation of fish. Stream flow modification as a result of decreased rainfall events and upstream dam impoundments primarily in the Chari-Logone and Komadugu-Yobe river systems, have impacted on the habitats downstream. Wetlands have been the most affected as a result of changes in the timing and extent of seasonal flooding. For example the surface area of Hadejia-Nguru wetlands, located in the Komadugu-Yobe sub-system, at one time covered nearly 300 000 ha, today, these wetlands have shrank to an estimated 70 000-90 000 ha (Barbier et al. 1997). The reduction in the stream flow has also caused the Lake Chad to shrink to less than 10% of its former surface area in the 1960s (Lemoalle 1991, USGS 2001). This has significantly altered the Lake from being an open water environment to being a predominantly marshy environment. The fish species composition has correspondingly been modified. The fluctuations in fisheries production is also primarily attributed to the variations in freshwater availability in the region.

The Causal chain analysis (CCA) focused on the priority issue of stream flow modification. The Chari-Logone/Lake Chad sub-system was

identified as one hotspot and the Komadugu-Yobe sub-system as another where there had been severe impacts from stream flow modification. In the Chari-Logone/Lake Chad sub-system the immediate causes of stream flow modification were the significant decreases in precipitation in the catchment and the increased diversion caused by the construction of the Maga Dam in 1979 as part of the SEMRY irrigation project.

The root causes behind the stream flow modification witnessed in the region were identified to serve as a foundation for the selection of policy options. In the Chari-Logone and Lake Chad region the demographic pressures from rapid population growth and environmental refugees escaping drought in the northern regions of the Basin and from fishermen migrating following the receding lake waters have concentrated the pressure on water resources in this region. The poverty in the region and reliance of the population on flooding and the lake resources made the population particularly vulnerable to the environmental changes. The planners of the SEMRY project did not take sufficient account of the impacts of stream flow modification from the Maga Dam, on the downstream populations and the ecosystems that support them. Planners also did not take into account the value of the environmental goods and services provided by the Waza-Logone floodplains. The inundated area of the Waza-Logone floodplain was reduced by almost 30%, incurring annual economic costs to the local economy of more than 2 million USD (IUCN 2002). Stakeholders were not involved in the initial planning and implementation of and management of the SEMRY project. The lack of available information is a hindrance to sound decision-making and to public awareness in the region and the countries have difficulties in cooperating and sharing information. According to the WSSD (2002) it is important to “enhance and accelerate human, institutional and infrastructure initiatives and promote partnerships in that regard that respond to the specific needs of developing countries in the context of sustainable development”. The governments active in the Chari-Logone sub-system, namely Cameroon and Chad have

two conflicting policies, one to reduce poverty and increase economic growth and food self-sufficiency, which they hope to achieve through irrigated rice cultivation, and the other to conserve wildlife through the creation of national parks. These policies need to be integrated so that they are able to benefit each other. The irrigations projects use water inefficiently; the farmers receive a low return on the amount of water used in the irrigated fields, at the expense of downstream traditional farmers (King 1993). King (1993) identified that rice extraction rates in Chad and Cameroon are very low by modern standards and it has to be questioned whether water intensive crops such as rice, should be grown anyway in a region prone to freshwater shortages.

Stream flows in the Komadugu-Yobe sub-system have also been reduced by the decrease in rainfall events and because of the many dams constructed aimed at utilising the water resources of the region. During the 1970s and early 1980s around 20 reservoir dams were built on the Hadejia River system, to supply irrigation and domestic water supply projects. They had a negative impact on the hydrology of the Yobe River, the only inflowing river into Lake Chad's northern pool. The potential water requirements in the Hadejia river system are 2.6 times higher than available water supplies (IUCN 2003b).

There has been rapid population growth that has led to greater pressure on the natural resources including water resources in the Komadugu-Yobe sub-system. The population currently represents over 55% of the Lake Chad Basin's population. The communities suffer from endemic poverty, which is often a catalyst for environmental degradation as they exploit natural resources at an unsustainable level for their short-term survival. The hydro-agricultural schemes were planned without consideration of the climatic variability of the region and there was insufficient account of the impact of reduced flows on these communities in the downstream Nigerian States and Niger. For example the Hadejia-Nguru wetlands that provide essential income and nutrition benefits for local populations have been reduced in extent since the construction of upstream dams (Barbier 1997).

The traditional communities and other stakeholders most affected by the water developments were not consulted during the planning or during the management of the dam infrastructure. Large irrigation and water developments are thought to have provided more negative economic impacts than positive. Existing knowledge is not utilised with poor information dissemination, particularly to the traditional communities, weak information sharing networks, and limited pollution monitoring and regulations. Information, education and local networks are important strategies for awareness raising (Gardner & Stern 2002, UNCED 1992, WSSD 2002).

There is no overall water management strategy for the Komadugu-Yobe sub-system (Bdilya et al. 1999) and the most acute obstacle in achieving this is the absence of a coordinating mechanism to harmonise the activities of the water users such as a water allocation law between the Federal Agencies and the Nigerian States or between Nigeria and Niger. Water management institutions are only concerned with meeting their water requirements, with minimal or no concern for the impacts of their activities on other users (Bdilya et al. 1999). Management is also fragmented with ill-defined and often conflicting responsibilities between government agencies and stakeholders. Water continues to be used inefficiently whilst poor water use management continues, and farmers are given no incentives or guidelines aimed at conserving water resources. Traditional management systems that are predominant in the region also play a role in the inequitable use of water. The rural population is highly differentiated and the poor, critically, do not have access to fishing and farming resources (Béné et al. 2002).

The Policy option analysis described alternative courses of action that may be taken by policy-makers in the region, and discussed the projected outcomes and trade-offs of each action. These actions should address the root causes identified during the CCA. Firstly, basin wide options were discussed followed by projects under discussion for the Chari-Logone and Lake Chad sub-system and Komadugu-Yobe sub-system.

The following options were discussed for the entire Lake Chad Basin:

1. Implementation of the GEF project for the "Reversal of Land and Water Degradation Trends in the Lake Chad Basin Ecosystem".
2. Water allocation agreement.
3. Inter-basin water transfer.

The following projects were discussed for the Chari-Logone and Lake Chad sub-system:

- 4a. Reinundation of the Waza-Logone floodplains (Chari-Logone sub-system).
- 4b. Assessment of changing land use in the head waters of the Chari-Logone sub-system.
5. Chad-Niger Transboundary Project to Combat Sand Dunes and Reverse Water Degradation Trends in Lake Chad (Lake Chad sub-system).

The following projects were discussed for the Komadugu-Yobe sub-system:

6. Grant subsidies to irrigation farmers in northern Nigeria for implementing water conservation measures.
7. Maintenance and improvements to the efficiency of dams and stream flow in the Komadugu-Yobe Basin.

Two of the broad challenges facing water management in the Lake Chad Basin were identified as increasing freshwater availability and/or reducing water demand and enhancing water allocation mechanisms. However to successfully implement projects/policy actions aimed at alleviating these challenges, the institutional and legislative failures identified during CCA that are resulting in the unsustainable and inequitable use of water resources needs to be addressed as a priority.

Many of the root causes were identified in the LCBC Master Plan (LCBC 1992), followed by an update of this plan and the formulation of a Strategic Action Plan (LCBC 1998), but unfortunately the implementation by riparian countries of recommendations made in these plans has been very slow. They serve as foundation from which the root causes identified in the CCA can be addressed. The GIWA Assessment recommends as a prerequisite to all other proposed projects, the development and prioritisation of recommendations made in the Strategic Action Plan (SAP). The GEF project entitled "Reversal of Land and Water Degradation Trends in the Lake Chad Basin Ecosystem" is beginning to implement prioritised recommendations made by the Master Plan and SAP. It has a development objective "to build capacity within the Lake Chad Basin Commission (LCBC) and its national committees so that it can better achieve its mandate of managing land and water resources in the greater conventional basin of Lake Chad" (World Bank 2002a). A strengthened LCBC will coordinate the member States national plans and actions with each other at the Lake Chad basin level and primarily address the root causes of: lack of coordination; and institutional weakness.

As a subsidiary priority to the strengthening of capacity in the LCBC, a water allocation agreement would be a key legal instrument in addressing the inequitable allocation of the water resources in the Lake Chad Basin. A water allocation agreement enforced and coordinated by a strengthened LCBC is necessary if integrated management of the Basin is to be achieved. The implementation of a water allocation agreement will address the root causes: i) lack of coordination, ii) legal - no water allocation law, and iii) lack of capacity to promote compliance. The reinundation of the Waza-Logone floodplains (Option 4a) can be incorporated within the flow rates stipulated by this legal framework, so that increased flooding can restore floodplain economic activities. Dam maintenance and enhancement, and the improvement of stream flow (Option 7) will allow the effective implementation of Option 2 (water allocation agreement) and Option 4a by allowing greater control and efficiency of water conveyance. The GIWA Assessment also recommends Option 6 (water conservation) as a possible means of increasing freshwater availability and addressing the root causes of poor water management and the lack of incentives to promote

compliance. The implementation of water conservation measures would allow water supplies that are available in the Komadugu-Yobe system to be used more efficiently and would be an effective tool for long-term water demand management as part of the wider allocation of water in the Basin.

The GIWA Assessment recommends the following actions in priority order:

1. Continued development of recommendations made by the Master Plan and Strategic Action Plan.
2. Implementation of the GEF project "Reversal of Land and Water Degradation Trends in the Lake Chad Basin Ecosystem".
3. An agreement on the equitable and reasonable allocation of water resources should be negotiated, finalised and ratified by member States (Option 2).
4. The reinundation of the Waza-Logone and Hadejia-Nguru wetlands (Option 4a), according to flow rates stipulated by Option 2.
5. Maintenance and improvements in efficiency of dams and stream flow in both the Chari-Logone and Komadugu-Yobe basins, to ensure the effective implementation of the allocation agreement (Option 7).
6. Feasibility study of water conservation techniques suitable for selected project sites (Option 6).