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Towards a Shared Environmental information System "SEIS"

TUNISIA COUNTRY REPORT
May 2012



National Agency of Environmental Protection



إحصائيات تونس
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The National Institute of Statistics



Republic of Tunisia

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List of acronyms

CPAQ:	Conservation Plans for Air Quality
CMS:	Coastal Modelling System
CLUPA:	Coastal Land Use Protection Agency
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Fauna
DCPA:	Directorate for Control of Polluting Activities
DGWR:	Directorate General for Water Resources
DGDLHW:	Directorate General for Dams and Large Hydraulic Works
DGLUCAL:	Directorate General for Land Use and Conservation of Agricultural Land
DHRE:	Division of Hydraulics and Rural Equipment
DEHEP:	Directorate of Environmental Health and Environmental Protection
GDRE:	General Directorate of Rural Engineering
GIS:	Geographic Information System
ICET:	International Centre for Environmental Technologies
MCSD:	Mediterranean Commission on Sustainable Development
MIESD:	Management of Indicators of Environment and Sustainable Development
NAEP:	National Agency for Environmental Protection
NOS:	National Office for Sanitation
NAWM:	National Agency for Waste Management
NCRS:	Ministry of National Defence/National Centre of Remote Sensing
NGB:	National Gene Bank
NCCRS	National Centre of Cartography and Remote Sensing
NGO:	Non-Governmental Organisation
NIS:	The National Institute of Statistics
NPMSW:	National Programme for Management of Solid Waste
ONED:	Observatory of new and emerging diseases
OECD:	Organisation of Economic Cooperation and Development
RCAD:	Regional Commission for Agricultural Development
RIILC:	Regional Indicators for Improvement of Living Conditions
SEEA:	System of Environmental-Economic Accounts
TCWOD:	Tunisian Company for Water Operations and Distribution
SD:	Sustainable Development
TOESD:	Tunisian Observatory for the Environment and Sustainable Development
TNTO:	Ministry of Tourism/Tunisian National Tourism Office
UNCBD	United Nations Convention on Biological Diversity
UNFCCC:	United Nations Framework Convention on Climate Change
UNCCD:	United Nations Convention to Combat Desertification

Summary

This report was prepared in conjunction between the National Agency for Environmental Protection and the National Institute of Statistics. This report seeks to analyse the current situation regarding data flows and the exchange of environmental information and to explore the options for introducing SEIS (Shared Environmental Information System) in Tunisia. This report focuses on the three topics defined during the consultation meeting held in Brussels in November 2010 including: **fresh water, marine water and waste water, waste management and industrial emissions**. The report consists of 4 parts:

- The first part is about inter-institutional cooperation, this section presents the different institutions and the links between them in terms of the exchange and sharing of information and environmental data.
- The second chapter describes the reporting requirements at national level and within the framework of international conventions and describes the data flow between producers and users of data, as well as existing environmental indicators.
- The third part deals with monitoring systems and environmental monitoring.
- The final part is devoted to a cross analysis that aims to identify the strengths, weaknesses and inadequacies for demonstrating SEIS in the country, followed by recommendations and a list of actions. This section is based on discussions during the country visit. The recommendations include:
 - The development of water accounts
 - Improving the exchange and the establishment of a link between the Ministry of Health and NAEP within the context of the fight against air pollution
 - The creation of a link between air quality and epidemiological analysis to allow for prevention in time and to take the necessary measures to improve the situation. The NAEP must work closely with the Ministry of Health to use existing data on the air quality in order to make the link with the impact and the consequences this may have on health. Hence the need to also define indicators to enable epidemiologists to analyse the effects on health: the morbidity indicators reflect the use of health care services for respiratory, eye and other diseases and cross this data with pollution concentrations in a given region.

1- Institutional framework

1.1 Ministries and institutions

Many qualified institutions are involved in the management and protection of the environment and the production of environmental information at national level. The main Ministries involved in this area are: the Ministry of the Environment, the Ministry of Agriculture, the Ministry of Regional Development and Planning, the Ministry for Equipment and Land Use, the Ministry of National Defence and the Ministry of Public Health.

Below we list the main institutions involved in the production and management of environmental information and small overview on their mandates:

The Ministry of the Environment: www.environnement.gov.tn

Since it was created in 1991 the Ministry has been responsible for proposing the overall State policy in the areas of environmental protection, preservation of nature, promotion of quality of life and implementation of the principles of sustainable development in general and sectoral policies of the State, in cooperation with relevant ministries and structures, to ensure its implementation, and to promote legislation relating to the protection of environment.

National Agency for Environmental Protection (NAEP) www.anpe.nat.tn

The NAEP was created pursuant to Law No. 88-91 of 2 August 1988 and amended by Law No. 92-11 of 30 November 1992, Article 3 of which states that the NAEP has, among other missions, "to ensure the control and monitoring of polluting discharges and the treatment facilities of such discharges."

It is administered by a Governing Board chaired by a Director General appointed by decree on the proposal of the Ministry of the Environment. In addition to its central structures the NAEP is represented at regional level by eight representations. The NAEP participates in the development of the Government's general policy related to pollution control and environmental protection, and in its implementation through specific sectoral actions, as well as global actions falling within the framework of the National Development Plan. The NAEP missions are, among other things, the control of pollution sources, monitoring of the air quality monitoring network and raising public awareness.

The Tunisian Observatory for the Environment and Sustainable Development (TOESD), placed under the authority of the Ministry of the Environment, is regarded as the dashboard for monitoring sustainable development activities in the country. It aims to establish a permanent system for the collection, production, analysis, management and dissemination of information on the state of the environment and sustainable development, and to help planners to make decisions in accordance with the requirements for environmental protection and development.

The TOESD collects data/relevant information which has been collected by competent ministerial departments :

- Ministry of the Environment and all the agencies under its supervision: NAEP, NOS, CLUPA, ICET, NAWM, Gene Bank.

- Ministry of Development and international Cooperation/National Institute of Statistics (NIS)
- Ministry of Agriculture
- Ministry of Tourism/Tunisian National Tourism Office-TNTO/Tourist Property Agency –TPA
- Ministry of Industry and Trade
- Businesses/National Agency for Energy Control
- Ministry of Health
- Ministry of Higher Education and Scientific Research and Technology
- Ministry of the Interior
- Ministry of National Defence/National Centre of Remote Sensing (NCRS)
- Environmental NGOs

Coastal Land Use Protection Agency (CLUPA) www.apal.nat.tn The CLUPA is a public institution of a non-administrative nature, created in July 1995, under the authority of the Ministry for the Environment whose functions are mainly:

- Management of the public maritime domain
- Management of coastal space
- Evaluation studies and research relating to the protection of the coastline, and fragile natural areas
- Rehabilitation of fragile natural coastal areas (wetlands, islands, etc.)

National Office for Sanitation (NOS): www.onas.nat.tn

The NOS is a public company of a non-administrative nature under the supervision of the Ministry of the Environment. The NOS is governed by a Board of Directors composed of representatives from the ministerial departments involved in its activities and a representative from large municipalities. It was created 3 August 1974 following the urban development that the country experienced in the 70s.

The Law creating the Office was amended by Law no. 93/41 dated 19 April 1993, whereby the NOS went from the role of administrator of the sewerage network to that of the main player in the field of protection of water environment and the fight against all sources of pollution.

The missions of the NOS are:

- Fighting against all forms of water pollution
- The planning and implementation of integrated sanitation projects
- The management, operation, maintenance and renewal of all waste water systems
- The promotion and recovery of sewage by-products.

The NOS operates throughout the republic especially in communal perimeters and in areas of tourist and industrial development for the implementation of master plans, studies of performance (Network & WWTP), sanitation work and supervision of work done by third parties. The NOS operates in a full and direct manner in areas supported by decrees for network maintenance and sanitation work.

The NOS lends technical assistance to local government authorities and other institutions in the fight against water pollution.

National Agency for Waste Management (NAWM) www.anged.nat.tn

Public institution of a non-administrative nature under the supervision of the Ministry of the Environment It is responsible for the following tasks:

- Participating in national programmes for waste Management
- Contributing to assisting and consolidating regional groupings or structures that local authorities create in the field of sustainable management of landfills
- Providing technical assistance to industries in the field of waste management. Managing public systems of waste management (plastic packaging, lubricating oils and used oil filters, batteries and cells, etc.)
- Promoting systems and programmes for collection, recycling and recovery of waste.

Tunis International Centre for Environmental Technologies www.citet.nat.tn The ICET is a public institution under the authority of the Ministry of the Environment, that aims to develop the national capabilities for better management of environmental technologies to ensure sustainable development in Tunisia and in the region, its main tasks are to:

- transfer, adaptation and promotion of environmental technologies
- Strengthening capacities and the development of skills in terms of environmental protection
- Providing technical assistance to industries and the promotion of environmentally friendly technologies and cleaner production.

National Gene Bank (NGB): www.bng.nat.tn

The principal mandate of the NGB, a public institution under the supervision of the Ministry of the Environment, is the conservation and assessment of genetic plant, animal and micro-organism resources, as well as coordination between the various operators in the field and the promotion of conservation activities and the sustainable use of genetic resources. It works with all institutions and operators in the field of genetic resources in the context of a national network comprised of nine thematic clusters.

The Ministry of Regional Development and Planning

The National Institute Statistics (NIS): www.ins.nat.tn

The NIS is a public institution of a non-administrative nature. The new Law on the National System of Statistics of 13 April 1999 has strengthened the powers of the NIS. Thus, according to this law: i) Art.18.-The NIS constitutes the central executive body of the National System of Statistics. It is responsible for the technical coordination of statistical activities, ii) Art.19. - The NIS's mission is to ensure, in coordination with other specialised public statistical structures, the collection, processing, analysis and dissemination of statistical information.

The NIS ensures the organization of any national statistical documentation having a relationship with development activity by collecting the data generated by the various components of the National System of Statistics. In this context it prepares a directory of the different statistical work. The National Institute of Statistics is the focal point the the MEDSTAT II project in Tunisia.

The work to collect environmental data statistics was carried out through the creation of questionnaires for each data source and through interaction with the national partners responsible for the data. Control and integration in the SAM-Environment database are ensured by the NIS, as well as extracting and sending data to MEDSTAT-Environment exchange (corresponding to the list of variables relating to air, water, marine environment, waste, soil, biodiversity Sustainable Development

indicators). In addition, the returned Euro-Med data is integrated into the centralised NIS database. Compendia on environment statistics have been published and an environment chapter was introduced to the NIS Statistical Yearbook since 2001.

Ministry of Agriculture

Directorate General for Water Resources (DGWR): www.semide.tn/DGRE.htm

The DGWR is responsible for assessing the water resources of the country, their development and monitoring the quality of both hydrological and hydrogeological water systems. Its main activities are in: (i) inventory, exploration and study of water resources, (ii) collecting data from monitoring networks, (iii) development and management of hydrological and hydrogeological data banks, (iv) analysis of observations on the various networks (v) the development of research and methods for assessment of water resources. The DGWR is responsible for the following activities:

- Establishing and managing measurement and observation networks regarding the various components of the country's water resources.
- Developing baseline and applied studies intended to evaluate and establish general water resource assessments.
Developing the principles and appropriate procedures for the management and operation of water resources, based on supply and demand.
- Promoting research and experimentation activities regarding conventional and unconventional water resources in order to ensure their development.
Developing the foundations of plans for the mobilisation of water resources and their operation.

Tunisian Company for Water Operations and Distribution (TCWOD):

www.sonede.com.tn

The TCWOD manages a monitoring and evaluation system for the production, use and distribution of water.

Created in July 1968, the TCWOD is a public body under the authority of the Ministry of Agriculture for providing water to urban and rural settlements, even in some cases if their population is less than 500 inhabitants. The TCWOD is responsible for the operation, maintenance and renewal of facilities for collection, treatment and distribution of drinking water. It operates two dams used for drinking water, many water points, wells and treatment and desalination plants.

Directorate General for Dams and Large Hydraulic Works (DGDLHW)

It is responsible for:

- Developing hydraulic studies, surface water control studies, water mobilisation studies, studies of large hydraulic works to mobilise surface water (dams, transfer of water, hillside lakes) and studies of large hydraulic structures
- Creating large dams, hill dams and large hydraulic structures -Monitoring and ensuring the maintenance of large dams.

General Directorate of Rural Engineering (GDRE)

It is responsible for:

- Conducting strategic studies, developing policies and plans related to the rural engineering sector and the use of water in the agricultural sector
- Monitoring and assessing irrigation and agricultural draining planning projects and

programmes for operating irrigation water and maintenance of hydraulic equipment structures and developing technical and economic methods that are the most appropriate in these areas

- Rationalising water use, promote and value unconventional water in agriculture, monitoring institutional aspects for the promotion of collective interest groups and studying and implementing management tools for water demand in the agricultural sector.

Directorate General for Land Use and Conservation of Agricultural Land:

It is responsible for:

- Developing plans and guidelines for the preservation of natural resources, soils, vegetation, water and agricultural land
- Assessing soil resources and their vocation and performing analysis and research
- Monitoring soil developments under different operating modes
- Developing studies of watershed management and erosion control work and scheduling them
- Assessing arrangements for the conservation of soil and water.

Regional representation

At regional level, the services of the Ministry of Agriculture are grouped within the administrative boundaries of each governorate in a Regional Commission for Agricultural Development (RCAD). The RCADs are organised into divisions and districts and it is within the Division of Hydraulics and Rural Equipment (D/HRE) that water resource districts, irrigated areas, maintenance of equipment and rural engineering are grouped. The RCADs have the following tasks:

- Ensuring the application of legislation relating to water policies, conservation of water and soil, as well as watershed management
- Ensuring the management and conservation of natural resources
- Implementing hydraulic equipment actions and hydro-agricultural enhancement projects (excluding work on a national scale)
- Managing the hydro-agricultural infrastructure in irrigated public land, ensuring maintenance and organising water distribution.

Ministry of Equipment and Land Use

Directorate General for Land Use

The main functions of the Ministry for Equipment, Housing and Land Use in the field of Land Use are:

- Conducting studies and research to discover the natural and economic specificities of the various regions of the country.
Developing and implementing policies related to land use at national and regional levels.
- Mastering tools and methods for urban planning and conservation of the architectural characteristics of the country.

Ministry of National Defence

National Centre of Cartography and Remote Sensing (NCCRS): www.cnct.nat.tn

The NCCRS is a public institution of a non-administrative nature under the supervision of the Ministry of National Defence, its main tasks are:

- To draw up basic maps, marine maps, satellite image maps, thematic maps and maps of towns
- To carry out aerial photography activities over the entire national territory
- To collect remote sensing data, process it technologically, disseminate it and archive it

- To monitor the organization of the geomatics sector.

Ministry of Public Health www.santetunisie.rns.tn

Directorate of Environmental Health and Environmental Protection (DEHEP):

http://www.santetunisie.rns.tn/msp/sante_tunisie/dhmpe.html. The main responsibilities of the DEHEP are:

- The sanitary control of water (drinking water, mineral water, raw and treated waste water, bathing water).
- Hygiene control in establishments open to the public.
- Hygiene control in public and private hospital
- To monitor the fight against insect vectors of disease.
- Environmental health (atmospheric pollution, noise pollution, chemical pollution, non-ionizing waves, ionizing waves, solid waste ...).
- Health education and awareness in the areas falling within its responsibilities.

Observatory of New and Emerging Diseases (ONED)

This Observatory was created in 2005 as a national observatory of new and emerging diseases "ONED", and began its operations in July 2008. Its missions are: To strengthen the international monitoring device

- To initiate new monitoring systems for priority diseases not currently covered by the Mandatory Declaration (West Nile, chikungunya, dengue...)
- To develop monitoring networks based on hospital physicians and independent professional physicians
- To provide the country with a laboratory networks and surveillance and national reference centres for major pathogens with epidemic potential
- To assess the risk of the spread of certain diseases in Tunisia
- To strengthen training in the areas of health monitoring and epidemiology of intervention: adequate investigation of threatening situations and epidemics.

1.2 Inter-institutional Cooperation

There is cooperation between the different ministries and institutions under their authority, for example the preparation of national reports on the state of the environment. The TOESD collects contributions from the various departments and/or agencies in areas that are relevant to them. In this context certain agreements relating to the provision of data are established. However there is no common platform for the sharing and exchange of information. The exchange takes place upon formal request, even between institutions in the same ministry. A strategy for the development of e-government has been established, its implementation will allow smoother exchange of information between institutions and ministries. Hence Tunisia's particular interest in the SEIS project (towards a shared environmental information system), because it will allow an exchange of experience with both the European agency and the countries of the European Union (through their experts) who have many years of experience in the field of exchange of information and reporting.

2 Contents

2.1 Legal framework

2.1.1 General information

The environmental legislation is based on the principles of Polluter Pays and Polluter Recovery (applied especially in the area of solid waste management). It is either of a preventative nature (Study on impact on the environment, quality of air, etc.) or an incentive nature (Fodep, Focred, tax benefits, etc.) and it takes into account Tunisia's commitments on an international scale through agreements and conventions. The legislation and laws for the protection of the environment are well developed but implementation on the ground is still very limited. Indeed, although since 1988, public authorities have introduced mechanisms in support of environmental policy, and despite the highly developed institutional landscape in Tunisia, environmental policy faces several challenges: continued economic growth that generates increased production of waste and waste water and increased emissions that endanger water and soil resources. To remedy this, the development of an environmental code will be of great value. The environmental code must use a participative approach encouraging the participation of civil society both upstream and downstream of programmes and development projects. The Ministry of the Environment is in the process of developing this code within the framework of the Tunisian-German cooperation in the context of a P3A Twinning project.

It is worth noting the absence of a legal framework for existing monitoring and control systems.

The following are the main regulatory texts concerning:

Study on impact on the environment:

- Article 5 of Law no. 88-91 of 2 August 1988, creating the NAEP, as amended and supplemented by Law no. 92-115 of 30 November and Law no. 2000-14 of 30 January 2000, that gives the NAEP the responsibility to ensure the control and monitoring of polluting discharges and the treatment facilities for such discharges.- Decree no. 2005-1991 of 11 July 2005, relating to the environmental impact study and defining the categories of units subject to the environmental impact study and the categories of units subject to specifications.

Incentive tools:

- FODEP, created by Law no. 92-122 of 29 December 1992, relating to finance law for management 1993. It is governed by Application Decree no. 2120 of 25 October 1993, amended and supplemented by Decree no. 2005-2636 of 24 September 2005.
- Tax benefits: Decree no. 94-1191 of 30 May 1994, laying down the conditions for tax benefits in favour of equipment designed to conserve energy, the research, production and commercialisation of renewable energy and research of geothermal equipment required for the fight against pollution or the collection, transformation and processing of waste , equipment required for professional training and equipment needed for research and development, as amended by Decree no. 99-11 of 4 January 1999.

2.1.2 Management of solid waste:

- Law no. 96-41 of 10 June 1996, on waste and the control of their management and disposal. This law aims to establish the appropriate framework in the field of waste and its management methods to achieve the following basic objectives:

- The prevention and reduction of waste production and its harmfulness particularly by acting at the level of its manufacture and the distribution of products; the recovery of waste through its reuse, recycling and any other actions aimed at recovering reusable materials and its use as a source of energy; landfills for the final disposal of waste, after exhausting all the possibilities for recycling.
- Decree no. 97-1102 of 2 June 1997, laying down the conditions and procedures for recovery and management of packaging bags and used packaging amended by Decree no. 2001-843 of 10 April 2001. This decree aims to ensure the necessary conditions to guarantee the sound management and recovery of packaging bags and used packaging and to avoid the negative impact of their abandonment in the environment. Its provisions apply.
- Decree no. 2000-2339 of 10 October 2000, establishing the list of hazardous waste.
- Decree no. 2002-693 of 1st April 2002 on the conditions and procedures for the recovery of lubricating oils and used oil filters and their management.
- Decree no. 1064-2009 of 13/4/2009 on the criteria for issuing permits for hazardous waste management and permits for disposal of waste at sea and others.

2.1.3 Industrial emissions

- Articles 107 to 139 of Law no. 75-16 of 31 March 1975, promulgating the Water Code as amended by Law no. 87-35.

The provisions of this code are intended to fight against water pollution in order to meet or reconcile the requirements of:

- The supply of drinking water
- Public Health
- Agriculture, industry, and any other human activity of general interest
- The biological life of the receiver environment and especially fish fauna as well as recreational water sports and protection of sites;
- The conservation and drainage of water.

It applies to direct or indirect spills, drainage, discharges, deposits, of material of any kind, and more generally to anything likely to cause or increase water degradation by modifying its physical, chemical, biological or bacteriological characteristics. It prohibits the spillage or disposal at sea of substances of all kinds, particularly household or industrial waste likely to adversely affect public health, marine fauna and flora and jeopardise the economic and touristic development of coastal regions. **Article 109** surface or ground water or marine water within the limits of territorial waters.

- Decree no. 85-56 of 2 January 1985, relating to the regulation of discharges into the receiving environment; this decree aims to set the conditions under which discharges into the receiving environment are restricted or prohibited. Article 14 of this decree provides for periodic checks, this is to say any operation subject to authorisation must perform periodic checks on its emissions and maintain a register for this purpose showing the date and results of the analyses performed.
- Decree no. 94-1885 of 12 September 1994, laying down the conditions for the release and discharge of waste water other than household water in sewerage systems installed in NOS intervention areas. This decree provides for authorisations of release or discharge of waste water other than household water in sewerage systems within the aforementioned Law of 19 April 1993, and determines the maximum advisable flows and concentrations.

2.1.4 Air Pollution

- Law no. 2007-34 of 4 June on the quality of air. This law aims to prevent, limit and reduce air pollution and its negative impacts on human health and or the environment as well as to lay down the procedures for monitoring air quality, in order to make effective the right of citizens to have a healthy environment and ensure sustainable development. Art.9. - Notwithstanding the legislation in force, facility operators are required, prior to the operational phase, to equip their facilities with equipment and clean technologies, that are able to prevent and limit air pollutants at the source. In addition, operators of facilities operating in one of the areas of activities causing air pollution, the list of which is laid down by order of the Minister of the Environment, must control air pollutants at the source and connect their facilities to the national network of air quality monitoring at their own expense.
- Decree no. 2010-2519 of 28 September 2010, laying down the limit values at the source of air pollutants from stationary sources. Article 3 of this decree states that "Facilities must be designed, installed and operated so as to avoid, limit and prevent air pollutants at the source, particularly through the implementation of clean technologies, the processing of missions according to their characteristics and reducing the quantities released. The operator shall take all necessary precautionary measures in the design of the facility, its installation and its operation in order to limit the risk of accidental pollution of the air. ".

2.1.5 Nature conservation

Tunisia has a rich legal arsenal concerning the preservation of the components of nature (wild flora and fauna, national parks and nature reserves, wetlands, coast, forest, etc.).

Tunisia also has other legal texts relating to the fight against desertification, energy management, etc.

2.1.6 Legislation the right to access information

- Decree-Law no. 2011-41 of 26 May 2011, regarding access to administrative documents held by public agencies. This decree defines the principles and rules governing access to documents held by public agencies and states that: "Every natural or legal person has the right of access to administrative documents as defined in Article 2 of the Decree, both as proactive disclosure and by disclosure upon the applicant's request, subject to the exceptions provided for in the decree. " and that "A public agency must, subject to the provisions of this Decree, regularly publish:
 - All information on its organizational structure, functions, tasks and policies
 - Important decisions and policies that affect the public
 - The procedure followed in decision making and control processes,
 - Etc."
- Decree-Law 88-2011 of 24 September 2011 governing the organisation of associations.

2.2 International Conventions

2.2.1 General

Tunisia has ratified over 60 international conventions and agreements on environmental protection in relation to certain sectors or aspects of the environment. The table below shows the main international conventions ratified by Tunisia.

Tunisia has developed, within the framework of the implementation of the three Rio Conventions, an information systems to facilitate reporting to various organisations:

- Information system developed within the framework of the implementation of the UNCCD.
- The Information System on desertification in Tunisia (DIS) has been developed with the help of the OSS, the support of the Cooperation allemande (GIZ) and France. The DIS constitutes a platform between all the stakeholders involved with LCD by allowing them to circulate and exchange their data and chosen information, once validated and made available in understandable forms. The DIS uses modern information and communication means on the basis of the Ministry of the Environment's Sustainable Development Network.

Since 2001, the Ministry of the Environment has developed and published national reports on the fight against desertification at a frequency of 2 to 3 years. The latest national report on desertification was entered and published directly on the DIS website in 2010.

- Information system developed within the framework of the implementation of the convention on biological diversity.
- Information system on the clean development mechanism.
- Tunisia's initial communication to the United Nations Framework Convention on Climate Change was published in 2001 by the Ministry of the Environment. The communication has been published in French (<http://unfccc.int/resource/docs/natc/tunnclf.pdf>). A summary in English is available at <http://unfccc.int/resource/docs/natc/tunnclsum.pdf>. There has been no national communication since 2001, a study whose ultimate goal was the development of the second communication was conducted in 2007 in cooperation with UNDP.

Convention	Date of ratification accession	Reporting obligation and structure
UNFCCC	Ratified in 1993 came into force in 1996	A National Committee on Climate Change (NCCC) was created in 1996 and has become the focal structure from 2001. It is an informal structure whose main mission is to ensure coordination and cooperation between the stakeholders affected by climate change in Tunisia, with a view to formulating the national position that will be defended in international negotiations. Communication on the website.
Kyoto Protocol	Ratified in 2003 Came into force in 2005	
UNCCD United Nations Convention to Combat Desertification	Signed in 1995 ratified in 1996	National report - a National Action Plan to combat desertification (NAPCD) (2000) - 3 reports (1999, 2002, 2004)
UNBD United Nations Convention on Biological Diversity	Signed in 1992 party since 1993	The institutional mechanism for the implementation of the Convention on Biological Diversity includes the National Council for Sustainable Development, the focal structure and focal point of the CBD attached to the Directorate General of MEDD, National report: 1998,2002, 2006
Cartagena Protocol	Party since 2004	The information is not available
Vienna Convention	1989	
Montreal Protocol	1989	
RAMSAR	Came into force 1981	

Bonn Convention (migratory land, marine and aerial species)	Came into force in 1987	
Convention on International Trade in Endangered Species of Wild Fauna-CITES	Came into force in 1975 ratified 1974	Report 2002.2003 2004 2005 2006 2007
Basel Convention	Accession 1995	Reports 1999 2000.2001 2002 2003.2004 2005
POPs Convention	Signature 2001 ratification 2004	
MARPOL	Signature 1976	
Barcelona Convention	first adopted in 1976 then reinforced and amended in 1995.	As part of the MEDSTAT project 2 statistical compendia on the environment were published in 2003 and 2006 and the NIS provides Eurostat with indicators each year on 5 topics: air,
MED POL		Provide a detailed report on the activities carried out and results of monitoring programmes carried out as part of the programme
SMAP Clearing House		Exchange system of environmental information, based on the web

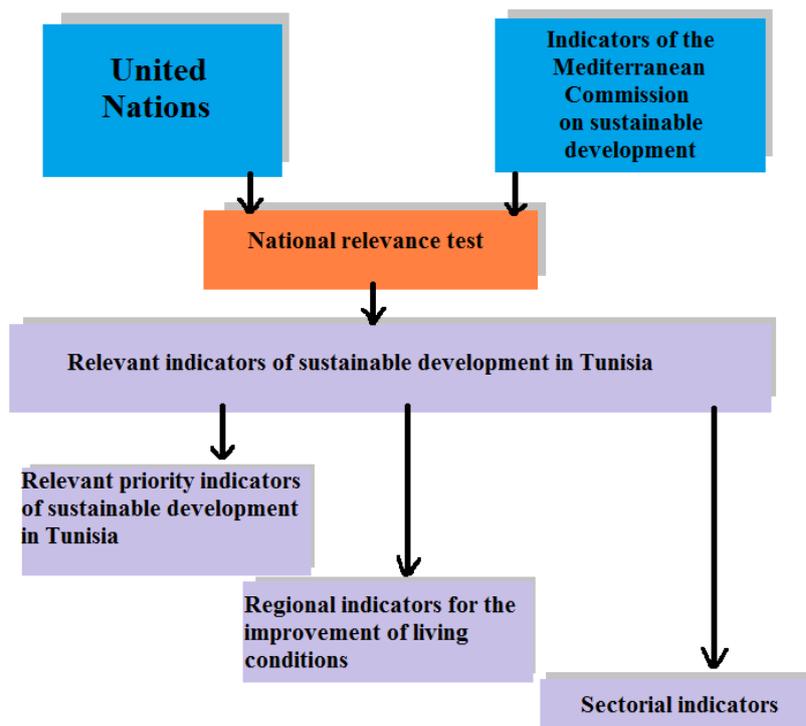
Convention	Date of ratification accession	Reporting obligation and structure
		- Med-Reportnet
MCSD	1996	SI indicators test

2.2.2 Description of environmental indicators

Environmental and sustainable development indicators and use of a geographic information system

Tunisia has carried out through the TOESD, a testing of United nations sustainable development indicators in 1998 and those of the Mediterranean Commission on Sustainable Development in 1999, in addition to several studies on sustainable development indicators. These tests and studies have focused mainly on two aspects, namely the relevance of indicators with respect to Tunisian specificities and issues and the technical aspects of availability of information and calculability of these indicators.

All of these studies have made it possible to identify a list of indicators deemed to be relevant at a national level. These indicators best reflect Tunisian concerns and adapt more to the socio-economic context of our country



Similarly, from the set of established relevant indicators, a more limited list was selected covering indicators deemed to be priority.

In addition, and based on the list of relevant indicators, regional indicators for the improvement of living conditions (RIILC) have been developed.

On another level, and for a better integration of the environmental dimension in the socio-economic sectors the TOESD has begun developing a series of sectorial reports and guides which covered the sectors of fishing, industry, tourism, agriculture, forests, oases and water resources. Each report and guide presents the situation of the sector in question, the challenges and the prospects for its sustainability, provides objectives and measures to ensure the sustainability of the sector and a set of indicators to ensure the monitoring of its sustainability.

These indicators have been the subject of a series of publications in 2003, 2006, 2008 and 2010 for national indicators and in 2005, 2007 and 2010 for the RIILC. Regarding sectorial indicators of sustainable development, five sectors have been the subject of publications namely: fishing, industry, tourism, forests and water resources.

Title of the publications:

- *The statistical compendium on environmental indicators*

Organisation: The National Institute Statistics (NIS), Mr Mohamed Chiha, project carried out by the plan bleu.

Year of publication: 2006

Framework: the compendium on environmental indicators was published as part of the MEDSTAT project

Language: French

Themes relevant to SEIS and covered in this publication are: air, water, waste

- *Sustainable Development Indicators in Tunisia-2003*

Organisation: (NAEP/TOESD).

Year of publication: 2003

Language: French and Arabic

Themes relevant to SEIS and covered in this publication are: air, water, waste

- *Environmental indicators in Tunisia-2008*

Organisation: (NAEP/TOESD).

Year of publication: 2008

Language: French and Arabic

Themes relevant to SEIS and covered in this publication are: air, water, waste

- *Regional indicators for improvement of living conditions*

Organisation: (NAEP/TOESD).

Year of publication: 2005 and 2007 and 2010

Language: French and Arabic

Themes relevant to SEIS and covered in this publication are: air, water, waste

- *Guide for sustainable management of water resources*

Organisation: (NAEP/TOESD). Year of publication: 2009

Framework: Developed with the support of GIZ.

Language: French and Arabic

Themes relevant to SEIS and covered in this publication are: water

- *Indicators for sustainable management of water resources*

Organisation: (NAEP/TOESD).

Year of publication: 2009

Framework: Developed with the support of GIZ.

Language: French and Arabic

Themes relevant to SEIS and covered in this publication are: water

- *Sustainable fishing*

Organisation: (NAEP/TOESD).

Year of publication: 2005

Framework: Developed with the support of GIZ.

Language: French and Arabic

- *Indicators for sustainable fishing*

Organisation: (NAEP/TOESD). Year of publication: 2006

Framework: Developed with the support of GIZ. Language: French and Arabic

- *Sustainable forests*

Organisation: (NAEP/TOESD).

Year of publication: 2005

Framework: Developed with the support of GIZ.

Language: French and Arabic

- *Indicators for sustainable forests*

Organisation: (NAEP/TOESD). Year of publication: 2009

Framework: Developed with the support of GIZ. Language: French and Arabic

- Sustainable tourism

Organisation: (NAEP/TOESD). Year of publication: 2010 Framework: Developed with the support of GIZ. Language: French and Arabic

2.2.3 List of available indicators

Field	Wording of the indicator	Frequency of production	Methodology	Source
Waste water	Households connected to sewerage networks (public and standalone)	every 5 years	Survey	NIS
	Population connected to sewerage network and purification	yearly		NOS
	Population not connected to sewerage network	every 5 years	Survey	NIS
	Processing capacity of treatment plants	yearly		NOS
	Public processing of waste water	yearly		NOS
	Household connection rate to sanitation network in communal environment	yearly	Infrastructure indicators	NIS
	The share of the waste water collected and processed by the public sewerage system	yearly		NOS
Drinking water	Share of drinking water distributed not compliant with quality standards	yearly		TCWOD
	Efficiency of the use of drinking water	yearly		TCWOD
Fresh water	Exploitation index of renewable resources	yearly		DGWR
	Production index of unsustainable water	yearly		DGWR
Industrial emissions	Indicators of industrial discharge			NAEP
Marine environment	Discharges into the marine environment	yearly		NOS

2.2.4 National report on the state of the environment

Reports on the state of the environment have been published annually since 1993. On the occasion of the celebration of the National and World Environment Day on June 05 every year, and since the first Earth Summit in Rio de Janeiro in 1992, the Ministry of the Environment, has, through the National Agency for Environmental Protection (NAEP), published each year since 1993, a National Report on the State of the Environment. All the reports are published on the NAEP website (1993 to 2006)

http://www.chmbiodiv.nat.tn/index.php?option=com_content&task=view&id=138&Itemid=359.

3 Infrastructure

3.1 General

The Information System of TOESD

For the management of information, the TOESD has a database (Management of Indicators of Environmental and Sustainable Development "MIESD") which includes approximately 125 indicators defined at national and sub-national levels, divided into 3 classes: environmental, social and economic. For each indicator, in addition to its value, information about its definition, unit of measure, frequency, source and method of calculation is recorded. This database makes it possible to edit the states of various indicators in the form of tables, graphs and map form.

In addition, the TOESD has a geographic information system unit with a localised database managed by ArcGIS software. This geographic information system (GIS) enables the management and development of indicators and their cartographic restitution on an administrative division (examples include location map of landfills in Tunisia, location map of treatment plants in Tunisia, etc.). In addition, the land use map of Tunisia, drawn up on the European CORINE Land Cover (C1C) classification (MEDGeobase project), amended to take into account the biophysical particularities of the environmental map of Tunisia are also used at the TOESD. But these maps are not updated.

In addition, there are also other national monitoring networks and information systems relating to the environment in Tunisia along the lines of:

Environmental information system at the National Institute of Statistics

Traditionally the work of the INS focused on social and economic statistics. The environment section was created as part of the MEDSTAT project in 1999. The National Institute of Statistics is the focal point of the project.

An environmental database covering seven environmental themes (inland waters, soil, waste, air, biodiversity, indicators for sustainable development and forests) was conducted containing 2692 variables from the Eurostat-OECD questionnaire, of which 548 are filled in. Of these, 300 variables are filled in in the meta data database which was also created and that deals with issues that primarily affect water, soil, forests and waste.

On the other hand, the list of variables exchanged each year with Eurostat involves five themes which are: air, water, waste, soil and forest with 202 and variables requested and 123 filled in. The work to collect environmental data statistics was carried out via collection questionnaires for each data source and by asking the national partners responsible for the data. Unfortunately, the environmental information is only produced within the framework of project management and rarely for statistical purposes. The statistical information exists in a fragmented, dispersed and heterogeneous manner. The NIS is confronted with regular non-availability of reliable data, the problem of consistency related to the lack of coordination between the data producing agencies, as well as the existence of a difference of terminology and nomenclature between the various stakeholders.

A - Water theme

The field of water statistics is vast and requires the establishment of an organised system of information and data management on a national and international scale. For all the fields of water statistics, the sources of data are diverse with different objectives. In addition the information is rarely produced for statistical purposes (except the DGWR directories and the TCWOD statistical report, which are

published annually, despite the fact that there are many producers), but more often for management, control and projects such as the GDRE, DGLUCAL and the DGDLHW which could publish samples of surface water per sector (which only exist as an internal memo), etc.

Among the difficulties encountered by the NIS are:

- Technical difficulties: The adaptation of classifications and nomenclatures specific to Tunisia (activities, quality, etc.) and to international classifications and nomenclatures requires a significant effort on the part of data providers (TCWOD, NOS and DGWR).
- Non-existence of an appropriate statistical unit, but each institution involved in the field of natural resource management develops its own data and statistics according to its purpose, hence the non-regular and periodic availability of reliable data is the main difficulty in the field
- Existence of a difference of terminology, methodology and nomenclature between the different partners
- Few publications on the knowledge aspect of the methods used for the production of statistics.

To remedy this, here are some suggestions to improve the NIS:

To improve the system of archiving and communication of data relating to the water sector, it is necessary to:

- Define the prerogatives of each national institution involved in the fields of production or management of water data
- Be absolutely specific in the implementation of the logical framework of cooperation between the different partners
- Publish all data in official publications by the different stakeholders such as publications of the DGWR and the TCWOD
- Give as much information as possible about the different estimates for resources, samples and supplies
- Harmonise the different data according to globally recognised definitions
- Communicate the data to the various stakeholders in the water sector and to the NIS on a periodical basis
- Ensure the circulation of information, this would require better adapted consultation tools using all the existing communication channels to achieve the exchange of information (regular mail e-mail, Intranet and publications).

Actions planned by the NIS to improve data collection on this theme

In order to harmonise the data provided and meet the needs of statistical surveys, data producers should make a special effort to provide data while differentiating the sources of water and related samples. Among other things, it is necessary to:

- Distribute TCWOD samples according to the uses for each type of resource (surface and underground water, renewable and non renewable water).
- Identify the GIC samples of drinking water within the framework of the use of operating directories of deep water tables that the DGWR publishes.
- Calculate the average rainfall for the entire country on a more suitable scientific basis to make it more accurate and indicative.

- Differentiate at TCWOD and DGWR level industrial samples for the mining sector and other industries.

B - Water accounts

As part of the MEDSTAT project, the NIS is responsible for developing water accounts in Tunisia and has performed the first accounts. The water accounts help to improve both economic statistics and water statistics by introducing consistency. The accounts facilitate international comparisons. Water accounts also enable organisation of information to facilitate integrated economic and environmental analyses.

The terminology is not always consistent between economists, environmental statisticians, scientists and policy makers. It is therefore necessary to use clear terminology on which everyone agrees.

One of the main contributions of SEEA is the standardisation of terms and definitions. The SEEA-Water provides the conceptual framework needed for monitoring and evaluation. Tunisia has carried out a pilot study through the NIS.

The development of water accounts is provided for in the Tunisia Statistics Plans.

The SEEA tables have been adapted to the Tunisian situation and some modifications have been introduced:

- The "natural water" product was subdivided into three: drinking water, irrigation water and reused water (the latter not being monetised).
- Branch 36 makes the supplier of drinking water appear separately (TCWOD).
- Renewable and non-renewable ground water resources were differentiated.
- "Desalted" water was considered as having been extracted from brackish water, but is now accounted for as ground water.
- "Tourism" (consisting of "classified" hotels) has been isolated from "services".
- Flows of water entering and leaving were considered with Algeria and Libya, for both surface water and ground water.
- For the emission accounts, the flows of three kinds of pollutants will be sought in a first approach: DBO, DCO and MES.
- For resources, the categories "lakes", "snow, ice and glaciers" have been removed while the artificial reservoirs category was divided into "large dams", "hillside dams" and "hillside lakes".

C) Waste theme

Situation in terms of existing information

Almost all of the available data comes from ad hoc studies; where the data values have not been measured, but estimated by applying technical ratios to basic data.

In the case where measurements were carried out, sampling has not always been representative, however, the level of approximation of the numbers put forward is still acceptable.

Main difficulties encountered in the production of information on waste:

From a technical point of view, the lack of information and experience in the production of waste data were the main difficulties faced by the NIS during the course of the project, especially as the majority of information collected is derived from ad hoc studies, and therefore the data is available for one year only.

The variables on which the NIS worked (from the Eurostat questionnaire) do not always correspond to those obtained in the different studies, in fact, the relationship between the definitions used on either side has not always been clear to the partners. Discrepancies in the definitions have often been observed and this has resulted in adjustment by approximation or even partial answers in some cases.

In addition, the various sources of information have not always properly developed the methods for calculating data: knowing that most of the data is not derived from direct measurements but through correlation by extrapolation or modelling. This situation has made difficult to explain the difference in values for a single variable when it came from different sources.

Proposals for improving information on waste:

The main producers of data on waste are the NAWM, Municipalities and Industrialists, and the NIS as an agency specializing in the collection of statistical data. For certain specific wastes we can include the Ministry of Health, the Ministry of Agriculture, etc.. However, no relationship is established for a systematic exchange of data relating to waste between these different data producers.

This deficiency could be remedied by creating a statistical unit at the NAWM, which would first collect all data on waste landfilled [This information is accurate and regularly available, it is used for billing], packaging waste collected as part of the Eco-Lef system, waste recycled by authorized recycling companies and hazardous waste generated [Producer registry system/ holder of hazardous waste and annual Statement on the production of hazardous waste].

This information would be supplemented by annual or even five-year questionnaires for other producers of waste. This could be done in collaboration between the NIS and the NAWM. The NAWM statistical UNIT would be responsible for formatting the results obtained. The questionnaire could be developed by mutual agreement with the information producers themselves and a protocol for exchanging data would formalise the procedures for collecting information.

Actions planned to improve waste data collection:

Certain actions to be undertaken have been identified to improve the information system on waste statistics. The selected proposals include:

- The use of data relating to the operation of the Greater Tunis landfill since May 1999. The operation of the controlled landfill at Jebel Chekir was assigned to a private operator in June 2000. The data obtained give information on the daily tonnage of waste that goes to landfill by client and by source (Municipalities, Industrialists, Private Carriers, Individuals and also by type of waste: household waste, sewage sludge, putrescible waste, common industrial waste).
- As part of the Eco-Lef programme of used packaging recovery, the information on waste collected separately by paid collection has been established by the Eco-Lef system. The NAWM currently has a file that provides information on the quantities collected by paid contribution per waste category [Plastics: PET, HDPE and films & plastic bags as well as non-ferrous metals]; the paid collection system was put in place in April 2001.
- Regarding recycled waste, the information is not systematically produced, but it can be understood from the various companies that are authorised to carry out recycling. A list of recycling companies, classified by type of waste recycled has been obtained. It is conceivable that the Sectors Management Directorate within the NAWM could send a specific questionnaire to recycling companies to monitor their progress each year.
- The NIS survey carried out every year with industries could cover one or two issues relating to waste and the household survey every 5 years.
- A questionnaire specific to waste management by municipalities could be developed and undertaken every three or five years. The analysis of this data will clarify some uncertainties on the quantities of waste generated and the conditions of its production, and will also identify specificities by municipality or group of municipalities, making it possible to propose appropriate management methods.

3.2 Marine Environment

The Coastal Observatory and its Geographic Information System

The CLUPA has developed a coastal observatory that collects a set of geographic data to support decision makers. The geographic information system (GIS) available at CLUPA is built on a base map to a scale of 1/5000 and includes the location of coastal infrastructures, the locations and descriptions of sources of coastal pollution, the locations and descriptions of wetlands, and of fragile coastal areas.

In addition, the CLUPA has adapted (in cooperation with the University of Cantabria, Spain) the characteristics of the Tunisian coast to: the CMS_ *Coastal Modelling System* composed of different modules for better management of beaches (dynamic changing profiles etc.).

Collection and management of data from the MEDPOL programme

For the implementation of the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols (Barcelona Convention), Tunisia has ratified by Law no. 98-15 of 23/02/1998, successively:

- The amendments to the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention).
- The amendments to the Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft
- The amendments to the Protocol for the Protection of the Mediterranean Sea against pollution from land-based sources.

The Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes. As well as other Protocols.

The national program for monitoring the quality (physiochemical and microbiological) of Tunisia's Marine Environment includes the monitoring of land-based pollution sources, pollution hotspots (estuaries, coastal sewage treatment plants), monitoring of conformity of bathing waters and shellfish waters, coastal analysis, bio-monitoring of trends and support measures (coordination system and information on data quality assurance). In application of this Convention, Tunisia does not issue permits to industrialists if the discharges from their plants contains substances listed in the Annexes of the Convention. There are 39 monitoring stations in Tunisia, including: 29 for data control activities related to waste water, 7 for coastal areas, 2 for pollution hot spots and 1 for monitoring of water for aquaculture.

The data collected is stored in a NAEP database and transmitted to the MEDPOL programme in the form of Excel or Word files.

Within the framework of MED POL Phase III, an assessment of eutrophication in the Gulf of Gabes (pilot phase) was also carried out by the NISTS (National Institute of Sciences and Technologies of the Sea) on the basis of two campaigns in 2006 (spring and summer).

Monitoring of bathing waters

Monitoring of seawater is carried out throughout the year but is accelerated in summer. The control aims to monitor the quality of bathing water, but also the impact of dumping at sea whether liquids or solids (treated waste water, solid waste), the samples for analysis are taken in a network consisting of fixed points whose separation distance depends on the level of use. Moreover, the programme of the Ministry of Public Health currently monitors bathing water fortnightly in summer (May-September) and monthly for the rest of the year (October to April). The services of the Ministry of Health are therefore responsible for monitoring bathing water, the total number of monitoring stations is 486.

The services of the Ministry provide only microbiological analyses.. These include total coliforms,

faecal coliforms and faecal streptococci. Physiochemical parameters are not taken into consideration.

3.3 Monitoring of water quality

A project for the creation of an information system is being developed. The project is designed as part of the Investment Project in Sector Water (IPSW) as a computerised tool that will facilitate the management and processing of information on water.

Currently in the development phase is the implementation of the SINEAU system and its subsystems, namely:

- The development and installation of the SINEAU portal
The upgrading and implementation of the Management System of Water Resources "SYGREAU"
- The development and implementation of the Soil Information System (Sisol)
- The redesign and installation of the Water Pollution Control System and its database (WPCS/SPORE)

In fact a previous project (IPSW: Investment Project in Sector Water) revealed the existence of nearly 756 potential sources of pollution of surface water and groundwater, and that there are at least 216 water environments requiring quality monitoring in order to prevent pollution.

- The various monitoring networks managed by the DGWR supply regularly updated databases: Rainfall (850 rain gauges across the country and 130 rain gauge recorders), Hydrometry (76 hydrometric stations, 164 low flow measurement points), Piezometry (3,800 regular points), Exploitation of groundwater (nearly 15,000 wells surveyed: estimation updated every 5 years), Exploitation of deep aquifers (5,000 active boreholes listed in 2005: annual publication). The information stored in the databases originates from periodical publications: directories (rainfall, hydrometry, piezometry, exploitation of groundwater; recharge; water quality), monographs, applied studies and numerous mathematical models used to characterise surface and underground hydrologic regimes and to establish the balance of water resources. Storage and computer processing of data at the DGWR play an important role in the assessment, monitoring and management of water resources. The DGWR has developed its activities by ensuring strengthening of the measurement network through automatic data acquisition exchanges..
- Furthermore, other agencies are also responsible for collecting, managing and disseminating data on water: a) the DGDLHW (Directorate General for Dams and Large Hydraulic Works) maintains the database on large dams (daily data on the water level, different extractions, inputs, quality, etc.), b) the DGLUCAL (Directorate General for Land Use and Conservation of Agricultural Land) manages the database of lakes and hillside dams (hydrology, erosion, samples, releases to groundwater recharge, etc.) as well as the data on the quality of soil, c) the GDRE (Directorate General for Rural Engineering and Water Use) develops data on rural drinking water, and on monitoring of the operations and costs of water in irrigated public land, d) the DGAGRD (Directorate General for Agricultural Research and Development) publishes agricultural maps by governorate including data on agricultural activities (agricultural use, soil type, etc.) and digital and cartographic information on the nature of water resources, the location of boreholes, wells, dams, hillside lakes, irrigated areas, etc.

In addition, the National Institute of Meteorology (NIM) maintains the climatological database from a network of 96 weather stations; the TOESD (Tunisian Observatory for the Environment and Sustainable Development) publishes an Annual Report on the State of the Environment, which includes data on water resources.

- Since being initiated in Tunisia more than 40 years ago, the digital water databases took on a new dimension with the development and automation of the networks, the introduction of telemetry, the multiplicity of stakeholders and the wealth of information collected. It became, therefore, necessary to manage these flows of information in real time. This culminated, leading to the first IPSW phase, the development of effective decision support tools for water and soil resources (National Water Information System [SINEAU], National Network of Water Pollution Monitoring, Monitoring System of Forms of Degradation to Soil Resources). Tunisia will therefore continue to strengthen the monitoring system of the resource in quantity and quality in the next five years, by optimizing the monitoring network of surface water and groundwater, the network of monitoring and control of the various sources of water pollution as well as risk monitoring of salinisation and other forms of soil degradation in irrigated areas.

A mobile unit has been in operation since 2004 and covers mainly the north of Tunisia (wadi, Sabkhas and lagoons). The parameters measured on site are the physiochemical, parameters heavy metals and ammonium. Cyanides, sulphides, nitrates, fluorides and chlorine. The other parameters are analysed in a laboratory (DBO, Hg, microbiological parameters detergents and pesticides).

Since 2007, and for a term of 3 years, the EC (LIFE Third Countries) finances a project (WPCS) to strengthen the capacity of the NAEP in its mission to control water pollution (strengthening capacities, improving coordination between the various stakeholders, the acquisition of 2 mobile laboratories to cover central and southern Tunisia, developing a procedures manual, releasing results on the internet).

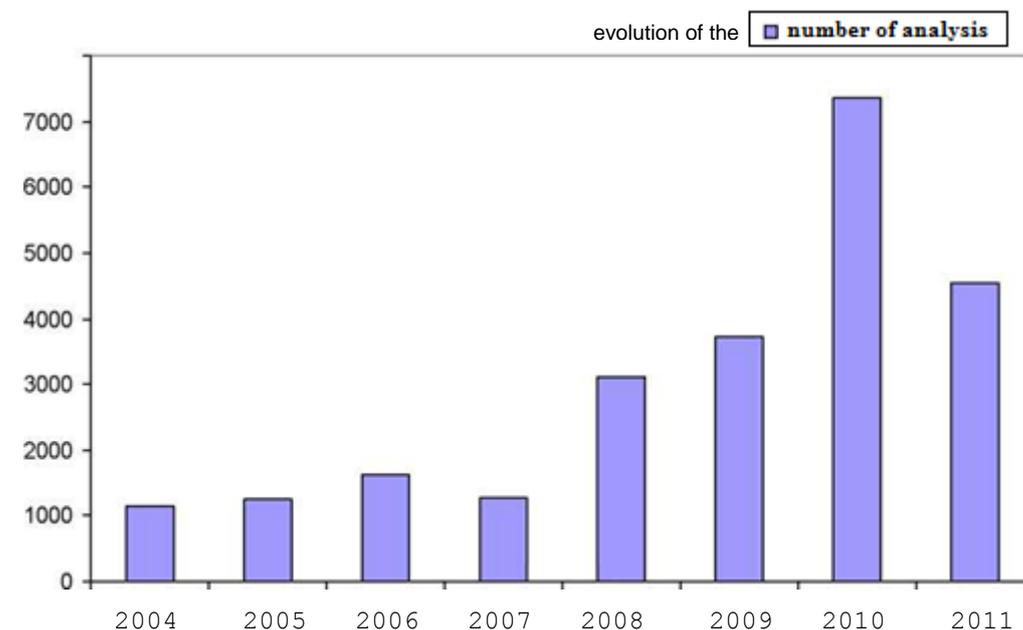
System for monitoring the quality of water:

Frequency: 2 times/year, except for certain urgent environmental interventions.

Equipment

- April 2004, a single mobile laboratory
- End of 2009, the acquisition of two more mobile laboratories and strengthening of the team within the WPCS project funded as part of the IPSW project (Investment Project in Sector Water).

Number of parameters measured: The following chart shows the evolution of the number of parameters measured.



The table below shows the parameters measured:

"In situ" analyses conducted by the NAEP	Analyses conducted by NAEP laboratories	Analyses subcontracted to an approved laboratory
pH	DCO	Microbiological (faecal coliforms, total coliforms, E. coli, Enterococcus streptococcus, etc.
Temperature	DBO5	Pesticides
Salinity	MES	Hydrocarbon
Electrical conductivity	Dry residue	Detergent
Dissolved oxygen	TH	Oils and fats
Turbidity	Chlorides	Phenol index
	Sulphates	Heavy metals
	Nitrate N-N03	VOC
	Ammonia N-NH4	
	Phosphate P-PO4	
	Heavy metals	
	Cyanide	
	Sulphur	

The parameters measured are not the same for environments and measuring stations, they depend on the nature of the water resources (surface or ground) and the environmental situation (source of pollution, etc.).

The selection of stations is fixed based on our experience in control and intervention and a study carried out within WPCS I "updating the inventory of the main potential sources of pollution of water resources and implementation of a national network for monitoring water pollution."

Data collection process

- Field sheets
- Laboratory sheets
- Validation of results
- Data entry in Excel
- Writing bulletins and reports
- Publication

Data Format

- Excel file (collection sheet)
- Report and bulletin in Word and PDF
- Internal NAEP base (environmental information system) on oracle
- The Internal WPCS project will be developed as part of the IPSW project The WPCS network data will be connected to the SINEAU system (National Water Information System) which is under way and will be housed at the DGWR.
- For the largest Medjerda basin, the 2011 results are in the form of digital mapping and GIS.

Data availability

- The results of the analyses are in the form of annual and interim reports which are published on the WPCS website: (www.aquapole.ulg.ac.be/copeau/)
- The monthly reports are internal in order to inform the NAEP management of all the main overruns.

The SINEAU National Water Information System

3.4 Industrial Emissions

National Network of Air Quality Monitoring NNAQM

The NAEP has a programme for monitoring air quality. The aim of the network is to monitor and inform on air quality and it also enables the prevention of critical situations. The network is made up of 30 stations. The stations are installed in various places across the Tunisian territory, especially in densely populated cities and industrial areas. There are fixed monitoring stations and mobile monitoring stations.

Measurements of air quality and meteorological parameters (wind speed and direction, atmospheric pressure and temp., relative humidity, sunshine, temperature) are also carried out by a mobile laboratory. The parameters measured are: SO₂, NO_x, particles in suspension (PM₁₀), ozone, CO, hydrocarbons and volatile organic compounds, Pb. (see table below)

The parameters measured and measurement technique:

Pollutants	Method of analysis
Sulphur dioxide SO ₂	UV fluorescence
Hydrogen sulphide H ₂ S	UV fluorescence
Nitrogen oxides NO _x	Chemiluminescence
Carbon monoxide CO	I.R absorption
Ozone O ₃	U.V photometry
H.C hydrocarbon	FID
Particles in suspension PS	Radioactive source

The Central National Post's mission is to collect and process data, validate it and inform citizens. The data collected is disseminated via the NAEP website.

The software used are X4 software version 4.6.20 (Iseo-French system) and NAMIS software (Korean system).

The databases are oracle 10g type. The toolboxes supplied with the software to extract the data are in Excel format. The data is in quarter-hourly format in the database.

The National Network of Air Quality Monitoring has several objectives, these include:

- Monitoring the evolution of the quality of air
- Clarifying the nature of air pollution and reporting limit value excesses, if they exist, to prepare intervention plans
- Providing the necessary information and indices of the atmospheric environment to the Tunisian

Observatory for the Environment and Sustainable Development (TOESD) and to all parties involved in this area

- To fight against all sources of pollution, environmental nuisance and any form of environmental degradation
- To propose to the competent authorities any measure of a general or specific nature designed to ensure the implementation of state policy in the fight against pollution
- The development of a pollutant dispersion model in the atmosphere to determine the most polluting areas that merit special attention
- Carrying out specific sectoral studies to provide the necessary information in order to find appropriate solutions and ensure the effectiveness of procedures that have been taken or will be taken to reduce harmful effects as a result of the introduction of new industrial projects and the growth in means of transport
- Publication of monthly newsletters on the quality of air in Tunisia distributed to members involved in the environmental field
- The presentation of information on the concentrations of gaseous pollutants from fixed stations for the public using luminous signs.

In addition, the National Agency for Environmental Protection, in coordination with the relevant local authorities, structures and public institutions, has started to draw up Conservation Plans for Air Quality (CPAQ) for urban areas whose population exceeds a fixed number, and areas that record excesses or that are likely to exceed the air quality limit values or alert thresholds.

The objective of "The preparation of Conservation Plans for Air Quality (CPAQ)" is summarised in following points:

- To develop an "inventory" of the air quality situation in the considered region
- To identify and analyse the different sources of pollution and elements of atmospheric pollution in the region concerned
- To specify the key regional issues in terms of limit values and atmospheric pollution alert thresholds
- To assess the impact of atmospheric pollution on the health of the population
- To make proposals for reduction actions (permanent or temporary) of pollutant emissions
- To propose an action plan and procedures to initiate in case of alert
- To make a strategic framework available to State services
- To lay down medium (one year) and long term (five years) guidelines to prevent or reduce atmospheric pollution in order to achieve the air quality objectives in the region
- To be a planning, information and consultation tool on a regional scale

The control and monitoring of each air quality conservation plan is provided by the NAEP and a pilot committee created within the ANPE which brings together about thirty senior representatives of the local authorities, structures and public institutions involved in the area of air quality conservation (the Ministry of Health [such as DEHEP] member in each pilot committee).

In addition, other actions are carried out in collaboration and consultation with the departments of the Ministry of Health.

Dissemination of information on the quality of air:

The NAEP currently publishes a **monthly bulletin on the quality of air and an annual report on the**

quality of the air and has a display board of air quality parameter values in central Tunis (that it hopes to expand to other sites).

The NAEP intends to develop the dissemination of information on air quality by installing two display systems that will allow the Ministry of Public Health and the Ministry of the Environment to view all the measurements from fixed air quality monitoring stations in real time. This action will be initiated in 2012, first by the purchase of workstation and server equipment, and after by the installation of the management interfaces for data display and analysis of gas and dust from fixed and mobile stations via the official NAEP website (maintained by the NAEP).

The NAEP is working to improve the link between the NAEP and health: The air quality Law no. 34 of June 4, 2007 states that "the Ministry of Public Health is responsible, in coordination with the NAEP, for the control monitoring and evaluation of the impacts of air pollution on human health, and for taking the necessary measures to protect humans and the environment".

The ONED has played an important role in this commission, both in establishing the national strategy and in tracking and epidemiological monitoring of influenza in Tunisia. It has also contributed to:

- International monitoring
- Documentation of the situation in Tunisia
- Weekly newsletter
- Communication
- H1N1 flu hotline
- Media contribution

In addition, the Ministry of Public Health has conducted a certain number of actions in relation to the impact of atmospheric pollution on health, including:

- Years 1992-1993 Preparation of a study on the assessment of chemical pollution of the air in Tunisia: This study allowed the establishment of national mapping of chemical air pollutants relating to the following pollutants: SO₂, NO_x, PM₁₀, CO and made it possible to classify the areas most affected by chemical pollution of the air that require serious attention.
- Year 1993: Implementation of two semi-automatic air sampling stations at Gabes in two different areas, one located close to the Ghannouche industrial zone where the prevailing wind blows and the other away from the area within a radius of 10 km.
- Years 1994-1996: Completion of an eco-epidemiological study in the Gabes region to assess the impact of pollution on health in the Gabes region.
- Year 1998: Installation of an automatic air quality monitoring station in the Ghannouche Industrial Zone.
- Year 1999: Installation of an automatic air quality monitoring station at Gabes (Gabes city) and installation of an automatic air quality monitoring station at Bizerte.
- Year 2001: Installation of two automatic air quality monitoring stations at Ben Arous (PM; SO₂).
- Year 2002: Analysis of toxic and carcinogenic pollutants in particulate matter with a diameter <10 microns in the region of Gabes and Ben Arous, namely Pb, Ni, Mn, Mg, As, Hg, Zn, Cu, Fe, Cr and Ca.
- Year 2003: Analysis of toxic and carcinogenic pollutants in particulate matter with a diameter <10 microns caused by to automobile traffic, namely: Pb, Ni, Mn and Mg in the Gabes and Ben

Arous area Year 2004:

- Development of awareness campaigns and production of televised awareness campaigns on the prevention of atmospheric pollution caused by automobile traffic.
- Participation in the development of quality standards for ambient air and the quality of air emissions.
 - Participation in the implementation of an action plan to reduce sulphur fuel
 - Promote the use of unleaded petrol
 - Implementation of a framework law relating to the quality of air

The health risks related to chemical pollution of external air are regarded as the main public health theme. Indeed, the incidence of asthma in the entire population is estimated at 3 to 5%, it is considered to be high compared to levels on an international scale. However, due to the increased rate of pneumococcal and cardiovascular disease and the increased incidence of cancer on the one hand and the lack of an information system on diseases related to atmospheric pollution and the absence of data on the toxicology of ambient air on the other hand, we can not calculate or estimate the role of air pollution in the occurrence of respiratory and cardiovascular diseases and cancer, which is an important indicator that serves as a decision support tool for establishing an effective national strategy in this area.

Cooperation between the Ministry of Health and the NAEP already exists but must be improved. We believe that the twinning project will strengthen cooperation and will create a platform for exchange between the two institutions.

Information system on industrial releases:

The NAEP possesses an information system on polluting activities. In fact, expert controllers assigned by the Directorate for Control of Polluting Activities, collect data on polluting activities. The system includes general information about the unit, quantities of discharges and their quality, as well as depollution projects and contraventions. The experts also collect information related to receiving environments of these discharges, such as the location of the source of pollution as well as its quality. Industries do not provide this information, but they are collected and estimated by experts from the DCPA.

In accordance with Decree 2273-1990 of 25 December 1990 defining the Statute of expert controllers from National Agency for Environmental Protection., they are responsible for performing regular control operations on all sources of pollution and monitoring the state of the environment across the Tunisian territory.

As a result they are responsible for controlling the operation, effectiveness and efficiency of waste treatment or disposal facilities implemented by industrial, agricultural or commercial establishments that damage the environment, or whose activity causes environmental pollution by solid, liquid, gaseous or other forms of waste.

To this end, they closely monitor the quality of bacteriological, chemical and microbiological affluent into the environment caused by, or emanating from such establishments.

The expert controllers have the same powers as judicial police in accordance with the requirements of Article 10 of Law no.88-91 of August 2, 1988 as well as provisions on their status.

The body of expert controllers includes:

- Officials from the National Agency for Environment Protection specially authorized for this purpose
- Public sector officials empowered to perform the control and who are appointed pursuant to a decree from the Prime Minister, made on the proposal of the National Agency for Environment Protection and approval by the relevant Minister.

The expert controllers are under oath. They are subject to professional confidentiality and must not disclose any information collected during their monitoring activities.

The NAEP expert controllers are equipped with a professional identification card giving them access to all public and private institutions referred to in Article 8 of Law no. 88-91 of 2 August 1988 referred to above. During their controls, they can perform, collect and remove any samples required to perform their task.

The expert controllers are assigned to the different Regional Directorates of the NAEP which are located in: Tunis, Rades, Sousse, Kairouan, Beja, Sfax and Gafsa.

The other expert controllers are assigned to the Directorate of Control, they are mainly responsible for intervention in case of a serious accident at sea or on land, monitoring control activities and coordinating between the different Regional Directorates.

3.5 Waste

The National Programme for Solid Waste Management (NPWSM)

A National Programme for Management of Solid Waste (NPWSM) has existed since 1993 to deal with pollution caused by waste and to improve its management regarding production, collection, transport, disposal and processing. In 2005, the National Agency for Waste Management (NAWM) was created under the supervision of the Ministry of the Environment.

3.6 Other themes

Système d'information sur l'occupation du sol en Tunisie Information system on land in Tunisia

This system consists of a database of the national inventory of land use covering the entire national territory. The first part of the inventory was conducted as part of the MEDGEOBASE project and was based upon SPOT satellite images dating back to 1988 and covers a coastal strip about 50 km long. The second part covering the rest of national territory was carried out as part of the SAIDE project and was based upon Landsat 5 satellite images dating back to 1995. The European *Corine Land Cover* nomenclature was adopted to achieve this land use inventory with prioritisation of 64 positions adapted to the bioclimatic specificities of Tunisia. The inventory methodology used involves the photo-interpretation of satellite images corrected by geometry and radiometry, based on ancillary documents for the classification of territorial units into classes of land use (aerial photographs, topographic maps, etc.). After control and validation of the inventory results, the data obtained was digitized and integrated into a GIS database. The geometric accuracy of the land use data in this inventory is about 25 hectares.

Development prospects:

We currently have homogeneous coverage of land use throughout the country at TOESD level,

including the very early coastal part (23 years) and the remaining part, which is not quite as old (16 years). Given the rapid changes experienced by the country during the last two decades, this land use coverage is less reflective of the state of the territory (especially artificial areas). It has therefore become essential to update this coverage with recent satellite images that are more accurate.

The data coverage of land use is an important component of the infrastructure of geo-spatial data in the country that must be developed and made available to users, particularly in the field of the environment. This data constitutes an important basis for the calculation of statistical environmental and sustainable development indicators, for the implementation of systems to support decisions for the management of natural resources and the environment.

Actions to be taken:

- Make a new inventory of land use based on more accurate and recent satellite images
- Form a permanent team to ensure the maintenance of the land use database
- Implement and upgrade the operating methods of the land use database to make it available through the use of Web-GIS techniques
- Acquire the necessary material resources for carrying out the actions indicated above.

Forestry and Pastoral Information System (FPIS)

The first forest inventory (1993-1994) produced land use maps in which forest areas with different strata (forests, scrub land, heath), courses (steppes, alfa, meadow, lawns) agricultural land and wetlands and the entire infrastructure (urban areas, roads, dams etc.) can be distinguished. This inventory is based on the areas that have been studied and sampling in the rest of territory.

The second forest inventory is currently well under way and is planning to publish a vegetation map at 1/25,000. This inventory is also based on sampling work and used digitised Mission 2000 orthophotos at 1/20,000. It comes with a statistical database which concerns areas covered by different formations and biomass production. The comparison between the first and the second forest inventories (2003-2004) shows vegetation evolution and changes to the landscape and land use.

Note that in Tunisia, there are phytocological maps at 1/200,000 covering all of the North and at 1/500,000 for arid areas. These maps specify the vegetation groupings occupying different environments. This work has not yet been updated. It has only been carried out very partially on restricted study areas.

The agricultural map of Tunisia

The agricultural map of Tunisia was prepared by the Ministry of Agriculture It shows the orientation of farms based on data on natural resources, water, soil, vegetation and the strategic choices of the country.

This "map" is a real Geographic Information System "GIS" which aims to identify the report in terms of natural resources between the state of the current resources allocation and the deviation between actual allocations noted in cultures of one hand, and options for sustainable development or competitive development on the other.

The agricultural map is made up of base maps, land use maps, agronomic maps and socio-economic maps

4 Cross analysis

4.1 Information system

Tunisia has been working for several years on the selection and calculation of Environment and

Sustainable Development Indicators and others such as to assess and monitor desertification and therefore has trained and skilled experts in the field.

Environmental information systems (GIS or databases) exist in various national agencies (NAEP, TOESD, CLUPA, MARH) and the NIS is currently strengthening its database with environmental data statistics.

Many projects with international and bilateral financing make it possible to regularly strengthen the capabilities of civil servants/experts as well as data processing and environmental parameter measurement units.

However, for the establishment of an information system which conforms to the principles of SEIS, we must work to improve the current situation which presents various difficulties, such as:

- The difficulties encountered for sharing information and environmental reporting are due to the lack of certain basic data needed. This partly due to insufficient financial means and human resources.
- There is also a need to rationalize/simplify international reporting bodies (conventions) in addition to the daily functioning of departments and agencies of jurisdiction.
- The lack of a regulatory framework that formalises the networks for data collection and exchange of environmental information/data between institutions.
- The various data management systems are built to meet the specific needs of institutions. It is therefore necessary to interconnect them in the context of a national network of environmental information. Increasing interoperability between national systems of environmental information is therefore vital. In addition to computing interoperability, it is necessary to harmonise terminology, methodology and nomenclature between the different stakeholders. It is also essential to continue to develop the processes of data validation and quality control.
- WebGIS technology, which improves the visibility of IS and GIS and their content, is not yet used systematically in Tunisia. Although all environmental institutions have websites, these sites are not enough supplied with technical data and information in connection with the projects and programmes.
- Written production on the environment remains undeveloped, with the exception of the national report on the state of the environment that currently constitutes the reference.

4.2 Water accounts

Tunisia wants to continue to develop and improve water accounts, an analysis of needs was conducted and the results of this analysis are summarised as follows:

Theoretical need: It relates to the methodology which states that the water accounts quantify water flows and stocks physical and monetary terms for all economic activities whether they are from production (as defined by the Tunisia nomenclature of activities [TAN]), consumption (households), or whether they are residential or not (outside).

Therefore, we need data on the water samples and use for each economic sector by source of water, water returns and availability of water from each sector and from each source of water.

We also need data on the inventory of the resource by water source as well as data on the increase and decrease of this inventory whether they are caused by a natural or an anthropogenic effect.

For emission accounts we need data on the water quality at the point of exiting the establishment and other information related to the establishment (volume of water, etc.) in order to be able to establish coefficients for these emissions.

Actual need:

The pilot study carried out has shown that there are deviations from the need indicated above as well as other problems relating to the availability and accessibility of data. The availability and accessibility that is the most determining varies according to the institution.

Only the DGWR, TCWOD, SECADENORD and the Statistics Department of the Ministry of Agriculture regularly publish statistics in their reports. The other institutions do not have any publications that could be used for water accounts.

On this subject, it was necessary to make formal requests which enabled us to obtain data on the inventory and operation of large dams, data on hillside lakes and data on the reuse of treated waste water in agriculture. The NIS succeeded in establishing pilot accounts concerning uses, physical resources and the inventory after having benefited from the assistance of MEDSTAT project.

Missing data:

Missing data relates mainly to

- Hillside dams in terms of stock and operating
- Soil water
- Return water from economic units to the environment
- The exchange of water between the different sources (for example infiltration)
- The volume of water distributed by GICs to households and agriculture
- Losses from the distribution of agricultural water
- Urban and agricultural drainage

Data accessibility:

The DGWR publishes directories on the exploitation of groundwater, deep aquifers, hydrological, pluviometric, and piezometric directories and directories on groundwater recharge. These directories are only accessible at the DGWR library upon formal request to the Director General.

The same goes for the TCWOD which publishes its statistical directory.

For the other agencies, which are the DGDLHW, DGRE, DGLUCAL and SECADENORD, there are no usable publications for water accounts.

Other considerations on the quality of data:

The partner agencies and producers of data do not use standard and common nomenclatures.

The partner agencies and producers of data do not use the same terminology and definitions.

No diffusion of data over the Internet.

We can consider setting the following objectives:

- In addition to the 3 tables that have already been established (the pilot accounts concerning the uses, physical resources and inventory for the year 2003), 2 other tables, which are more approachable at the moment, must be prepared in a second phase. These are accounts of hybrid resources and uses (3).
- Afterwards, we will address the emission accounts (3 times 2 tables). The preparation of the expenditure accounts does not seem able to be conceivable in the near future. Even if some information can be drawn from existing sources (State budget, surveys), one or more preliminary investigations are needed to establish these accounts in full.

Therefore, after first validating or modifying the assumptions used in the three existing tables, we will

proceed to produce the other tables in a second step, and thereafter, we will establish a series of years for all the tables produced.

4.3 Improving the link between air quality and health

Data on Air Quality exists but there is a need to strengthen the link with the Ministry of Health to achieve the following objectives:

- The NAEP develops plans for the preservation of air quality to ensure healthy air that does not harm human health and coordinates with the Ministry of Health to develop epidemiological studies.
- The network of quality monitoring reaches their targets.
- The fixed and mobile stations work well and guarantee reliable data and information.
- Capacity building: the members of the air quality monitoring unit having skills that are comparable to those of international experts in the fields of measurement, air quality monitoring, depollution, impact studies, spatialized emission inventories, modelling, scenario preparation, environmental audits, metrology, maintenance, etc.
- To strengthen cooperation and coordination with the Ministry of Health.

5. Proposed pilot projects and implementation plans

5.1 Environmental information system

Tunisia is a signatory to many international conventions that establish a system for the production of information and the right to information.

There are various data management systems which are built to meet the specific needs of institutions. It is therefore necessary to interconnect them in the context of a national network of environmental information. This requires, on the one hand, the development of interoperability between the systems and, secondly, unification and harmonisation work on terminologies, methodologies and nomenclatures between different institutions.

The promotion and formalisation of coordination with other national entities must be organized for regular information sharing.

To achieve the objectives mentioned above, the implementation of a register of release and transfer of pollutants is recommended in order to apply the polluter pays principle and the principles of SEIS.

5.2 PRTR

For the creation of a register of release and transfer of pollutants (RRTP), it is necessary to organise a workshop to bring together senior officials from the Ministry of Environment, Ministry of Industry, Ministry of Health, Ministry of Labour, Ministries of local government, the Agency of Chemical Management and non-governmental organisations in order to assess the current situation of the legal, institutional and technical infrastructures. The workshop will determine whether the legal basis for the establishment of a RRTP exists, or if the enactment of a new law will be required. An expert mission will help to see whether the information system in place can be adapted and developed into a RRTP or if another system is needed.

The expert mission and workshop will help to describe the activities to carry out for the establishment of a RRTP system in greater detail.

5.3 Link between air quality and health

As mentioned in the cross analysis section, before the link is established, we must ensure that air quality data is available and reliable. For this we propose the following activities:

I - Strengthen the capacities of the National Network of Air Quality Monitoring through the following actions:

Action 1- Equip a chemistry laboratory well enough to perform chemical analysis after measurement campaigns.

Action 2 - Acquire a mobile laboratory lorry, equipped with ambient air analysers and able to determine the main meteorological parameters (temperature, atmospheric pressure, wind direction, wind speed, etc.)

Action 3 - Acquire 3 cars for the control and monitoring of exhaust gases.

Action 4 - i) Renew the whole fleet with gas analysers (SO₂, H₂S, NO, NO₂, NO_x, NH₃, CO, O₃, HCT, BTX, VOC, etc.), ii) Get analysers and samplers for particles (TSP, PM₁₀, PM_{2.5}, PM₁, etc.)

Action 5 - Acquire a stock of spare parts for fixed and mobile air quality stations for 4 years.

Action 6 - Acquire two mobile laboratories for measuring air quality of emissions with Multi gas analyses SO₂, H₂S, NO, NO₂, NO_x, NH₃, CO, HF, HCL, VOC and dust (a laboratory for the south and another for the centre and Sahel).

Action 7 - Acquire two "FID Detector" analysers to measure volatile organic compounds for the mobile emission laboratory.

II - Training sessions for air quality and health teams (see Appendix 1).

III - Establish a link between air quality and the epidemiological analysis to allow for prevention: The NAEP must work closely with the Ministry of Health to define indicators to enable epidemiologists to analyse the effects on health: the morbidity indicators reflect the use of health care services for respiratory, eye and other diseases and cross this data with pollution concentrations in a given region.

5.4 Water account

The following activities have been suggested to continue to improve water accounts:

- Develop environmental accounts based on an ecosystem approach: these accounts respond to the question of sustainable development from the perspective of resources and environment.
- Validate or modify the assumptions used in the three existing tables in a first stage, create the other tables in a second stage (9) tables and establish a series of years for all the tables created.
- Develop the expense accounts for protection of the environment by adapting the classification of activities and expenses for protection of the environment, we want to know how to:
 1. Classify the activities, products, actual spending and operations relating to the expense of environmental protection
 2. Determine the potential sources of data
 3. Integrate the environmental expense accounts into the system of national accounts.

5.4.1 Water account

It is useful to call upon a qualified expert for 6 days, in order to revive the discussion with the relevant partners and to propose methods to estimate the shortfalls and improve what has already been done. The 6 days would be distributed as follows:

- 1 day with the NIS to review the work
- 1 day to present the pilot study to partners and to review the assumptions
- 4 days to work with the NIS and, if necessary, bilaterally with partners on emissions accounts and economic accounts.

5.4.2 Expenditure accounts for protection of the environment:

To develop expenditure accounts for protection of the environment by adapting the classification of activities and expenses for protection of the environment, we want to know how to:

- Classify the activities, products, actual spending and operations related to expenditure on environmental protection
- Determine the potential sources of data
- Integrate the environmental expenditure accounts into the system of national accounts.

For this, it is useful to call upon:

- 1 expert for a period of 6 days or more to organise a training workshop for the benefit of potential users and producers of the economic environmental information to raise awareness among partners about the importance of this subject
- 1 expert in a second phase, for a period of 5 days for the diagnosis of existing data and to propose the subsequent steps to complete the expenditure on environment protection .

Appendix no.1: Training session requirements for the Air Quality Unit

Training and courses abroad for the Air Quality Monitoring Team:

1. Training on the maintenance of gas and dust analysers for measuring air quality.
2. Training session on the estimation of pollutant emissions from road traffic
3. Training on techniques for reducing atmospheric pollution in certain areas
4. Training on measures to control atmospheric pollution at the source and self-monitoring.
5. Training session: Training session: Operation, Maintenance and Management of fixed and mobile stations.
6. Metrology training on air quality.
7. Training session: Health Safety and Environment Auditor.
8. Training session: Modelling and mapping of atmospheric pollution
9. Training session: Chemistry of atmospheric and physical environmental pollution.
10. Biomonitoring training on air quality.