

Policy options

This section aims to identify feasible policy options that target key components identified in the Causal chain analysis in order to minimise future impacts on the transboundary aquatic environment. Recommended policy options were identified through a pragmatic process that evaluated a wide range of potential policy options proposed by regional experts and key political actors according to a number of criteria that were appropriate for the institutional context, such as political and social acceptability, costs and benefits and capacity for implementation. The policy options presented in the report require additional detailed analysis that is beyond the scope of the GIWA and, as a consequence, they are not formal recommendations to governments but rather contributions to broader policy processes in the region.

Stream flow modification – Senegal River Basin

Definition of the problem

Stream flow modifications were observed in Senegal River Basin at levels equivalent to what can be seen in other basins of the region. The main consequence is the problem of water resources availability, in terms of quantity or quality.

The major causes of stream flow modification in the Senegal River relate primarily to climatic change, population growth and its implications, problems in implementation of appropriate management, and insufficiencies in technology and financial resources. These causes are summarised as follows:

- Since 1968, the climate of the region has been characterised by decreased and irregular rainfall and thus a reduction in river flow.
- Demographic growth has resulted in pressing demands from water infrastructure installations in order to supply the needs

of new development, to assure food security, to create jobs and to guarantee a good livelihood for the populations of the Basin, particularly in urban zones that are subjected to a strong demographic pressure.

- Technologies used are limited or are inappropriate. It is the reason why water resources control and use in the Basin have not been mastered and installations are generally poorly designed. This is due essentially to the insufficiency of financial resources and to the lack of education.
- Constraints related to water resources management are the insufficiency of knowledge and tools for monitoring, the absence of an appropriate institutional setting, the absence of water and environment regulations or their lack of enforcement, and the lack of stakeholder accountability.

Policy options

Different actions can be carried out to face these problems and to ameliorate the impacts of the reduction of freshwater resources in the Senegal River Basin. For each major cause, specific measures and recommendations that have been identified from the previous analysis are described below.

Reduced precipitation

This phenomenon is very complex and its scale exceeds the framework of the Basin, since it has a regional or even a worldwide extent and implications. Its temporal evolution in the region is not well known, as even time series show an alternation of dry and wet periods. However, a predominance of dry years has been observed after 1968, but it would be difficult to conclude with certainty about future climatic trends based on these records. Nevertheless, the persistence of this tendency is worrisome in view of the history of the Sahara Desert, which was once wet and populated. Some Senegal River tributaries such as the Ferlo are not active anymore because of climatic change, which is also the reason behind a general decrease in groundwater recharge.

Taking into account the space and time scale variation of this phenomenon, the actions to be carried out should be implemented within the framework of regional programmes aiming at limiting the negative effects of climate change; soil and water conservation (protecting the existing vegetation cover and reforestation), preventing the use of inappropriate agricultural practices, preventing bush fires, controlling atmospheric pollution, and coming up with a system for environmental impact assessments for all new projects. These programmes should also be accompanied by monitoring of environmental indicators, with scientific research and by environmental education and sensitisation activities.

Demographic aspects

The Senegal River Basin is far from being overpopulated. Certain parts of the Basin such as the Falémé and Ferlo basins are even underpopulated. What is needed however, is an appropriate land use planning strategy that would:

- Avoid the population concentration in the irrigated perimeters;
- Avoid the pollution of water resources;
- Better distribute the resource between areas with a surplus of water and others with water deficits;
- Facilitate the access to water in order to avoid the conflicts between users;
- Limit the risks of floods;
- Optimise existing infrastructures.

Feasibility studies and environment impact assessment studies should be realised in a systematic way for all projects in order to identify and to evaluate the risks early on and to carry out the necessary accompanying measures (preventive or curative). The insufficiency of financial resources of the populations and the institutions involved is also one of the major constraints that is linked to demographic aspects. To this end, a better organisation of the trade relationships for agricultural products and a better distribution of wealth (loans, investments in infrastructures) are also essential to fight against poverty in the Basin, to improve the financial resources of populations in order to enable them to get better water-saving technologies.

Water sector technology

The weakness in technology is due primarily to insufficient financial means for intervention. It is also due to the lack of professionalism and the lack of enforcement of regulations. The means for intervention and financial resources could be reinforced by better organisation of trade relationships and a better distribution of wealth. Educating and sensitising the population would make it possible to improve professionalism of different breeders (farmers, fishermen, and technicians) in terms of water-saving technologies, pollution control and the appropriate design of installations. To this end, it is also essential to create a system for feasibility studies as well as environmental impact assessment studies for each planned project.

Agriculture practices such as cultivation after slash-burning and deforestation, bush fires, inefficient irrigation systems and poorly designed drainage systems, and misuse of fertilisers and pesticides should all be banished. Taking into account the increase in water demand, the re-use of treated water is one possible way to increase water resource availability. The Senegal National Sanitation Board (ONAS) produces nearly 10 000 m³ per day of treated wastewater, which can be made profitable for farm gardening, reforestation and arboriculture. In urban areas, it is essential to improve purification systems to reduce groundwater pollution by nitrates. In the Thiaroye area in Dakar, the nitrate concentration in the aquifer can reach 200 mg/l, which compromises its use as drinking water.

Water governance

Many problems related to the management and the mobilisation of water resources in the Senegal River Basin are in reality due to the lack of good governance. Some examples of this problem are:

- The inefficiency of the actual institutional setting which in general encompasses non-functional structures;
- The absence of democracy or the lack of inclusion of all stakeholders in the design of the projects or in the decision-making process;

- The lack of information dissemination;
- The failure to enforce existing regulations (water and environment laws) or the insufficiency of these regulations;
- The insufficiency of the coordination of existing regulations;
- The insufficiency or the absence of monitoring indicators;
- The insufficiency of education and sensitising policies concerning good agricultural and forest practices, and appropriate water management technologies.

Identified policy options

Addressing these problems will require major changes. Attention should also be paid to the transboundary issues, since water resources in the Basin are shared and the problems are quickly transported elsewhere, whether the proliferation of invasive plants, or the transport of pollutants and water-borne diseases, or other, similar problems that know no boundaries. This demonstrates how essential it is to maintain permanent appropriate institutional organisations such as the Organisation for the Development of the Senegal River Basin (OMVS) and the irrigated domain network of the Management and Exploitation Society for Senegal Delta River (SAED) and to promote and implement the different existing regulations related to water and environmental law in the countries concerned.

Conclusions and recommendations

Senegal River Basin is a good example of how joint programmes can be implemented in the context of a regional institution such as OMVS. The consolidation of OMVS assets is one of the major and immediate options to be pursued, particularly a concerted follow-up and monitoring of the water resources at the basin scale. Institutional instruments such as the Environment Observatory are one possible way to ensure the monitoring and the management of the River Basin. The Standing Committee of Water (Commission Permanente des Eaux, CPE) constitutes a framework for dialogue concerning the technical aspects of water resources management; the committee can formulate and present recommendations for the Ministers' Council. The role of these two bodies (the Environment Observatory and CPE) should be reinforced.

Capacity building in the institutions in charge of water resources

management will have to accompany all governance measures, in particular the implementation at the local, national and regional level of the various laws, agreements and regulations (Water Code, Environment Code, Forest Code, Cleansing and Hygiene Code, Charter of the Irrigated Field, OMVS Charter of Water) and the different planning tools at the community level (Local Plan of Development, Plan of Installation and Land Occupation).

Finally, the following concerns must also be addressed:

- Monitoring of different indicators and the inclusion and informing of all stakeholders through dialogue and management committees;
- The creation of a system for feasibility and environmental impacts studies for all projects;
- The reinforcement of financial capacities in both institutions and residents by establishing agricultural credit and equitable sharing of national resources.

Lowering of the water table – Souss-Massa River Basin

Definition of the problem

In many cases, the great expansion of irrigated lands using groundwater has caused the overdraft of aquifer reserves largely beyond their recharge capacity. This process may lead to depletion in the mid-term. Five main root causes for lowering of the water table in the Souss-Massa River Basin were identified:

- Demographic growth and population changes;
- Socio - cultural constraints;
- Governance and enforcement of water regulation;
- Technological changes;
- Economic causes.

The approach aims to create a management system of the aquifer as well as to explore appropriate techniques for its appropriate exploitation. The following analysis considers both supply and demand management, including socio-economic and environmental perspectives. Therefore the process must involve the majority of economic and social agents affected.

The development of management tools, which can harmonise resource exploitation while ensuring sufficient reserve sustainability, must therefore be an objective of any potential policy. The purpose of the policy options are:

- Basin level:
 - Increase agricultural and non-agricultural production.
 - Improve efficiency of water use.
- Local level:
 - Satisfy domestic and industrial needs for water;
 - Provide agriculture with enough irrigation water;
 - Alleviate transaction costs linked to regulation enforcement;
 - Generate a technological change;
 - Shift farmers' behaviour toward more rational water use.

The situation in the Souss-Massa Basin is paradoxical: Water supply decreases and demand for water increases while production intended to increase. Proper socio-economic management can be achieved only if it is founded on a decision making process which takes into consideration the different possible options.

Policy options

Three options for water resource exploitation are presented and ranked from the least feasible to the most workable.

Governmental control

Government agencies collect water and distribute it to users without any charges and the cost are fully supported by the government. The consequences of such a policy are:

- Free water results in poor efficiency in water use;
- A burden on the government budget.

This option is not workable because of scarce financial resources. This policy prevailed in Morocco up until the 1980s within the framework of a planned economy governed by the objective of “food self-sufficiency” mainly for strategic crops, primarily sugarcane and sugar beets, vegetable oil, soft wheat, milk, and meat.

Free market distribution

The free market would be the most efficient way to allocate water resources among users. But water is actually not a good that can be freely traded; instead its trade is ruled by customs and Islamic inheritance practices (i.e. the Moroccan Ulama Malekite school interpretation) and the fact that the rights to most water resources in Morocco belongs to the government. Therefore this setting can be made workable only if the following two-stage scheme is considered:

- Basin level: Government financing; government agencies will take care of environmental issues (erosion, reforestation, pollution prevention)
- Local level: Supply and demand basis: concession approach; a cost and benefits analysis will have to be employed in decision-making.

Holistic approach

The general framework of this scenario assumes a clear understanding of an integrated system (technical, institutional, political and economical settings) and full stakeholder participation through consultation and education (Figure 26). It is only through this participation that benefits from future actions can effectively be transferred from the level at which policies are made down to the people affected by them.

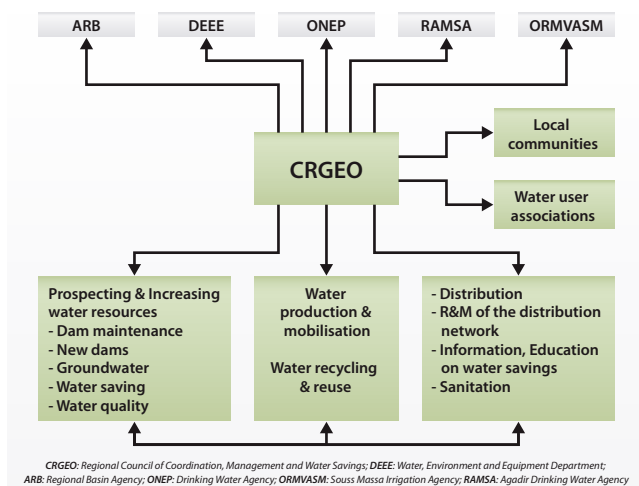


Figure 26 Local water management system in the Souss-Massa River Basin.

The policy option most suitable for the Souss-Massa case is based on:

- The existing water law (1995);
- Existing regulations (“Code des Investissements Agricoles”);
- Traditional water rights and local rules.

Given the previous facts, this option is intended to be effective, efficient, equitable and politically feasible.

Economic instruments: Pricing policy

Prior to the 1980s, Morocco employed different pricing policies, ranging from a land betterment levy, volumetric charges, and pumping charges. From 1983, agricultural sector adjustment reforms have been introduced and one of the main concerns is about the impending water shortage and the need for conserving water and managing demand.

The proposed water price for Souss-Massa case should include: (i) private cost (cost of pumping); and (ii) social cost, to partially compensate for the damage caused by overexploiting the aquifer. To make irrigation water use more rational, and to take in to account the root and immediate causes, any pricing policy should embody a component of financial cost (fully or partially) and the social cost (environmental variable). Moreover, the irrigation water charge should be one that is affordable, even by small producers.

Based on the principles listed above and using various techniques to lower transaction costs, this should result in finding “the right price”. A volumetric charge and the acreage involved might be two criteria that would give farmers incentives to conserve water.

The GIWA Task team expects this policy to result in:

- Some technological change (more progressive irrigation systems)
- Changes in cropping patterns (the introduction of more value-added crops)

Institutional instruments

Any pricing policy will not work without institutional change. In fact, the institutions, rules and property rights needed for reform already exist, but they are not operating effectively. Moreover, there is no alternative for existing institutions because at this stage, the market cannot allocate water resources based on supply and demand.

Regulation and governance could be the responsibility of para-state agencies that are already established in the region. Their mission would be guided by:

- Governance will be achieved by para-state agencies with autonomous financing status
- Para-state agencies will also have responsibility for education, information and creating awareness about water use and the need for environmental protection.

Identified policy options

The expected results of the recommended policy are as follows:

Effectiveness

An adequate pricing policy will: (i) have an effective impact on non-agricultural water use (rational, not wasteful, water use); (ii) improve water governance and lower transaction costs; and (iii) encourage technological changes (water-saving techniques).

Efficiency

No additional cost is required to implement and enforce the proposed policy and more advantages are associated with this policy (rational water use).

Equity

Price scaling according to acreages and volumetric charges are fundamental techniques for ensuring equity in cost distribution.

Political feasibility

Agreements between stakeholders (users, government agencies, NGO’s) could be reached via the existing High Council for Water and Climate at the national level and the Water User Associations at the local level.

Conclusions and recommendations

In the Souss-Massa Basin, even under the best planning conditions, the current rate of water usage is unsustainable if no drastic water policy changes are made. The overpumping of the aquifer has resulted in significant water level declines and by the year 2010, groundwater levels will be sufficiently low in some locations that it may be uneconomical to pump. Some land now under cultivation may have to be abandoned, with an associated loss of agricultural employment.

The lowering of the groundwater table is further complicated by the use of inappropriate well digging technology that is similar to that used by commercial oil prospecting companies. The policies thus far used have failed to give local farming communities the necessary incentives to participate in responsible water management decisions, both from the perspectives of technology use and water pricing.

Furthermore, with the current irrigation systems and practices, there is a little opportunity for change without implementing new policies and mechanisms that encourage adoption of innovative water-saving technologies. The efficient use of water is therefore not adequately addressed in the region, despite the fact that water is a scarce factor in agricultural production and that the groundwater resource is being overused.

The most critical water management issue in the region will be the ability of the River Basin Management Authority to reverse or slow the declining water levels in the aquifer to prevent the cost of pumping water from becoming too excessive for economical crop production. Unless policies are implemented to conserve water, the export economy of the Souss-Massa Basin may decline with severe economic impacts to the region.

For the Souss-Massa region and for Morocco as a whole, ongoing global climate change will have a pervasive influence on the future demand, supply and quality of freshwater resources, and will add pressure to water and environment resources, and coastal systems currently under stress. All sectors of the economy, environment and society may be vulnerable to one degree or another, and measures to increase the capacity to adapt to greater climatic and hydrological variability, including more frequent flood and drought extremes will be required.

Overexploitation of fish – Canary Current

Definition of the problem

Excessive fishing effort

The artisanal fisheries, which account for a large proportion of the fisheries production throughout the region, have always operated outside of the system that controls fishing effort. Free access to the fisheries resources is not without undesirable effects on fishermen, who are faced with problems of overproduction and low prices during periods of glut.

Unsustainable fishing practices

The use of unsustainable fishing methods and gear has significantly exacerbated the overexploitation of resources in most coastal countries of the West African region. The consequences are inter-connected; decreased catches, increased production costs, disruption in supplies to local markets and threats to household food security.

Policy options

Artisanal fishing license system

The current thinking in the region is to explore the possibility of instituting a licensing system for the artisanal fishing units as a way to manage access to the resource. This approach will consist of controlling fishing effort through various components, such as restricting the number of fishing units and their actual fishing capacity and the issuance of restrictive licenses. These licenses would confer fishing rights to license holders only. The benefits of issuing artisanal fishing licenses would be that it would be possible to control fishing capacity and the catches by these fishing units and it would also systematically eliminate excessive fishing capacity.

However, an artisanal fishing license system invariably poses the problem of equity or fairness related to the allocation of the licenses both in the choice of the first beneficiaries (fishermens, canoe owners) and the conditions of issuance (the modalities and duration of licenses, payment of fees etc.). The solution of this problem is critical as artisanal fishing is currently handed from fathers to sons, and it is unlikely that those denied licences will convert to other ways of making a living. Other sectors of the national economy are already being undermined by successive crises, for example, the drought, which affects agriculture,

or unfavourable terms of trade affecting other products. Furthermore, fishing remains the only sector open to those who have lost opportunities in the other sectors of the economy.

The feasibility of an artisanal license system poses a number of problems also linked to the availability of certain basic information to determine the optimal number of licenses for canoes, gears and tonnage. A license system also requires people and mechanisms for control and regulation of the system like administrative staff, material and financial resources. The artisanal fisheries sector operates along a several hundred kilometres-long coastline with more than 1 000 landing sites and countless related ancillary service providers. Confronted with declining resources, artisanal fishers have adopted several strategies so they can fish year-round: migration along the coast and a combination of different kinds of fishing gear.

Regulation of access to resources

This method of regulation aims to set the mesh sizes of fishing nets and trawl nets used in the fishery, the minimum authorised sizes and minimum weights of species that could be landed and the prohibition of certain types of fishing such as explosives, drift nets, beach seines and mono-filament (nylon) nets.

Immediate application of this management method could pose a problem of equity. In view of the high investments made by the fishers to equip themselves with monofilament nets, it would be necessary to grant them a grace period to allow them to time to change gear before the strict application of all these regulations.

As far as efficiency is concerned, the proposed regulation would protect juveniles, reduce discards at sea and encourage the catching of bigger individuals of commercial value. Thus, by modifying the selectivity of fishing gear, one modifies the size of fish caught, and thereby the average age at first capture. The individuals protected as a result of this change could then contribute to the recruitment of future stocks. These measures must be accompanied with measures aimed at exercising direct control of fishing, such as a ban on the landing and marketing of species with sizes or weights below certain set limits.

This regulation is already being applied in the Senegalese fisheries and is addressed by a provision in the Fishing Code. The main problem is its efficient application. In Senegal, as in most coastal countries of

the region, a lack of enforcement of the fisheries regulations and the control and surveillance of unsustainable fishing methods and practices can be attributed to the lack of adequate human, financial and logistical resources.

Banning use of the beach seine

The ban on the use of the beach seine, enacted by the Gambian Parliament in 1989, could be an example to be emulated in the region. But this measure needs to be carefully assessed before it can be applied in other states such as Senegal, where banning use of the beach seine could have far reaching socio-economic and political implications.

Joint negotiation of fishing agreements

The Sub-Regional Fisheries Commission (SRFC), comprised of seven countries in the West African region, has as its objectives the strengthening of cooperation and coordination of member states by coordinating policies on preservation, conservation and exploitation of marine resources in the region. It also works to develop regional cooperation in the area of fisheries surveillance and to develop the capacity of states to conduct fisheries research at the regional level.

The motivation for the establishment of the SRFC is the fact that several fish stocks are either shared by one or two states or are highly migratory or both. Successful management and sustainable exploitation of such stocks requires regional cooperation by the nations that share these stocks.

The most significant singular initiative of the Sub-Regional Fisheries Commission (SRFC) is the establishment of a mechanism that would enable member states to conduct joint negotiation of fishing agreement with third parties seeking access to fisheries resources of member states. This initiative has not made much progress because of insufficient commitment and political will on the part of member states to see it through.



Figure 27 Tuna fishing boat at sea off the coast of Mauritania.
(Photo: Corbis)

Conclusions and recommendations

A primary initiative is to create a programme to promote the restoration of sensitive and degraded marine habitats by the immersion of artificial reefs. The objective of restoring degraded habitats is the reconstitution of ecosystems to make them favourable for the return and maintenance of species. Stabilisation of the ecosystems will contribute to keeping artisanal fishermen to the areas reserved for them. The promotion of skills and reduction of conflicts between the different fisheries justifies this policy.

In recent years, national and local organisations and institutions in West Africa have been working to promote coastal planning. Several Marine Protected Areas (MPAs) have been established along the coastline by West African states, chiefly by state members of the Subregional Fisheries Commission (CSRP). These areas make it possible to preserve some of the coast's key hot spots which are of crucial importance for the replenishment of fish stocks and biodiversity as a whole.

Coalition of environment and fisheries ministers from West African nations have agreed to establish a network of national and transboundary Marine Protected Areas in the region and restore fisheries to sustainable levels, among other goals. The Regional Strategy for Marine Protected Areas in West Africa aims to allow the harmonisation of protection efforts within five years, based on a shared vision of sustainable development and poverty reduction. It will involve the governments of Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mauritania and Senegal, which signed the Policy Statement in 2003.