



WWF's Water and
Wetland Index

Results for Morocco

December 2003

This paper was elaborated by Lucia De Stefano, Water and Wetland Index Co-ordinator, WWF European Living Waters Programme, with contributions from Mohamed Dakki (Institut Scientifique, Rabat) and Mohamed Touji (Direction Génér. Hydraulique, Rabat) and the WWF's Mediterranean Freshwater Programme.

If you wish to have further information about the project or receive an electronic copy of this paper, please contact:

Mr. Holger Schmidt, WWF Mediterranean Programme Office
c/o WWF-Italy
Via Po, 25/c
00198 Rome, Italy
Tel. + 39 06 84497338
e-mail: HSchmid@wwfmedpo.org

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1 INTRODUCTION

The Water and Wetland Index (WWI) is an initiative of WWF aimed at stimulating debate on how to preserve and improve the state of freshwater ecosystems through sustainable and integrated management of water.

The WWI assesses two critical aspects of water policy in 22 countries (20 European countries¹ and in two Northern African countries, Morocco and Tunisia):

- a) the quality of the existing programmes to monitor the state of and pressures on water resources in each country – an essential basis for sound decision-making in water management –
- b) the policy and legislative responses by governments and water authorities to the pressures acting on freshwater ecosystems.

The present paper reports the results of the WWI project for Morocco. The results for Tunisia are described in a separate report, while the conclusions of the European survey are available at www.panda.org/freshwater/europe.

2 METHODOLOGY

The methodology of the Water and Wetland Index (WWI) was developed by a Working Group composed of members from WWF offices and partner organisations in a number of European and non-European countries.

During the definition of the WWI, the Working Group consulted for advice officials of the European Environmental Agency, the European Commission Directorate General for Environment, as well as public and private water experts.

The WWI survey was carried out using a questionnaire, completed by an independent consultant team who was provided with a Working Document with detailed guidelines on how to score each of the indicators assessed in the Index and was requested to support each score with explanatory comments. WWF's European Living Waters Programme was in charge of overall coordination.

When designing the questionnaire, special emphasis was given to activities and results that are reported in written documents, which are unquestionable evidence of formal on-going or completed processes.

The analysis and the corresponding results are based on the information available to the public until September 2003, as well as on interviews and written consultation with 17 individual governmental and non-governmental water stakeholders. Moreover, on 27 September 2003 a stakeholders' workshop was carried out in Rabat, to revise, amend and complete the answers elaborated by the surveying team.

¹ Austria, Belgium, Croatia, Austria, Belgium, Bulgaria, Croatia, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey and United Kingdom

The survey assessed significant aspects of the existing water policy at a national level and in the Moulouya river basin. This is because the Index wished not only to know the overall situation in the country, but also to assess the state of water policy at the ‘natural’ managing scale of waters - river basins – as highlighted in the Declaration of the Euro-Mediterranean Ministerial Conference on Local Water Management, held in Turin on 18-19 October 1999².

As for the content, the WWI survey considered the following issues:

1. Quality of the monitoring programmes: the national water monitoring programmes and the monitoring programmes in fifteen Moroccan water bodies (aquifers, lakes, oases, rivers, *sebkhas*³).
2. The application of measures tackling the most urgent freshwater problems in the country.
3. The application of WWF’s integrated river basin management (IRBM) principles⁴.

In the following pages the WWI assessment for points 1 and 3 above is summarised in tables as a percentage of the maximum possible ‘score’ for the considered aspects of water management. The level of compliance of the WWI criteria has been expressed according to four ranges: very good (90-100%), good (75-89%), moderate (50-74%), poor (25-49%) and very poor (0-24%).

The views expressed in this document do not necessarily reflect the opinion of all the organisations and individuals that have been consulted during the WWI project. The survey assessed the current Moroccan water policy against high standards set by the European Union legislation and international Conventions and agreements such as the Turin Declaration of 1999.

The conclusions of the survey, while identifying gaps where further improvement is needed, are by no means aimed at discrediting or dismissing the positive achievements of Morocco in relation to water management.

3 WATER MONITORING PROGRAMMES

The availability of high quality data about the state of freshwater ecosystems and the pressures on water resources is an essential basis for making sound political and strategic decisions in water management.

WWI assessed the quality of both national water monitoring programmes, which should give decision-makers an holistic and reliable view of freshwater in their country, and local water monitoring programmes - linked to specific water bodies -, which should provide the basis for designing specific actions at a local level.

² The Turin Declaration (1999) establishes a number of water management principles and defines an Action Plan to achieve sustainable water management in the Mediterranean region. In relation to IRBM, the Declaration states that the activities of the Action Plan “should be implemented within the framework of integrated water management at the river basin level”. Signatories to the Declaration are: the Council of the European Union, the European Commission, Finland, Algeria, Austria, Belgium, Cyprus, Denmark, Egypt, Spain, France, Germany, Greece, Ireland, Israel, Italy, Jordan, Lebanon, Luxembourg, Malta, Morocco, The Netherlands, Portugal, Sweden, Syria, Tunisia, Turkey, the United Kingdom and the Palestinian Authority.

³ Large flat depressions with salty and sandy bottom irregularly flooded, generally present in Saharan or arid areas and created by wind activity.

⁴ For more details see: WWF (2002) Managing water wisely: promoting sustainable development through integrated river basin management, WWF Living Waters Programme/WWF-UK, Godalming (http://www.panda.org/livingwaters/pubs/IRBM_English.pdf)

The survey assessed the quality of data referring to biological⁵, hydro-morphological⁶ and physico-chemical⁷ elements in terms of:

- **Comparability over time** of the data collected by the monitoring programme (i.e. it is possible to compare data collected in different years);
- **Comparability over space** of the data (i.e. data collected in different parts of the water body can be compared);
- **Availability of data**, meant as their accessibility and the suitability of the format they are stored in and provided;
- **Data accuracy**, meant as quality of data, adequacy of the sampling points distribution, and periodicity of measurements.

3.1 QUALITY OF THE NATIONAL MONITORING PROGRAMME

National monitoring programmes have to provide decision-makers and all the interested parties (water managers, water users, NGOs, citizens) with an overall view of water resources in their country: how these resources are distributed over time and space, in which state of conservation they are and which pressures are affecting them. Moreover, national programmes should identify and monitor freshwater ‘hotspots’, i.e. areas where water resources are specially under pressure due to pollution, unsustainable water abstraction or excessive physical fragmentation.

National water monitoring programme	
Overview of water bodies	82%
Knowledge of pressures on water quantity	79%
Knowledge of pressures on water quality	87%
Time comparability of monitoring data	80%
Space comparability of monitoring data	85%
Availability of monitoring data	83%
Accuracy of monitoring data	83%
Quality of monitoring data about biological elements	77%
Quality of monitoring data about hydro morphological elements	76%
Quality of chemical & physico-chemical elements	81%

Table 1: Assessment of the quality of the national monitoring programme. In the column on the right, percentages of the maximum achievable score for each parameter. Key: bright green: very good (90-100%); olive green: good (75-89%); yellow: moderate (50-74%); orange: poor (25-49%); and red: very poor (0-24%).

Good water quantity data. Morocco is covered by a large network of meteorological and hydrologic stations, some of these being 70 years old. This network ensures quite an accurate overall surface waters and groundwater monitoring and hydrologic-climate models, playing major role in decision making. Traditionally, these monitoring programmes are mainly focused on the water quantity estimates, but recently a national programme for water quality control was established. Nevertheless, in parallel to this improvement, several hydrology and climate equipments are progressively getting out of use and are not renewed in their totality,

⁵ Where applicable: composition, abundance and biomass of phytoplankton, composition and abundance of other aquatic fauna, Composition and abundance of benthic invertebrate fauna and composition, abundance and age structure of fish fauna.

⁶ Where applicable: hydrological regime, morphological conditions, river continuity, groundwater level and groundwater dynamics.

⁷ Where applicable: Thermal conditions, oxygenation conditions, salinity, nutrients (total phosphorus), nutrients (total nitrogen) and pH.

which reduces their country coverage and, consequently, the quality of the collected data.

Hydrological and meteorological data are organised into a database available at the State Secretary in charge of Water (BADR 21), where reports on water quality monitoring are issued every year. Other monitoring programmes are being run in some *Offices Régionaux de Mise en Valeur Agricole*.

Since the approval of *Law 10-95* (1995), the accessibility to results of water monitoring studies, normally kept undisclosed to the public before 1995, has significantly improved since part of them are periodically edited and widely dispatched. However, data on water stress are still sometimes difficult to obtain when they are gathered in internal reports only.

Good but fragmented monitoring of biological elements. Biological components of the aquatic ecosystems are studied mainly through specific research projects in universities, in agriculture and forest institutes/schools and in the *National Office for Drinking Water*. For this reason, the level of knowledge about biological components varies considerably in space. A positive exception in this field is the programme for monitoring wintering populations of water birds, which started in 1983 and covers most of the national wetlands.

An important synthetic study about significant biodiversity areas was undertaken by the Department of Waters and Forests and its results were presented as a Master Plan of Protected Areas, where more than 80 water bodies were identified as sites of ecological importance and worth to be protected.

3.2 *QUALITY OF THE MONITORING PROGRAMMES OF SELECTED WATER BODIES*

The WWI assessed also the quality of monitoring programmes ‘on the ground’, which are essential for supporting local decision-making and to feed national datasets with data.

For this reason, the monitoring programmes of fifteen Moroccan water bodies (permanent and seasonal rivers, freshwater lakes and brackish lakes, oasis, aquifers, table 2) were assessed according to the aspects specified at the beginning of this chapter (page 3).

Selected water bodies	
Nappe de R'mel-Loukkos	Aquifer
Nappe de Triffa (Berkane)	Aquifer
Aguelmam Afennourir	Lake
Daya de Sidi Amira (Ma'mora)	Lake
Dayet 'Awwa	Lake
Dayet Erroumi	Lake
Marais du bas loukkos (Ain Chouk-Boucharene)	Lake
Sidi Boughaba	Lake
Oasis de Figuig	Oasis
Oasis de la Moyenne Dr'a	Oasis
Bou Regred	River
Oued Rmel (Rif Northern slopes)	River
Oum Er-Rbia	River
Sebou	River
Sebkha Zima	Sebkha

Table 2. Moroccan water bodies assessed in the WWI survey.

The survey concluded that, on average, the quality of monitoring data in selected water bodies ranges from moderate to poor (table 3). In particular, the existing knowledge about pressures on water bodies both in terms of quantity and quality, and the quality of monitoring data about biological and hydro morphological elements were found insufficient.

Monitoring programmes in selected water bodies	
Overall knowledge of the water body	74%
Knowledge of pressures on water quantity	47%
Knowledge of pressures on water quality	47%
Knowledge of pressures on physical integrity	50%
Time comparability of monitoring data	51%
Space comparability of monitoring data	54%
Availability of monitoring data	57%
Accuracy of monitoring data	59%
Quality of monitoring data about biological elements	46%
Quality of monitoring data about hydro morphological elements	49%
Quality of chemical & physico-chemical elements	62%

Table 3: Assessment of the quality of the water monitoring programme in fifteen water bodies. In the column on the right, percentages of the maximum achievable score for each parameter. Key: bright green: very good (90-100%); olive green: good (75-89%); yellow: moderate (50-74%); orange: poor (25-49%); and red: very poor (0-24%).

4 TACKLING WATER QUANTITY PROBLEMS

Agriculture is the biggest water-consuming sector (93% of the used resources). The most severe problems of this sector are the relatively low efficiency of water use in irrigated areas and the strong inertia to changes in the agricultural sector.

Industrial and household activities consume relatively low water quantities (4% and 3% of the national water supply, respectively). However, these amounts are generally abstracted from regional water reserves and cause serious local water stress, mainly downstream of the reservoirs and in aquifers.

Approach to the problem. Morocco has developed Master Plans for water resources management for most of its main river basins and is now completing the National Master Plan, where agriculture has an important role. The existing strategy to tackle water quantity problems is mainly based on increasing water provision through reservoirs and aquifer exploitation. The main limitations of this policy are: the progressive decrease (by silting) of the capacity of dams, the lack of a process to seriously involve stakeholders in water management and the great ecological losses induced by excessive freshwater abstraction.

Legal & economic instruments. In order to regulate water use by agriculture, the Water Law 10/95 clearly requires that every user pays for consumed volumes, and that every water use permit is associated to the existence of a water meter and to the payment of a water fee. Nevertheless, in most of the small and medium irrigated areas, traditional water rights are still very strong and make the enforcement of water fees regulations very difficult.

In rural areas, the direct measurement of water consumption through water meters is still rare and difficult to establish, for both cultural and financial reasons. The current consumption rates for agriculture and domestic activities in rural areas should be revised and increased as they are underestimated.

There are no regulations obliging to save water but there are financial aids to promote the use of water saving techniques. However, these subventions schemes should be revised because they are not delivering the expected results. The Administration should increase awareness about the existence of water saving techniques and of subsidies to use them and ensure that low-income farmers – who can not afford to invest in water-saving technology – are the main beneficiaries of the state aids.

On the contrary, regulatory instruments employed in the domestic sector (water price) at the national level are relatively efficient, in view of the positive results obtained in terms of water economy.

5 TACKLING WATER QUALITY PROBLEMS

During the past 20 years, water pollution sharply increased, both in terms of territorial diffusion of the problem and in terms of pollutants quantity and diversity. Currently, several river sections are used as wastewater receivers and some of them (e.g. Oued Fès) are reduced to wastewater channels. Indeed, most of the urban areas are not yet equipped with wastewater treatment plants and arrangements to manage industrial wastewaters are still in a definition phase.

Authorities have started establishing national regulations to tackle water pollution by imposing treatment processes to industrial enterprises or taking into account the impact studies in industrial projects. On the contrary, in agriculture the use of fertilizers and pesticides is extended with inefficient control, both in nature and quantity of the deployed chemical products. Consequently, surface waters and aquifers are largely enriched with nutrients, especially with nitrogen and phosphorous ones.

Legal & economic instruments. The Water Law 10/95 considers the “polluter-pays” principle and several efforts have been focused on definition of water quality standards, as a first step for the set up of a system of damage compensation. However, no effective application of this principle is made, except in urban areas where water treatment fees are included in the water bill.

Several new factories are obliged to decontaminate their wastewaters, but generally the processes used are rarely controlled and sometimes inefficient. The lack of financial resources was until now presented as the main obstacle to the implementation of any payment measure.

6 RIVER FRAGMENTATION BY DAMS

Currently Morocco has more than 100 large dams and the construction of 10 more is planned on the short term (source: Direction Générale de l’Hydraulique, Rabat). Most of the existing reservoirs face problems due to silt accumulation, which rapidly reduces their storing capacity and their life duration. This phenomenon is naturally caused by violent rains and strong erosion in catchments areas, but it is exacerbated by the destruction of natural vegetation cover and the lack of mitigation measures associated to the dam construction, particularly the reforestation of slopes in the catchment area and protection of river edges.

National dams strategy. There is no national strategy dealing with dams all together, but there is a National Commission on Dams (*Comité National des Grands Barrages*) which is the local representative of the World Commission on Dams (WCD).

Construction of new dams. The Moroccan law requires the elaboration of an environment impact assessment prior to the construction of new dams and a large database of the existing studies is available at the State Secretary of Water. Despite the existence of a local representation of the WCD, not all its recommendations are included in the guidelines for the

impact assessment studies and there is no overall strategy to maintain selected rivers with high ecosystems functions in their natural free-flowing state.

Management of existing dams. Dams facilities are regularly assessed and upgraded (if necessary), to ensure their good economic performance. Dams have major negative impacts on the environment, mainly on biodiversity, but the establishment and enforcement of measures to reduce these impacts - e.g. ensuring an acceptable ecological flow in rivers downstream the dam and the construction of artificial scales for fish migration - is strongly hampered by administrative obstacles or by economic and social pressure to supply water for human uses. For example, environment impact assessment studies recommend mitigation measures but they are poorly applied. Moreover, the maintenance of ecological flow is not respected during dry periods.

7 IMPLEMENTATION OF IRBM PRINCIPLES

The WWI assessed the level of application of two IRBM principles⁸: Participation and Integration. The reason for this selection is that these are priority issues for WWF and key principles set out in the Turin's Declaration and in the EU Water Framework Directive.

- **Integration** means coordination among bodies involved in water management; cooperation between water managers and other sectors; linkage of surface and ground water management, and linkage of inland and coastal waters. This principle is one of the pillars of the Turin Action Plan (1999), which stresses in several points of its text the importance of "good coordination, complementarity and synergy among existing organisations and activities" and "the importance of water resources in social, economic and environmental terms" "at all levels and integrated into sustainable development policies". The WWI assessed the integration of the approach to water policy and the level of integration of the different water authorities.
- **Public Participation** is "the process of ensuring that those who have interest or a stake in a decision are involved in making that decision"⁹. Regarding this issue, the Turin's Declaration states that "a participatory approach should be encouraged that involves the civil society, including water users and organisations at local, regional, sub-national and national level". The parameters assessed by WWI in relation to public participation were: information provisions, public consultation and active involvement.

The WWI also assessed the role of **wetlands**¹⁰ in water management since WWF considers wetland ecosystems as an essential component of water management, despite the fact that wetlands are often disregarded as a "nature conservation issue".

⁸ In 2000-2001 WWF and the European Commission organised the 'Water Seminar Series', where more than 300 individual water stakeholders identified five general cross-cutting principles that should be applied for an effective implementation of Integrated River Basin Management: Timing, Participation, Capacity, Integration and Scale.

⁹ WWF's Preliminary comments on Public Participation in the context of the Water Framework Directive and Integrated River Basin Management, April 2001.

¹⁰ Wetlands are defined as: "heterogeneous but distinctive ecosystems in which special ecological, biogeochemical and hydrological functions arise from the dominance and particular sources, chemistry and periodicity of inundation or saturation by water. They occur in a wide range of landscapes and may support permanent shallow (<2m) or temporary standing water. They have soils, substrates and biota adapted to flooding and/or water-logging and associated conditions of restricted aeration' Definition provided by the EC-co-funded research project Evaluwet.

In relation to wetlands, the Water and Wetland Index assessed the following issues: the role of wetlands in water management, the wetland protection policy and the wetland restoration policy.

7.1 INTEGRATION

Sustainable use of water can be achieved only through integrated management of water resources, which means coordination among bodies involved in water management, cooperation between water managers and other sectors, linkage of surface and ground water management, and linkage of inland and coastal waters.

The Water and Wetland Index looked at the arrangements enabling this integration in Morocco and considered issues such as the existence and competencies of a single commission/board for the management of the different types of waters (surface, ground-waters, coastal waters, etc.) and the existence and content of a national strategy or plan on freshwater management that analyses and balances the needs from the different sectors depending on water (e.g. industry, environment, agriculture, etc).

Integration	
Integration of competencies	67%
Integration of sectors	52%

Table 4: Percentage of the maximum score achievable in integration. Key: bright green: very good (90-100%); olive green: good (75-89%); yellow: moderate (50-74%); orange: poor (25-49%); and red: very poor (0-24%).

Coordinated planning of sectorial water use. Water management responsibility is divided between a few administrative bodies. The main responsible for the use of inland waters is the Water State Secretariat (*Secrétariat d'Etat à l'Eau*), who coordinates its planning activities with several departments that express the national needs of the different sectors (agriculture, industry, urbanism, energy, etc.). The final approval of decisions is done by the High Council of Water and Climate, where the main water stakeholders are represented (scientific institutions and professional associations involved in water engineering and protection of water resources and elected representatives of water users associations, mainly farmers).

On-going decentralization of competencies. For a long time, water management decisions were concentrated in the central administration, but recently (since 1995) several river basin agencies took the responsibility for regional water resources planning. In this context, each agency prepares its own regional master plan for water management, where water needs and possibilities to satisfy them are identified and quantified regionally. The approval of this plan should be based on a wide debate with all water stakeholders, but this does not occur yet: for instance no research institution working on water biodiversity conservation involved in is involved in the process. The National Master Plan for water management is based on the approved regional plans.

Biodiversity as the most neglected sector. As mentioned above, the major absent in this management process is the biodiversity sector. Administration bodies in charge of the wildlife protection (i.e. Water & Forests) are aware and concerned by this deficiency but the repetitive drought crises make the biodiversity protection very weak into the national strategies for tackling social effects of these droughts. Moreover, impact assessment studies done in the context of water management plans poorly take biodiversity conservation concerns into account. For this reason, the progressive loss of aquatic flora and fauna biodiversity in inland ecosystems remains the major weakness of the Moroccan water management plans.

The elaboration of the Moroccan National Water Master Plan – based on the regional plans – is now in its final study phase and will be submitted for discussion and approval to the High Council for Water and Climate during 2004. This plan presents still many deficiencies in biodiversity conservation actions. In the meanwhile, the Department of Waters and Forests undertook a study to identify a network of sites to be protected (Master Plan of Protected Areas) and kicked off studies of management plans for several of these sites.

7.2 PUBLIC PARTICIPATION

The Water and Wetland Index analysed three aspects of public participation in relation to water management decision-making processes: proactive information, public consultation and active involvement of non-governmental water stakeholders¹¹ (box 1). This meant analysing issues such as: the organisation by the authorities of events to inform stakeholders and foster their involvement, the existence of established procedures to access available documents, the characteristics of the provisions for sending out draft legal documents for comments, etc.

Box 1 -Three key ingredients of Public Participation

‘Pro-active information’ refers to information about legislation, the planning process and specific projects affecting freshwater ecosystems, including results of ecological, economic or other analyses, proposed actions, measures, strategies and plans, debates over key issues etc. Pro-active provision of information can take a variety of forms including, for example, the publication of leaflets or brochures, letters informing specific stakeholders about key issues, web-based information provision etc.

‘Public consultation’ means requesting comments and feedback from any interested party on a published document or proposal (e.g. a time table, a draft policy, work programme).

‘Active involvement’ implies that those involved have a genuine and early opportunity to influence the decision-making process. It is a dynamic, interactive process that relies on building trust and confidence that public/stakeholder views will be accommodated and have a real influence on the development of legislation, policies, plans and projects.

7.3 PUBLIC PARTICIPATION

Public Participation	
Information provision	63%
Public consultation	15%
Active involvement of the public	19%

Table 5: Percentage of the maximum score achievable in public participation. Key: bright green: very good (90-100%); olive green: good (75-89%); yellow: moderate (50-74%); orange: poor (25-49%); and red: very poor (0-24%).

Need for more transparency. The most developed aspect of public participation is information, as there are several means to inform the public and interested parties about the state of water resources and the decisions related to water management. However, information transparency during the decision-making processes themselves should be improved, as the hydraulic administration provide stakeholders with selected information only.

Insufficient participatory instruments. The availability of information is not accompanied by arrangements to enable the involvement of non-governmental stakeholders, either in the form of public consultation of documents or in the form of direct collaboration of these stakeholders in round tables or working groups on the elaboration of planning or legislative documents. Several

¹¹ In the survey, ‘non-governmental stakeholders’ were defined as non-governmental organisations that represent the following interested parties: industry (including power generation, water supply companies, agriculture (including livestock), environmental NGOs, and research/academic sector.

stakeholders are involved in certain parts of the water management process, but their number is relatively limited and their choice is guided by political reasons (e.g. biodiversity experts are normally not consulted). Some of them are involved into this process only through the High Council of Water and Climate and do not participate in the definition of the decisions content.

However and although it is too soon to assess its application and effect on water management, the enforcement of the Water Law of 1995, which establishes that basic decision proposals should come from the River Basins' agencies, is expected to increase the involvement of local users.

7.4 WETLANDS POLICY

Wetland ecosystems are ecologically and functionally significant elements of the water environment and, potentially, have an important role to play in helping to achieve sustainable river basin management by contributing to e.g. the abatement of the impact of pollution, mitigating the effects of droughts and floods and promoting groundwater re-charge.

The Water and Wetland Index considered the existing wetland protection and restoration policies. For this purpose, the survey verified the existence and content of overall, strategic wetland protection and restoration policies in the surveyed countries.

Wetlands Policy	
Wetlands protection	22%
Wetland restoration	0%

Table 6: Percentage of the maximum score achievable in wetlands policy. Key: bright green: very good (90-100%); olive green: good (75-89%); yellow: moderate (50-74%); orange: poor (25-49%); and red: very poor (0-24%).

During the past 40 years, the construction of dams, excessive groundwater abstraction and drainage of wetlands to transform them into agricultural or urban areas has caused severe damages to natural ecosystems, particularly in terms of loss of wetland biodiversity.

Fragmented responsibilities. A major obstacle to wetlands conservation is related to the division of management responsibilities between several sectors. For example, the High Commissariat of Waters and Forests is in charge of the protected areas which ensure wetland biodiversity conservation, while wetlands ownership is with the State Secretary of Waters, which takes several management decisions with no participation of the biodiversity conservation bodies.

Recently, a law project on protected areas has been prepared by the High Commissariat of Waters and Forests. In addition to the laws used by this authority to control fishing and hunting, the law of on protected areas will constitute a good opportunity to accomplish real conservation in-situ of the biodiversity.

The flagrant weakness in wetlands policy will continue for several years, because legislation texts take long time to be adopted by the government and its implementation on the field take more time, mainly because the necessary human and financial resources are only lately employed.

Insufficient resources to change trends. Some NGOs and research institutions are working to raise awareness about damages caused to freshwater ecosystems, but their actions are still limited, because they have not enough strength before the Administration. The conservation governmental institutions (Waters & Forests and Environment sectors) are aware of the urgency

of biodiversity problems; nevertheless, and although the law has improved, the biggest obstacle to tackle biodiversity losses is still the insufficiency of national financial resources to:

- repair damages (i.e. creation of migrant fish passages in dams, pollution control, habitats restoration, etc.)
- guarantee alternative income to users who will be touched by biodiversity conservation
- employ human resources to implement the law, more especially through field control
- Solve problematic land tenure status of some wetlands

Some opportunities to improve wetlands conservation. Recently, two national strategies (strategy for biodiversity conservation (including water fauna and flora) and a 5-years strategy for wetland conservation) were elaborated by the Department of Waters and Forests and the Department of Environment, respectively. Moreover, the Department of Waters and Forests, as the national focal point of the Ramsar Convention, created a Wetland National Committee, while the Department of Environment acts through the National Biodiversity Committee. Both structures involve scientific institutions and some concerned NGOs and represent two major complementary opportunities to tackle problems of biodiversity and natural habitats loss.

Apart from these strategic activities, several measures were undertaken to protect wetlands. These were published on 1996 in a synthetic work, the National Plan of Protected Areas, which affects 84 wetlands. Conservation management plans are under preparation for some of these wetlands; however, the most important event is the inscription of 24 wetlands onto the Ramsar Convention list, which constitutes a decisive step in the conservation process and should open the door to many field initiatives in biodiversity protection.

8 CONCLUSIONS

The WWI identified some strong points of the Moroccan water management and formulated recommendations in relation to some aspects that, in WWF's view, should be improved.

Morocco is provided with a good national water monitoring programme, which gives quite a complete overview of water resources state. However, there are several monitoring stations that are getting out of use and that are not being fully replaced, which is gradually reducing the quality of the data coverage.

In 1995 a new Water Act was approved that introduces positive elements in water management, first of which the central role given to river basins, which should become the place where decisions are started, through the analysis of the river basin needs and a broad debate with local water stakeholders. Nevertheless, for the time being the implementation of the ground is very slow and public participation is still far from satisfactory.

In the field of nature conservation, there is a very long way to be done due to the current approach to economic development and water supply satisfaction, which often provoke loss of water biodiversity. Despite of the critical situation in this field, it is important to point out the recent presentation of a project law for wetland protection, the existence of two committees and strategies for wetlands conservation and the gradual commitment of the Moroccan Administration with the Ramsar convention.

Based on the WWI analysis, WWF recommend to:

- Ensure the **maintenance and update of the existing hydrological and climate monitoring network** to avoid the decrease in the quality of the existing data coverage..

- Improve the **spatial coverage of monitoring data about biological parameters**, which currently have a high quality in areas of special interest only.
- Revise and improve the effectiveness of the existing means and resources used to **ensure the enforcement of water laws, especially** in relation to water rights in rural areas and fight against water pollution due to industrial activities.
- Establish **limitations to the use of polluting substances in agriculture**, to tackle water pollution problems in rural areas.
- **Implement on the ground the mitigation measures** requested by the dams environment impact assessment studies to reduce the negative impact of dams on biodiversity.
- Urgently **tackle biodiversity loss due to unsustainable water management**, by involving nature conservation experts and stakeholders in decision making and give the right weight to their requests. Damaging or destroying wetlands for quickly and “cheaply” satisfying water supply or land use requirements for economic purposes is not sustainable on the long term.
- Ensure **information transparency in the decision making processes**, which implies providing stakeholders with all the background information supporting decisions.
- **Create participatory mechanisms** where all the water sectors are consulted (including the nature conservation ones) and where stakeholders are truly involved in the decision-making process.
- Speed up the adoption of the **new wetlands protection law** and make available enough human and financial resources to enforce it on the ground.