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MANAGEMENT OF COASTAL AQUIFERS AND GROUNDWATER

LEGAL, INSTITUTIONAL AND POLICY ASPECTS OF COASTAL AQUIFER MANAGEMENT

Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem

Together for the Mediterranean Sea

MedPartnership



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LEGAL, INSTITUTIONAL
AND POLICY ASPECTS
OF COASTAL AQUIFER
MANAGEMENT

Note

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ABBREVIATIONS AND ACRONYMS

AGS	Albanian Geological Survey
AL	Agriculture Law
BD	Brčko District
BiH	State of Bosnia and Herzegovina
CAMP	Program of Integrated Coastal Zone Management of Montenegro
CER	Public Institution Centre for Eco-toxicological Research
CETI	Centre for Eco-toxicological Research
CMRI	Channel Maintenance Research Institute
CMWU	Coastal Municipal Water Utility
CORI	Coastal Research Institute
CRDA	Regional Committee for Agricultural Development
CRI	Construction Research Institute
DCM	Decision of the Council of Ministers
DRI	Drainage Research Institute
DSI	General Directorate of State Hydraulic Works
EAP	Environmental Assessment Policy
ECRI	Environmental & Climate Research Institute
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental impact assessment
EIEI	General Directorate of the Electrical Power Resources Survey and Development Administration
EL	Environment Law
EPA	Environmental Protection Agency
EQA	Environmental Quality Authority
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
GDWA	General Directorate of Water Administration
GEF	Global Environment Facility
GIS	Geographic Information System
GOFI	General Organization for Industrialization
GSEWE	Geological Science Energy, Water and Environment
GSM	Geological Survey of Montenegro
GWA	General Water Authority
HRI	Hydraulics Research Institute
ICZM	Integrated Coastal Zone Management
IHMS	Institute of Hydrometeorology and Seismology of Montenegro
IMOC	Institutional Maritime Operational Centre
IPD	Infrastructure Planning Directorate
IWRM	Integrated Water Resources Management
LA	Local Authorities Law
LBS	Land-based Sources
LWR	Law on Water Resources
MALR	Ministry of Agriculture and Land Reclamation
MAP	Mediterranean Action Plan
MARD	Ministry of Agriculture and Rural Development
MARDWA	Ministry of Agriculture, Rural Development and Water Administration
MBI	Marine Biology Institute

ME	Ministry of Economy
MERI	Mechanical & Electrical Research Institute
MH	Ministry of Health
MHUNS	Ministry of Housing, Utilities and New Settlements
MoA	Ministry of Agriculture
MoE	Ministry of Environment
MoFTER	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
MoH	Ministry of Health
MoHP	Ministry of Health and Population
MoLD	Ministry of Local Development
MoLG	Ministry of Local Government
MoPAD	Ministry of Planning and Administrative Development
MoU	Memorandum of Understanding
MSDT	Ministry of Sustainable Development and Tourism
MTMA	Ministry of Transport and Maritime Affairs
MWRI	Minister of Water Resources and Irrigation
NEA	National Environmental Agency
NRC	National Regulatory Commission
NRI	Nile Research Institute
NSSD	National Strategy for Sustainable Development
NWC	National Water Council
NWRC	National Water Research Center
NWRP	National Water Resources Plan Project
NWS	National water strategy
PE	Public Enterprise
PNA	Palestinian National Authority
PWA	Palestinian Water Authority
RBA	River Basin Agencies
RBC	River Basin Councils
RBMP	River Basins Management Plan
REA	Regional Environmental Agencies
RIGW	Research Institute for Groundwater
RS	Republic of Srpska
RWU	Regional water utilities
SEA	Strategic Environmental Assessment
SPA	Special Provincial Administrations
SPCA	Spatial Plan for the Coastal Areas
SRI	Survey Research Institute
W&WW	Water and waste water
WFD	Water Framework Directive
WHO	World Health Organization
WIS	Water information system
WL	Water Law
WMRI	Water Management Research Institute
WRRRI	Water Resources Research Institute
WRA	Regulatory Authority of the Water Supply and Waste Water Disposal and Treatment Sector
WU	Water Utility
WUA	Water Users' Associations
WWTP	Waste water treatment plant

1. FOREWORD

This report is the result of activity related to the legal, institutional and policy aspects of coastal aquifer management, within the component executed by United Nations Educational, Scientific and Cultural Organization-International Hydrological Programme (UNESCO-IHP) on "Management of Coastal Aquifers and Groundwater" in the frame of the United Nations Environment Programme (UNEP)/Mediterranean Action Plan (MAP) Global Environment Facility (GEF) project Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem (MedPartnership). The MedPartnership is a collective effort of leading organizations (regional, international, non-governmental, etc.) and countries sharing the Mediterranean Sea and has the aim of protecting the marine and coastal environment of the Mediterranean. The MedPartnership's overarching goal is to enable a coordinated and strategic approach to reverse the degradation trends affecting the Mediterranean, including its coastal habitats and biodiversity. The aim of UNESCO-IHP's component is, through policy interactions, to reverse the trends in over-extraction and degradation of coastal aquifer quality and provide appropriate capacity and technology for groundwater management.

The project is being carried out in the following eligible countries:

Albania, Algeria, Bosnia and Herzegovina, Croatia, Egypt, Lebanon, Libya, Montenegro, Morocco, Syria, Tunisia and Turkey, and in Palestine.

The objectives of the activity on the legal, institutional and policy aspects of coastal aquifer management are to:

- Identify gaps in and requirements for legal and institutional frameworks for coastal aquifer management vis à vis the Barcelona Convention and related protocols (Integrated Coastal Zone Management (ICZM), Land-based Sources (LBS) and Biodiversity Protocols)
- Identify possible supplementary provisions to Strategic Action Programme for the Conservation of Biological Diversity (SAP MED), Strategic Action Programme for the Conservation of Biological Diversity (SAP BIO) and national action plans (NAPs)
- Provide recommendations.

The methodology applied to meet these objectives was based on two steps. The first was to undertake a desk study in the participating countries.¹ With the assistance of the focal points (the persons in charge in each country of the project), national legal experts were identified and invited by UNESCO-IHP to contribute. Each expert prepared a national report:

- assessing the existing legal and institutional frameworks for groundwater management at the domestic and bilateral/regional levels
- analysing the specific provisions on groundwater, and on coastal aquifers if any
- identifying gaps and recommendations for legal and institutional improvements at national level for coastal aquifer management.

The second step was to prepare the present regional report based on the findings of the national reports with the aim of identifying:

- gaps vis à vis the Barcelona Convention and related protocols
- gaps vis à vis the requirements of the sustainable management of coastal aquifers
- recommendations at the national and regional levels.

The national reports were prepared in 2012, and served as the basis for preparing the part of this report related to the country overviews. However, the national summaries in the current report were updated in 2015 to reflect the last legal and institutional evolutions in the participating countries.

The report starts with a brief presentation of the Barcelona Convention as the legal framework of MAP. It also presents the related protocols which deal with freshwater resources in general and coastal aquifers in particular. These are the Land-based Sources and Activities Protocol, the Specially Protected Areas and Biological Diversity Protocol and the Protocol on ICZM. The second part of the report goes through the country overviews of the policy, legal and institutional aspects. The report concludes with findings and recommendations.

1 Eleven countries, excluding Libya and Syria, participated. However, Libya later provided a summary, which is included in this report.

The regional legal and institutional report on coastal aquifer management was compiled and prepared by Ms Raya Marina Stephan, water law expert and consultant, UNESCO-IHP, with contributions from the following national experts:²

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2 Full list with affiliation in Annex 1.

2.

BACKGROUND: THE BARCELONA CONVENTION AND RELATED PROTOCOLS

In 1975 16 Mediterranean countries and the European Community adopted the MAP with the objective of assisting Mediterranean countries to assess and control marine pollution. The focus of MAP shifted gradually from its initial focus on marine pollution to include integrated coastal zone planning and management. In 1995 MAP Phase II (the Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean) was adopted, involving 21 Mediterranean countries and the European Union (EU). MAP II is the frame for the MedPartnership project, and the Barcelona Convention and its related protocols represent its legal framework.

2.1 THE BARCELONA CONVENTION

In 1976 the Mediterranean countries adopted the first Barcelona Convention, the Convention for the Protection of the Mediterranean Sea against Pollution (in force in 1978) as the legal framework for MAP. The Convention was then amended in 1995 to become the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (in force 9 July 2004) with 22 Contracting Parties. The amended Convention reflects the shift in the focus of MAP II, as well as international evolutions including the adoption of the Rio Declaration in 1992, the Convention on the Law of the Sea (1982) and the concept of sustainable development. It focuses on actions to protect the Mediterranean Sea.

The Convention covers the Mediterranean Sea with a possible extension to coastal areas as defined by each Contracting Party within its own territory.

The Convention's main objectives are:

- to assess and control marine pollution
- to ensure sustainable management of natural marine and coastal resources
- to integrate the environment in social and economic development
- to protect the marine environment and coastal zones through prevention and reduction of pollution and, as far as possible, elimination of pollution whether land or sea-based
- to protect the natural and cultural heritage
- to strengthen solidarity among Mediterranean coastal states
- to contribute to improvement of the quality of life.

The Convention (article 4) imposes on the Contracting Parties the implementation of the following principles in order to protect the environment and contribute to the sustainable development of the Mediterranean Sea Area:

- the precautionary principle

- the polluter pays principle
- the undertaking of an environmental impact assessment (EIA) when an activity is likely to cause an impact on the marine environment, and to cooperate in matters of EIA
- to commit themselves to promote the integrated management of the coastal zones.

In article 8 on pollution from land-based sources, the Convention requires that the Parties shall eliminate pollution from LBS originating within their territories and reaching the sea, even when indirectly through rivers, canals or other watercourses, including underground watercourses, or through run-off. This provision is further specified in the Protocol related to LBS.

In the context of the Barcelona Convention a first Transboundary Diagnostic Analysis was prepared in 1977 and revised in 2005. The following major transboundary environmental concerns were identified and agreed upon:

- Decline in biodiversity
- Decline in fisheries
- Decline in seawater quality
- Human health risks
- Loss of groundwater-dependent coastal ecosystems due to the contamination, salinization and over-exploitation of coastal aquifers.

Coastal aquifers are mentioned under this last environmental concern. The Transboundary Diagnostic Analysis for the Mediterranean Sea (TDA-MED) specifies that the seepage from coastal aquifers is estimated to be about one quarter of the total freshwater inflow into the Mediterranean. The overuse of coastal aquifers leads not only to drying up of groundwater-dependent coastal ecosystems but also to less freshwater flowing into the sea. The adverse water quality from the coastal aquifers (due to pollutants introduced from various activities including agriculture and industry) causes degradation of wetlands and also affects the quality of the seawater and contributes to the decline of fisheries.

This is the only mention of coastal aquifers in TDA-MED. One of the main outcomes of the component executed by UNESCO-IHP is the preparation of a coastal aquifer supplement of TDA-MED based on findings from the various activities and case studies.

2.2 THE PROTOCOLS

Under the Barcelona Convention, seven protocols were adopted related to the following topics:

- Dumping Protocol (from ships and aircraft)
- Prevention and Emergency Protocol (pollution from ships and emergency situations)
- LBS and Activities Protocol

- Specially Protected Areas and Biological Diversity Protocol
- Offshore Protocol (pollution from exploration and exploitation)
- Hazardous Wastes Protocol
- Protocol on Integrated ICZM.

Only the Protocols on LBS and Activities, on Specially Protected Areas and Biological Diversity and on ICZM are related to coastal aquifers. Their provisions concerning coastal aquifers are presented below.

2.2.1 Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources (LBS) and Activities

This was adopted in 1996 and entered into force in 2008. The aim of the Protocol is to prevent, abate, combat and eliminate, to the fullest possible extent, pollution of the Mediterranean Sea Area emanating from any LBS and activities within the territories of the Contracting Parties. The Protocol identifies "groundwater communicating with the Mediterranean Sea" as part of the area to which it applies (article 3). The Protocol applies to discharges originating from land-based point and diffuse sources and activities within the territories of the Contracting Parties that may directly or indirectly affect the Mediterranean Sea Area. These discharges include those that reach the Mediterranean Area through watercourses, including groundwater flow. Parties have the obligation to eliminate such pollution, and to impose an authorization or regulation for any release into the Mediterranean Sea, which might affect it (article 6).

2.2.2 The Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA)

This was adopted in 1995 and entered into force in 1999. The Protocol includes in its geographical coverage the terrestrial coastal areas designated by each of the Parties, including wetlands. The Parties have the general obligations to protect, preserve and manage areas of special value, namely for their biological diversity, with the establishment of specially protected areas.

2.2.3 The Protocol on ICZM in the Mediterranean

This was adopted in 2008 and entered into force in 2011. According to the Protocol one of the objectives of ICZM is to ensure the sustainable use of natural resources, particularly with regard to water use. The Protocol also requires that:

- the ecosystems approach should be applied to coastal planning and management
- public participation and involvement of local stakeholders should be ensured
- all relevant sectorial policies shall be considered
- various economic activities shall minimize the use of natural resources and take into account the needs of future generations
- respect for Integrated Water Resources Management (IWRM) shall be ensured
- a high level of protection of the environment has to be achieved in the location and operation of agricultural and industrial activities to preserve coastal ecosystems and landscapes and prevent pollution of the sea, water, air and soil
- coastal aquifers and dynamic areas of contact or interface between fresh and salt water are monitored, as they may be affected adversely by the extraction of groundwater, or by discharges into the natural environment (article 9§2eiii)
- the characteristics of specific coastal ecosystems such as coastal wetlands are protected (article 10§1).
- all elements relating to hydrological, geomorphological, climatic, ecological, socioeconomic and cultural systems shall be taken into account in an integrated manner in coastal zone management

3.

COUNTRY OVERVIEWS

3.1 POLICIES AND LEGISLATION

3.1.1 National policies and strategies

3.1.1.1 Albania

Strategies have been prepared to provide a basis for the development of laws regulating water supply services in Albania:

- The Albanian Water Strategy on “Water Supply and Sanitation Sector”³ dated from 2004, and included an action plan for the water sector, for investment in, and stabilization and improvement of water supply and sanitation services in urban and rural areas, according to the EU Standards, taking into account the decentralization process of the sector. The action plan comprised:
 - introducing a monitoring programme
 - increasing revenues by reducing the number of illegal connections
 - adjusting tariffs and increasing the collection rate
 - introducing a demand management programme
 - conducting a public awareness campaign
 - providing the water companies with information that will help them to improve their management and operation
- The National Water Strategy approved by the National Water Council in 2004 deals with issues as:
 - supplying drinking water for tourism development to increase the requirements for water quality and quantity, and also strengthening measures for treatment of wastewater and solid waste
 - preserving the quality and quantity of agricultural water
 - defining the standards of urban and industrial dirty water discharges and assurance of protective zones around them
 - protecting riverbeds through a permitting and regulatory system for the extraction of sand and gravel
- The National Strategy of “Water Supply and Sewerage” was adopted in 2011 by the decision of the Council of Ministers No. 643, dated 14 September 2011. It improves the provision of water supply and sewerage services, and moves towards convergence of Albanian Law with EU Water Directives:
 - It increases:
 - (i) access of both urban and rural populations to safe, reliable drinking water
 - (ii) the connection of both urban and rural populations to sewage collection networks
 - It orients water utilities towards principles of cost control and full cost recovery:
 - (i) targets investments into reducing non-revenue water and energy consumption
 - (ii) requires to all licensed water utilities to have a fully documented asset management system and to develop an annually updated 5-year business plan
 - It improves governance and regulation in the sector:
 - (i) strengthens the role and functions of the Water Regulatory Authority
 - (ii) expands the licensing activities of the Water Regulatory Authority
 - (iii) develops a Model Service Delivery Agreement
 - (iv) strengthens the new General Directorate in its role as Technical Secretariat under National Water Council and River Basin Agencies
 - It invests in enhancing the capacities of the sector workforce:
 - (i) establishes a national programme of training and certification, with training target requirements at all water utilities
 - (ii) requires all Supervisory Council members of licensed water utilities to attend and complete a training course on their roles, duties and responsibilities
- National Strategy for Development and Integration 2014-2020:
 - is to ensure good management of basin catchment and integrated management of transboundary waters:
 - (i) fully transposes EU *acquis* in the area of water resource management into national legislation
 - (ii) adopts joint agreements with the Republic of Kosovo, Montenegro, Macedonia and Greece on improving management of transboundary waters
 - (iii) is to rehabilitate riverbeds by 25% by 2020 compared to 2011, and reduce permits for river exploitation
 - is to develop the sector and establish a data collection system for marine inhabitants:
 - (i) to establish an effective data collection system on fishing fleets and on the biological conditions of Albanian waters
 - (ii) to build Durres fishing port and fish wholesale markets
 - is to expand and improve the quality of the water and sewerage services sector to ensure:
 - (i) urban water supply network coverage at 100%, and in rural areas at 95%
 - (ii) sewerage network coverage in urban areas at 89% and in rural areas at 60%
 - (iii) that the percentage of the population connected to a wastewater treatment service is increased to 50%
 - (iv) continuity of water supply service to 22 hours a day throughout the country

³ Repealed by a Decision of the Council of Ministers No. 643, dated 14 September 2011.

- (v) that utilities are orientated towards full cost recovery and control through full recovery of maintenance and operation costs with revenue from all utilities
- (vi) that non-revenue water is reduced to 30% by 2020.

There are ongoing efforts to incorporate the fundamental principles, objectives and measures of the EU Framework Directives, so that EU *acquis* in the area of water resource management is fully integrated into national legislation.

3.1.1.2 Algeria

The policy on legal and regulatory issues is based on:

- promulgation in 2005 of the Water Law as the legal framework for water resources
- publication of an important number of implementing instruments of the Water Law.

The policy on the institutional aspects is:

- primarily the existence of a ministry dedicated to water resources
- the establishment of a number of institutions concerning, inter alia, the management, regulation, planning and capacity-building aspects of the 2005 Water Law.

The main principles of the water policy are:

- water saving by controlling water waste and leakages
- raising awareness of the user to the rational use of water
- protection of water against all forms of pollution
- that water is the business of all users.

The main principles of water management:

- water is part of the common heritage of the country
- use of water for all.

The components of national policy:

- increase conventional and non-conventional aspects of water resource mobilization to ensure supply for domestic, agricultural and industrial needs
- rehabilitate and develop water conveyance and drinking water distribution infrastructures
- rehabilitate and develop sanitation and wastewater treatment infrastructures
- modernize and extend irrigated surfaces to support the strategy on food security
- ensure good water governance and an improvement of management indicators.

3.1.1.3 Bosnia-Herzegovina

The State of Bosnia and Herzegovina (BiH, or State), consists of two entities: the Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS). The Brčko District of Bosnia and Herzegovina (BDBiH) has been created under the exclusive sovereignty of Bosnia and Herzegovina.

The Development Strategy of the FBiH for 2010-2020 overviews the status of waters, and particularly groundwater, recognizing it as a factor in development. It reports on major negative impacts to groundwater; pollution incidents; water quality; and the need to define protected areas. The key feature of this document is that it sets strategic goals of major importance to the state of groundwater in FBiH:

- legal and institutional reform of the water sector
- integration of water management into the economic system
- safeguarding the good status of surface and groundwater.

Harmonization with EU environmental *acquis* is also established as an objective in strategy regarding water-related legislation.

On 20 December 2011⁴ FBiH adopted a “Water Management Strategy” for the plan period 2010-2022, whereas RS developed the “Framework Plan for Development of Water Management” in September 2006 and the “Action Plan for the Implementation of the Framework Plan for Development of Water Management” in March 2007. In November 2013 RS adopted the draft “Strategy of Integral Water Management of RS” for the period 2014-2024.

According to article 24.9 of the Water of FBiH, the Water Management Strategy is part of the Environmental Protection Strategy of FBiH for the period 2008-2018. It sets strategic objectives (with appropriate operational objectives and measures) directly related to groundwater:

- Strategic objective no. 1: legal reform of the water sector and its alignment with EU water *acquis*
- Strategic objective no. 8: achieving and maintaining the good status of surface water and groundwater to protect aquatic flora and fauna and the needs of water users.

The Water Management Strategy of the FBiH includes the application of appropriate technologies for purification of wastewaters and the use of clean technologies in the production process to reduce pollution, thus creating some of the prerequisites for maintaining good water status.

The main requirements relating to groundwater in the Water Management Strategy of the FBiH were:

- Water usage
 - Strategic goal: increasing coverage of population with public water supply from 60% to 80% (groundwater supplies 85% of drinking water)
 - Operational goal: rational water usage, protection and preservation of water resources planned for water supply of population
 - Measures: continual investigation of present and potential drinking water resources, particularly focusing on underground water (intergranular and karst aquifers)
- Water protection

4 Data from the official website of the Ministry for Agriculture, Water Management and Forestry of FBiH. Available from <http://www.fmpvs.gov.ba/index.php?user=86a8bfe8e7b96928ce54655015242dee§or=0&pageID=241&textID=950>.

- Strategic goal: achieving and maintaining good-quality surface and groundwater to protect flora, fauna and users (population, economy)
- Operational goal: developing water management plans for watershed areas of the Sava River and Adriatic Sea
- Measures: methodology to determine water body types and to characterize surface and groundwater bodies. Defining parameters of quantitative and chemical quality to classification state of groundwater bodies. Establishing supervision system of surface and groundwater quality derived from monitoring programme. Developing river basin management plans.

According to FBiH strategy the deadline for developing the first River Basin Management Plans was 2012. Features included:

- Operational goal: decreasing pollution load from urban and industrial wastewater systems
 - Measures: increasing population coverage of public wastewater system from 33% to 45% and constructing wastewater treatment plants (WWTP)
- Operational goal: decreasing harmful and toxic substances from industrial facilities through application of the "polluter pays" principle
 - Measures: setting up register of polluters; continual monitoring, by polluters, of the effluent they release
- Operational goal: decreasing pollution of surface and groundwaters from dumping sites
 - Measures: removal of dumping sites; construction of environmentally sound landfills
- Operational goal: decreasing pollution from agriculture, forest and traffic activities
- Operational goal: establishing protected areas according to FBiH Water Law (and Water Framework Directive (WFD). Establishing and notifying areas for potable water abstraction: sanitary protection zones; protected areas for economically significant aquatic species; protected areas important for sport and recreation; areas sensitive to eutrophication and nutrients, and relevant monitoring programme; protected areas for habitats of aquatic and semi-aquatic species; establishment of database on status of surface waters and groundwaters.

In RS the Framework Plan of Development of Water Management covers groundwater by setting out several activities to be undertaken in order to satisfy water protection standards:

1. ensuring the implementation of the EU WFD
2. defining limits of substances for surface and groundwater in protected areas
3. devising a programme to establish nitrate monitoring in surface water and groundwater
4. adopting measures to ensure water protection and prevent its contamination in case of outflow in ground and surface water.

The 2006 "Framework Plan of Development of Water Management" represents the basis for the development of the "Strategy of Integral Water Management of RS. The draft "Strategy of Integral Water Management of RS" is a planning document

that defines a model for the strategic planning of management, objectives and criteria of integral water protection, as well as the principles of integral water protection, which are highly important for the selection of strategic goals. It defines directions, priorities and measures for water usage and protection. One objective is the setting of a legal framework with the purpose of enabling the efficient functioning of the water sector.

In its 97th session on 11 January 2013 the Government of RS adopted a decision on establishment of the public institution "Waters of Srpska". According to this, two former RS water agencies – one for the Sava River basin (in the town of Bijeljina) and the other for the Adriatic Sea basin (in the town of Trebinje) were to merge to form the public institution "Waters of Srpska".

The "Waters of Srpska" has initiated development of the "Study on the state of aquifers in the Republic Srpska and risk assessment relating to quality of ground water reserves". The study is to review and analyse the existing state of the quality of groundwaters, performing the following very important activities:

- evaluating the physicochemical characteristics of the aquifers
- characterizing the typology of the aquifers and analysing the risk levels of some aquifers or groups of connected aquifers
- risk assessing the aquifers at risk (i.e. the zones with expressed effluent pressures affecting groundwater quality).

When the study is complete, preparation of the groundwater monitoring programme will begin.

The main references to groundwater in the RS Framework Plan were to:

- increasing the population covered by public water supply systems through intensive use of groundwater sources (particularly intergranular aquifers, but also karstic aquifers). This requires securing water quality through treatment and water source protection measures, as well as guiding economic development so these sources are permanently preserved as resources for drinking water
- increasing the population covered by public wastewater systems, and constructing WWTPs for settlements of over 5,000 people (as well as for smaller settlements) if necessary according to criteria for priorities selection (public health, drinking water sources protection, water protection and water courses protection).

The draft RS strategy of integrated water management up to 2024 put special emphasis on constructing sewage systems and WWTPs for agglomerations with populations of 5,000 or more; that is, on increasing population coverage with public wastewater systems. This should also be applied to smaller agglomerations if it proves to be necessary, for example because of water source protection or protection of natural values. The strategy also put special emphasis on construction of WWTPs for larger towns in RS, as well as for settlements, which affects accumulations and ecosystems.

3.1.1.4 Croatia

A Water Management Strategy was adopted in 2008 for the period 2009-2023 (OG 91/08). Its aim is the establishment of an integrated and coordinated water regime in the national territory and in each of the two river basin districts, and ensuring:

- sufficient quantities of good-quality drinking water for the population
- required quantities of water of adequate quality for various economic purposes
- protection of people and assets against floods and other adverse effects of water
- achieving and preserving the good status of water to protect aquatic and water-dependent ecosystems.

The Strategy defines the areas of special water protection, i.e. the protected areas:

- areas designated for the abstraction of water intended for human consumption
- areas designated for the protection of economically significant aquatic species
- bodies of water designated as recreational waters, including areas designated as bathing waters
- "vulnerable" and "sensitive" areas
- areas designated for the protection of habitats or species (NATURA 2000).

The Water Management Strategy promotes the intensification of the establishment of sanitary protection zones around well fields and springs and implementation of adequate protective measures in these zones. It also promotes the "user/polluter pays" principle and the principle of recovery of the costs of water services.

A system of recording the data and economy of groundwater resources of Croatia has been established for groundwater monitoring.

To manage river basin districts in the national territory of the Republic of Croatia two river basin districts are established: the Danube River Basin District and the Adriatic River Basin District. The River Basins Management Plan (RBMP), which includes both river basin districts, was adopted in June 2013 (OG 82/13) for the period until 2015 and follows the requirements of the EU WFD. The RBMP for each river basin district specifically includes:

- an analysis of basin characteristics
- an overview of the impact of human activities on the status of surface waters, including transitional and coastal waters, and groundwater
- an economic analysis of water use
- an overview of water monitoring systems and a programme of measures for improving the status of water in the Republic of Croatia.

In addition, the RBMP contains the following registers and report:

- a register of protected areas (summary)

- a register of more detailed plans and programmes related to specific sub-basins, sectors, specific questions or types of water in the river basin district to which the plan refers, with a summary of their contents
- a register of the water bodies with their features
- a full report on public information and consultation (minutes from public debates and meetings with stakeholders; a list of comments and opinions that have been accepted and incorporated into the RBMP; and a list of unaccepted remarks with accompanying explanations).

These registers and report are located in Croatian Waters (see p. XXX) and all available data and information are available to the public pursuant to the Right to information Act (OG 25/13).

3.1.1.5 Egypt

The national water policy to 2017 rests on three major pillars:

1. increasing water use efficiency
2. water quality protection
3. pollution control and water supply augmentation.

The National Water Resources Plan Project (NWRP) developed water resources management and investment plans including for groundwater resources. The Implementation of the NWRP depends on:

1. development of additional water resources
2. more efficient use of the available water resources
3. improvement of water quality to protect public health and the environment.

In 2010 the Minister of Water Resources and Irrigation (MWRI) launched the strategy of water resources development and management in Egypt until 2050. The new strategy takes into consideration major issues of concern such as scarcity of water, pollution control, securing water quality and water saving, industrial and agricultural waste disposal, protection of groundwater resources, and environmental problems of climate change. Groundwater management is one of the key issues in this strategy.

3.1.1.6 Lebanon

The General Direction of Hydraulic and Electrical Resources has established a 10-year plan (2000-2010) with the objective of ensuring the necessary volume of water to satisfy the needs of the population in all uses. This plan does not deal explicitly with groundwater resources or coastal aquifers. However, it recognizes the need for a global approach, including elements of IWRM.

The national strategy for the water sector (2010) is composed of three documents:

1. Baseline for the strategy (September 2010)
2. Forecasts for water supply and demand (November 2010)
3. Investment plan for the period 2011-2015 (December 2010).

With reference to the identified reforms, the investment plan for the national strategy is based on:

- institutional reforms as defined by Law no. 221/2000
- improving the financial performance of the sector: participation of the private sector, and establishment of more rational tariffs
- adopting the Water Law and developing the legal framework for the national strategy
- including environmental concerns in the water sector such as protection of water resources and of the recharge zones.

The investment plan does not deal specifically with groundwater resources or coastal aquifers.

3.1.1.7 Libya

A national water resources strategy for the period 2000-2025 was prepared in 1999.

The main objectives of the water strategy are to:

- reduce the deficit in the water budget
- prevent water-quality deterioration.

The strategy's components are to:

1. minimize the water budget deficit (WDM)
2. develop conventional and non-conventional water resources
3. protect water resources from pollution
4. recover the costs of providing water
5. develop human and institutional capacities
6. improve and strengthen water legislation
7. promote technical cooperation in the field of water resources management.

The strategy includes the following sub-components:

1. Reducing the water budget deficit (WDM):
 - upgrading water monitoring capacity
 - strengthening the capacity for groundwater modelling
 - using remote sensing technology
 - reconsidering agricultural policies
 - reprogramming plans for the Great Man-Made River water allocation
 - reducing the amount of water used for domestic and industrial purposes
 - promoting extension and awareness programmes
2. Reviewing agricultural policies:
 - identifying crops and areas according to water potentials
 - gradual changing food consumption patterns
 - preventing export of agricultural products
 - subsidizing efficient irrigation systems
 - increasing return per unit of water and reducing production losses and consumptive use
 - encouraging rain-fed and low water-consumption crops

- creating non-agricultural or low water-consuming economic activities in areas threatened by depletion or degradation of water quality

3. Reviewing investment plans of the Great Man-Made River water:

- reconsidering priorities and water allocation ratios
- increasing allocation to most affected zones
- giving priority to domestic water supply of inland urban areas which cannot receive desalinated water
- giving priority to existing public and private agricultural projects instead of developing new ones
- improving water use efficiency

4. Reducing the amount of water used for urban and industrial purposes:

- reducing leakage in water distribution systems
- providing water saving fittings at affordable prices
- activating the billing system
- adopting water-efficient manufacturing processes

5. Extension and awareness raising:

- competent handling of water issues in the media
- water is a national issue requiring the development of the cultural values of society
- rationalization of food consumption

6. Developing conventional and non-conventional water resources:

- updating data and information on groundwater basins
- establishing a national institution for desalination
- completing the implementation of desalination, sanitation and sewage treatment projects

7. Protecting water resources:

- assessing the water quality situation
- limiting the depletion of groundwater basins
- preparing and applying standards for the disposal and use of treated wastewater
- controlling the use of chemicals in agriculture
- protecting surface water estuaries
- applying "polluter pays" principle
- use more water-efficient and environmentally safe industrial processes
- requiring environmental impact studies for new projects

8. Recovering the cost of providing water:

- establishing rules for the valuation of water to reflect its true cost
- including the actual cost of water in development calculations
- allocating water for uses that achieve the highest level of social, economic and environmental value
- calculating the true cost of agricultural products

9. Developing human and institutional capacity:

- developing and implementing education and training programmes

- developing funding mechanisms needed to build human and institutional capacity
 - securing sustainable financing of the water sector
 - establishing a National Water Council
 - changing General Water Authority (GWA) reporting relationship
 - reviewing sector governance and legal texts
 - establishing stakeholder consultation
10. Developing water legislation
- reviewing and improving legislation to protect groundwater resources
 - basing legislation on stimulus, motivation and encouragement to serve targeted agricultural policies.

3.1.1.8 Montenegro

The Water Basis (2001) contains:

- a description of the status of water and water management facilities by individual areas
- the conditions for maintenance and development of water resources to ensure the most advantageous and most expedient technical, economic and environmental solutions for uniform water management, protection from the adverse effects of water, the protection of waters against pollution, and water use.

The Water Basis covers all relevant aspects for surface water, groundwater and seawater. It describes all groundwater sources by water basin and includes the capacities of individual groundwater sources, as well as their use, pollution prevention and protection measures. The overall assessment of the state of groundwater shows that its ecological status is good. The main sources of pollution are communal wastewaters, industrial wastewaters, use of fertilizers and intrusion of saline waters in coastal areas.

Chapter 3 of the Water Law provides for the adoption of the Water Management Strategy of Montenegro, which represents a long-term national programme of water management. The Water Management Strategy evaluates the status (disposition, reserves and characteristics) of water resources in Montenegro and includes:

- a description and assessment of the present status of water facilities and systems
- the objectives of sustainable development, and the regulation of waters, achievement of good water status, use and utilization of waters and the time limits for their realization
- conditions in the area of legal and organizational solutions in the field of water
- water requirements in all segments of life and work in Montenegro and the possibilities of ensuring sufficient quantities of water of adequate quality for various purposes
- analysis and measures for overcoming conflict of interest with respect to preceding use, and the regulation and protection of waters and aquatic land

- the measures necessary for preservation of the natural balance of waters (i.e. those required for its restoration and improvement)
- the strategy and conditions for maintenance and enhancement of the water regime, in order to stimulate the uniform and harmonized development of water-related activities in the entire territory of Montenegro
- priorities for achievement of the objectives in water management and in water regime enhancement, the bases for the plan of water use, which determine the strategy for the protection of water against pollution
- the basis for the protection plan from the adverse effects of waters
- water balance
- guidelines for international cooperation and implementation of international agreements in the area of water management
- evaluation and sources of the funds needed to attain the set objectives
- the basic terms of monitoring and information systems for water management in the territory of Montenegro, and other guidelines of importance to water management and to the requirements of the water regime.

However, the preparation of the Water Management Strategy initially scheduled for 2011 was postponed. The current Water Basis from 2001 remains valid.

The National Strategy for Sustainable Development (NSSD) was adopted in 2007, identifying inter alia general sustainable development goals and priority objectives for 24 areas related to economic development, environmental protection and natural resource management, and social affairs.

The NSSD sets the overall framework for application of integrated approaches in managing natural resources (including water and the coastal zone) and in protecting the environment. Priority tasks identified for the sea and coastal zone are introduction of ICZM, and reduction of pollution of the sea and coastal zone. NSSD was the first national document to set specific objectives regarding the proclamation of protected areas in the coastal zone (at least 10% of the coastal zone was to be protected by 2009). An action plan was developed as a constituent part of the strategy that outlined a set of measures, the implementation of which is necessary to achieve identified objectives. An overview of priority objectives for water is relevant for coastal zone management is the next step, to ensure a sufficient quantity of good-quality drinking water and to introduce integrated river basin management, with the necessary legal and institutional changes and improvements in the quality control and monitoring of waters.

The National Strategy for Integrated Coastal Area Management (NS ICAM) (draft document, 2014) for the territory of Montenegro was developed in the framework of the Program of ICZM of Montenegro (CAMP Montenegro). It was realized in the framework of cooperation between the Ministry of Sustainable Development and Tourism and UNEP MAP, and the latter's Regional Centre for Priority Actions Programme in Split (Priority Actions Programme (PAP)/Regional Activity Centre (RAC)).

NS ICAM has been developed with reference to the NSSD and the Mediterranean Strategy on Sustainable Development, as well to the Barcelona Convention and its Protocols and EU guidance documents for marine and coastal environments. The strategy identifies key issues, challenges and strategic goals for ICZM, and comprises a set of operational objectives for each goal, with measures, activities, indicators and partnerships for implementation.

Defining a set of concrete measures and actions in the Action Plan strategy created a dynamic framework to support the implementation of the Spatial Plan for the Coastal Areas of Montenegro (SPCA of Montenegro), and to reform resource management of coastal areas.

3.1.1. Morocco

A national strategy for the water sector was prepared in 2009. The document considers groundwater as a strategic resource for domestic supply. The main principles of the strategy are:

11. Water demand management
12. The strategy aims at more efficient water use and water savings in all sectors by resorting to new technologies, adapted water tariffs, water recycling and developing awareness
13. Water supply management
14. Efforts to improve water supply will continue with the construction of new large and small dams, knowledge development in relation to groundwater resources, the promotion of rain harvesting and desalination
15. Preservation and protection of water resources
16. The protection of water resources relies mainly on implantation of the national sanitation plan and the national solid waste management plan.
17. Special mention is made of preservation of groundwater resources together with reinforcement of controls over groundwater abstraction, limitation of abstraction in over-exploited aquifers and developing artificial recharge
18. Reducing the vulnerability to natural risks related to flooding
19. The strategy aims to implement the National Protection Plan against Flooding, integrating risk management, and developing flooding announcements and safety plans
20. Continuation of legal and institutional reforms
21. The adoption of the water Law in 1995 has left gaps in issues such as management of droughts and floods, recovery of water tariffs, wastewater outflow to the sea and desalination.

3.1.1.10 Palestine

A National Water Strategy for Palestine was adopted in 2014 covering the period until 2032. This presents a detailed and consolidated strategic plan for water resources management, and water supply and sanitation in the West Bank and Gaza Strip. It builds on and is in line with previous plans, policies and strategies, namely the National Water Policy (2012-2023), the Strategy for the Water and Wastewater Sector (2011-2013), the Draft Water Resources Management Strategy (1997), the National Water Policy (1995), Water Sector Strategy Planning Study (2000),

Water National Plan (2000) and the Coastal Aquifer Management Plan (1999-2004). Some aims of the strategy are to:

- reinforce sustainable water resources management and establish a cooperation framework for sustainable development of water supply and wastewater services among the various stakeholders
- increase the quantity of water delivered to citizens
- maximize the volume of water available for irrigation
- provide reliable access to quality water at affordable prices
- reduce inequalities among regions and localities
- improve sanitation to protect natural water resources from pollution and excess depletion.

The strategy includes an overview of the status of the coastal aquifer and concrete objectives to restore it by tackling the root causes of its deterioration. The coastal aquifer underlying the Gaza Strip has been depleted because of the lack of other water sources to the 1.8 million inhabitants of the Gaza Strip, which has been under occupation, severe restrictions and blockade for years by Israel. Abstraction from the coastal aquifer has reached 178 MCM a year, whereas the natural recharge of the portion of the aquifer underlying Gaza is only 55-60 million m³ (MCM) a year. As a result, the water level in the coastal aquifer has declined to about 10-15 metres below sea level, causing intrusion of seawater to large parts of the inland aquifer and upward leakage of saline water. Consequently, the salinity of groundwater in the coastal aquifer has increased significantly to unacceptable levels, and more than 96% of the pumped water exceeds World Health Organization (WHO) drinking standards. It is expected that the groundwater quality of the coastal aquifer will not be fit for use by 2016, and the aquifer system will collapse completely by 2020 if no action is taken to ensure the supply of additional water resources and IWRM.

The water strategy aims to reduce total groundwater abstraction from the coastal aquifer in the Gaza Strip from the current rate of 178 MCM a year to 70 MCM a year in 2032. To achieve this goal, the strategy focuses on increasing the water supply to the Gaza Strip by desalination of seawater as the main additional source, the use of treated wastewater for irrigation and the possible importing of water.

3.1.1.11 Tunisia

Priority activities with respect to groundwater relate to preservation of the resource and improving the management of water demand while promoting a systemic approach; 44% of the water resources to meet expected demand in 2030 are likely to be from underground. The regions of Cap Bon, the Sahel and the central region of the country are the most sensitive to over-abstraction in relation to the succession of dry and wet years and their random natural recharge. In these regions, 27% of the groundwater tables are affected by excessive drawdowns of their levels.

The national strategy for the preservation of groundwater was implemented for the period 2010-2014. The objectives of the strategy were the efficiency, sustainability and preservation of groundwaters. The expected results were:

- improved management of conventional waters
- reinforcement of the fight against pollution.

The national strategy did not consider the effects of climate change on groundwaters, and omitted coastal aquifers.

Part of the Actions planned by the strategy were the revision of the water code and institutional reform. Improvement in the recovery of water fees was also one of the main actions. A programme of training and capacity building focused on groundwater resources. Projects of artificial recharge of some coastal aquifers with conventional water and with treated wastewater were under development, as well as robust management to prevent seawater intrusion.

To limit the over-abstraction of water from aquifers, the use of treated wastewater was encouraged.

The water code was revised during 2014 and was adopted in 2015, although at the publication of the present report this had not yet taken place. This code will include the impact of climate change on water resources and ecological uses such as wetlands.

The Minister of the Environment is developing an environmental code, to be adopted in 2016, which will deal with the preservation and sustainability of groundwaters.

3.1.1.12 Turkey

Water resources management is described in five-year development plans that aim to ensure the optimum distribution of all kinds of resources among various sectors of the economy. The Ninth Development Plan (2007-2013) aims to increase the percentage of irrigated areas as investment opportunities are favourable. Turkey's water policy can best be characterized by its wish to:

- gain independence from imported energy sources
- increase production levels of agriculture and to achieve food security
- satisfy increasing water demand from industry, urban and rural populations
- correct regional economic and social imbalances in the country, thus raising the living standards of the population.

3.1.2 National legislation

3.1.2.1 Albania

The legal framework for water resources in Albania is composed of:

- Law No. 10431, dated 9 June 2011, On Environmental Protection⁵

- This Law provides a water quality standard to prevent, control and reduce pollution in the water. It elevates the obligation for environmental protection to a higher level from the laws related to this field that were enacted between 1993 and 2002.
- It specifies protection and improvement of environment and quality of life, and provisions for Albania's sustainable development. The Law refers to issues such as water resource protection, water quality norms and standards, and air and soil protection. It also deals with the goals and principles of EIA, the relationship of EIA to technical designs, and establishes the National Environmental Agency (NEA) as the competent authority in relation to environmental permits. The Law also underlines the obligation of any state or private entity to invite public and other interested parties to participate in activities related to environmental protection.
- The Law provides the principles of "polluter pays" and of "recovery of the costs".
- Article 48 of the Law contains provisions on access to justice, and guarantees individuals and organizations the right to bring cases to court when there has been damage, pollution or a threat to the environment. The public has the right to ask the relevant public authorities to take appropriate measures within the prescribed deadlines, and a lawsuit may be filed in court against a public authority or any natural legal person causing damage to the environment.
- Criminal penalties for breaches of environmental law are defined in the Penal Code of the Republic of Albania.⁶
- Law No. 111/2012, dated 15 December 2012, On integrated management of water resources⁷
- This Law provides protection of water sources, distribution and efficient administration of water, and defines the institutional framework for administration and management of waters, for community benefits and the socioeconomical interest of the country. It refers to the Law on Environmental protection of 2011, in part related to environmental permit procedures for water extraction.
- The Law defines the Protected Areas, and provides a structure of them (composed of First Protected Area, Closed Protected Area and Remote Protected Area) including lists of prohibited activities for each of them. The Law defines that the Water Basin Agency is the responsible institution for monitoring surface and groundwater bodies to be used for drinking water supply.
- The Law focuses on:
 - (i) Environmental protection and improvement of water, surface water, internal seawaters, territorial waters, exclusive economic zones, continental shelf, transboundary waters, groundwater and their status
 - (ii) Security, protection, development and rational utilization of water resources
 - (iii) Equitable distribution of water resources

⁵ Amended by Law No. 31/2013 "For changes and additions on the Law No. 10431, dated 9.6.2011 "On Environmental Protection" which fully complies with Directive 2004/35/KE of the European Parliament and Council dated 21 April 2004 on "Environmental Liability, Prevention and Rehabilitation of Damage on Environment"

⁶ Law No. 7895 dated 27 January 1995, The Penal Code of the Republic of Albania, details Crimes against the environment.

⁷ Fully complies with EU Directive 2000/60/EC of the European Parliament and of the Council dated 23 October 2000, Establishment of a framework for Community actions in the field of water policy.

- (iv) Protection of water resources from pollution and overuses
 - (v) Determination of the institutional framework, at national and local level, for the implementation of a national policy for the administration and management of water resources.
- Law No. 8102, dated 28 March 1996, On regulatory framework for water supply, removal and treatment of waste waters⁸
 - It specifies the establishment of a regulatory framework and an independent regulatory entity for water supply and removal or treatment of polluted waters. It also provides the functions, competences, procedures and standards under which the Regulatory Entity will operate.
 - Law No. 9115, dated 27 April 2003, On environmental treatment of polluted waters⁹
 - This Law provides for the treatment of polluted industrial and urban waters. The Law establishes a separate licence system on requirements, terms and conditions for construction sites of plants, and installations for water purification operations. The purpose of this Law is to protect the environment and human health from the negative impact of polluted waters, by setting rules for environmental treatment of such waters and defining binding obligations upon subjects who discharge polluted waters into the environment.
 - Regarding this Law, the Council of Ministers approved Decision of the Council of Ministers (DCM) No. 177, dated 31 March 2005, On permitted norms for liquid discharges and criteria for environmental zoning of rivers or sea waters, which defines measurable and controlled discharges coming from the water treatment plant.
 - Water resources were also regulated by Law No. 8093, dated 21 March 1996, Law on water resources¹⁰
 - It provides a comprehensive framework for water resources management in Albania. The Law on water resources (LWR) defines the legal status of water and water state, the activities and organization of water management, conditions for water use, water protection, development, sustainable use and distribution of water resources, protection from pollution and other issues relevant for water management. The Law contains provisions on the preparation of a national water strategy (NWS) and requires the preparation of national and river basin water resources plans. The goals and objectives of the NWS are laid down in the Law as follows: The NWS is the definition of national objectives in the field of water resources and institutional structures for implementation of the strategy. It indicates the way to fulfil the requirements of the different water uses and identifies programme and priority projects, while promoting water resources conservation and sustainable use of water resources. River Basin District Management Plans: According to the LWR, a river basin water resources plan must be prepared for each basin.
 - This Law sets out the standards for drinking water quality, and a regime for the regulation of sewerage works and the discharge of water wastes.
 - Law No. 8905 dated 6 June 2002, On protection of the marine environment from pollution and damage¹¹
 - It provides for protection of the marine environment from pollution and damage, by preventing human damage in the sea and coastal zone.
 - The Law contains a water permit, which is the permission required for using water according to the following seven main purposes:
 - by means of permanent installations
 - irrigation
 - livestock
 - aquaculture
 - industrial use of water
 - use of underground water for different purposes, including domestic
 - removal of solid material from banks and beds of rivers, streams and reservoirs, with or without water.
 - The Law provides for the use of water for public purposes, including potable water supply and hydropower generation, on the basis of a concession issued by the National Water Council (NWC). Water use permits are issued by the River Basin Councils (RBCs) and are issued for a period not exceeding 5 years, except for permits on water users' associations, which are issued for not longer than 10 years.
 - Law No. 8906, dated 6 June 2002, On protected areas¹²
 - This provides for management, and ensures sustainable use of protected areas and their natural and biological resources. The Law establishes six categories of protected areas (including marine and coastal zones) and their definition. According to this, the management of water in a protected area shall be the responsibility of the administration in charge of the area. The administration of such activities shall be exercised directly or through an authorized subject. In cases when these properties are in private ownership they shall be managed and utilized by the owner and legal user, providing that this management is in compliance with area management plans approved by the Ministry of Environment.
 - Law No. 9103, dated 10 July 2003, On the protection of transboundary lakes¹³
 - The Law concerns the environmental protection of transboundary lakes in their natural state, guaranteeing appropriate conditions for the development of life and ecosystems in these lakes, through the promotion of useful activities and preventing activities that threaten them.
 - The Law defines the prohibited actions in the transboundary lakes and in their watersheds, the environmental permit for activities on these lakes, and the tariffs for obtaining the environmental permit and other relevant licences.

8 Amended by Law No. 9915, dated 12 May 2008, For changes and additions on the Law No. 8102, dated 28 March 1996.

9 Amended by Law No. 34/2013 dated 14 February 2013, For changes and additions on the Law No. 9115 dated 27 April 2013.

10 Amended by Law No. 10137, dated 11 May 2009, For changes and additions on Law No. 8093, dated 21 March 1996.

11 Amended by Law No. 30/2013, dated 14 February 2014, For changes and additions on the Law No. 8905 dated 6 June 2002.

12 Amended by Law No. 9868, dated 4 February 2008, For changes and additions on the Law No. 8906, dated 6 June 2002.

13 Amended by Law No. 35/2013 For changes and additions on the Law No. 9103, dated 10 July 2003.

- The Law also provides an inventory of species and their habitats in the transboundary waters and watersheds, to protect them from danger of extinction.
- This Law is implemented in the following transboundary waters and respective watersheds:
 - the Albanian part of Shkodra Lake
 - the Albanian part of Ohrid Lake
 - the Albanian part of Prespa Lake.
- The Law also includes sanctions in case of violations of its provisions.
- Law No. 9663, dated 18 December 2006, On Concessions
- This regulates procedures for granting concessions for use of natural resources, including water resources used for hydropower production, distribution and management, and for the collection, distribution and management of water for irrigation, drainage and cleaning of canals and dams.
- Law No. 9587, dated 20 July 2006, On the protection of biodiversity¹⁴
- The Law defines the protection of biological diversity. It regulates the sustainable use of its elements through integration of the main elements of biodiversity in strategies, plans and programmes, and at all levels of decision-making. The Law includes aquatic and marine areas, and the diversity of living organisms in these areas, by implementing a National Strategy Plan (to be adopted every 10 years) and the Action Plan for biodiversity. It establishes an inventory and monitoring networks, and penalties for unexpected harm to the environment that can form a threat to biodiversity.

3.1.2.2 Algeria

- Water Law no. 05-12 (4 August 2005) governs “the use, management and sustainable development of water resources as the good of the national community” (article 1) with the objectives of ensuring:
 - water supply in quantity and quality for domestic needs, agriculture and industry
 - preservation of public health and protection of water resources from pollution
 - evaluation of surface and groundwater resources
 - flood control.
- The Law applies the following principles:
 - the equitable right to water and sanitation
 - the right to use water resources within the limits of the general interest
 - consideration of the effective cost of water supply in water tariffs
 - systematization of water savings practices
 - a participatory approach.
- Water (including groundwater) is part of the natural hydraulic public domain. The Law includes the following measures for

the protection and preservation of water resources (articles 30-55):

- perimeters of quantitative protection, relating to over-exploited or threatened aquifers (ruled by decree no. 10-73, 6 February 2010)
- plans to fight water erosion
- qualitative protection perimeters established around vulnerable parts of aquifers
- measures to prevent and protect against pollution. Only non-toxic discharges of effluents are allowed, after authorization by the administration in charge
- measures of prevention against floods.

The following decrees refer to groundwater resources:

- Decree no. 10-25 (12 January 2010) relating to the modalities of granting a concession in view of the autonomous supply of industrial zones from surface and groundwater
- Decree no. 10-317 (21 December 2010) on withdrawal of surface and groundwater for sampling and analysis
- Decree no 10-318 (21 December 2010) on the modalities of granting a concession of water use from fossil aquifers or with very little recharge
- Decree no. 11-219 (12 June 2011) setting quality objectives for surface and groundwaters intended for domestic use.

Other decrees relate to groundwaters without mentioning them explicitly, such as Decree no. 07-399 (23 December 2007) relating to the qualitative protection perimeter on water resources; Decree no. 08-48 (31 May 2008) setting out the granting modalities of authorizations for water use; or Decree no. 10-88 (10 March 2010) setting out the conditions and modalities of granting authorizations for discharging non-toxic effluents into the public hydraulic domain.

3.1.2.3 Bosnia & Herzegovina

There is no legally binding Act relating to water at the State level, with the exception of the Rulebook on the health safety of drinking water (Official Gazette of BiH No. 40/10, 43/10 i 30/12).

3.1.2.3.1 F BiH Water Law

The Water Law prescribes measures for water management, protection and use; protection against deterioration of the water; regulation of watercourses and other waters; establishment of the water information system; and issuing of water Acts.¹⁵

Water is defined as a common good and as such is under special protection.¹⁶

Water management is defined within two river basin districts: Sava River Basin District and the Adriatic River Basin District.

This Law regulates all categories of water, including groundwaters. The Law on Water classifies all surface waters as Category I waters (in this case, the Federation of BiH is the owner

¹⁴ Amended by Law No. 9587, dated 20 July 2006, For changes and additions on the Law No. 9587, dated 20 July 2006.

¹⁵ Article 1 of the Water Law, “Official Gazette of FBiH”, No. 70/06.

¹⁶ Article 3, Paragraph (1) of the Water Law, “Official Gazette of FBiH”, No. 70/06.

of public water property for these waters) and Category II waters (in this case, the owner of public water property is either the city or the municipality, unless regulated otherwise by the Cantonal regulations).

The Law defines some notions, such as:

- groundwater: "all waters under the ground surface in saturated zone, which are in a direct contact with surface and ground soil layers"¹⁷
- coastal water: "surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters"¹⁸
- aquifer: "subsurface layer or crevices in the rocks or other geological formations of such porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater".¹⁹

Article 49 of the Law implies that use of water from the source and groundwater for purposes other than for basic needs of a household can be approved only if water research activities (availability, extent, quantity and quality) are previously performed.

Any water use exceeding the volume of general use (abstraction of groundwater on one's land for basic needs) falls under the provision of article 47 which implies the obligation to obtain a water permit.²⁰

The Law gives priority for drinking water supply, sanitary needs and fire protection over needs for irrigation, power generation and other energy purposes, fish farming, navigation and sport use.

It is forbidden to discharge wastewater into a natural lake, pond, swamps and other natural water reservoirs, and it is prohibited to discharge wastewater directly into groundwater.

A water authorization shall be obtained for the following activities (inter alia):

- abstracting water in all branches of economy and activities
- discharging wastewater into surface waters
- indirect discharging of wastewater into groundwater
- artificial recharging of groundwater
- constructing flood protection structures.

In addition to the above-mentioned activities, a water authorization shall also be issued for activities that may:

- temporarily or permanently cause deterioration in the water quality, or impede the improvement of the existing quality
- have an adverse impact on aquatic or semi-aquatic ecosystems

- increase the risk of flooding or erosion
- significantly reduce water quantities, change the morphology of a watercourse, impede the recreational use of surface waters, etc.

3.1.2.3.2 Cantons and their regulations

While the FBiH is in charge of adopting the regulations on the quality of water intended for human consumption and the regulations on effluents, the cantons are responsible of the use and maintenance of the infrastructure for drinking water purposes and elimination of wastewater. Each of ten cantons in FBiH has adopted its Water Laws and established ministries specifically for waters, or has assigned water issues to some other ministry (economy, environment, etc.).

3.1.2.3.3 RS Water Law

This Law includes all categories of water including:

- groundwaters: "all waters under the ground in the saturated zone, which are in a direct contact with surface and ground soil layers"
- aquifer: "water layer under the surface of soil or other geological status of sufficient porosity and permeability which allow either a significant flow of ground water, or extraction of significant quantities of groundwater".

Water use and wastewater discharges follow the same conditions as in the Water Law of FBiH.

According to the Water Law, the Ministry of Agriculture, Water Management and Forestry of RS is entitled to issue regulations on the limiting values of pollutant substances in wastewater, on other requirements related to wastewater discharge in surface water, soil and the public sewage system, and on other dangerous substances whose discharge into water is prohibited, and soil that belongs to water goods, forest and agricultural land.²¹

For the purpose of managing waters in the territory of RS, Regional River Basins were established on the basis²² of the Water Law provisions:

- Regional River Basin of Sava river
- Regional River Basin of Trebisnjica river.

3.1.2.3.4 BDBiH Water Law

According to the Law on Water of Brčko District of Bosnia and Herzegovina (BDBiH)²³ the notion "waters" implies all waters, natural and artificial, surface and groundwater.

As defined by this Law, protection of water and water ecosystems includes both surface and groundwater; special prohibitions and restrictions in protected areas; control and collection of data related to water protection and other measures.

17 Article 4 Item 3 of the Water Law, "Official Gazette of FBiH", No. 70/06.

18 Article 4 Item 5 of the Water Law, "Official Gazette of FBiH", No. 70/06.

19 Article 4 Item 22 of the Water Law, "Official Gazette of FBiH", No. 70/06.

20 Article 47 of the Water Law, "Official Gazette of FBiH", No. 70/06.

21 Article 67 of the Water Law, "Official Gazette RS", Nos 50/06 and 92/09.

22 Article 23, Paragraph 2 of the Water Law, "Official Gazette RS", Nos 50/06 and 92/09.

23 "Official Gazette of BDBiH", Nos 25/04, 1/05 and 19/07.

The Government of Brčko District of BiH is entitled to set limiting values for chemical, physicochemical and biological parameters for bathing waters and drinking, and for mineral, and thermal and thermo-mineral waters.

A direct discharge of wastewaters into groundwater is forbidden and a direct discharge of wastewaters, emission of heat into groundwater and absorption of heat from groundwater can be performed only under the conditions prescribed by the Law. It is also stipulated that it is forbidden to use water that degrades the chemical and ecological state of waters in natural lakes, fishponds and other natural bodies after accumulations with permanent and periodical inflow and outflow into/out of the surface and groundwater.²⁴

The authorized agency determines protected areas with the purpose of protecting water flows or parts of water flows, and protection of groundwater flow, so the water is usable for drinking water, for bottling of natural water and for the usage of mineral, thermal and thermo-mineral water for production of drinks.

The authorized agency defines protected areas with the objective of protecting water sources, and groundwater for drinking water supply, for bottled water and the use of water in the production of drinks.²⁵

3.1.2.4 Croatia

3.1.2.4.1 Water Act (OG 153/09, 63/11, 130/11, 56/13 and 14/14)

The Water Act regulates the legal status of waters, management of their quality and quantity, protection from the adverse effects of waters, the activities of public water supply and public sewerage, and any special activities for the purposes of water management. The Act also deals with the institutional organization of performing these activities.

The Act applies to:

- groundwaters and surface waters excluding coastal waters
- coastal waters in terms of their protection
- waters of territorial seas in terms of their chemical status and in relation to the deposits of drinking water
- mineral and thermal waters, except mineral and geothermal waters suitable for extraction of mineral raw materials or utilization of accumulated thermal energy for energy purposes, which is regulated by the Act on Mining.

According to article 7 of the Water Act, waters are a common good and may not be the object of rights of ownership and other property rights.

One of the principles of water management is that protection and use of water shall be based on the precautionary principle, undertaking preventive measures, rectification of damage

caused to the water environment at the source, and the “polluter pays” or “user pays” principles.

Pursuant to the Water Act (article 76) anyone is allowed to use water for private use in a manner and quantity that does not exclude others from the same use (general water use). General water use includes in particular abstraction of surface water and groundwater from the first water-bearing layer for household purposes, and use of surface water for bathing, sport and recreation, and other similar purposes.

Each water use exceeding the extent of general water use needs a concession agreement, or water rights permit for water use, setting out the conditions and limits of use for water users.

The domestic water supply and the supply of water for fire protection and prevention shall have priority over other water uses.

Pursuant to the Water Act (article 36) a River Basins Management Plan shall for each river basin district specifically include a description of the natural characteristics and the water status. For groundwater the requirements are, specifically:

- an overview of the location of the water bodies and their boundaries
- a description of their characteristics
- an assessment of pollution from diffuse sources including an overview of the significant impacts on the aquatic environment
- a summary of the most significant pressures and impacts of human activity on the status of groundwater
- a monitoring programme, including a monitoring network map depicting the results of monitoring groundwater and protected districts in relation to water status
- a list of quality objectives for groundwater and the deadlines for accomplishing them.

Pursuant to article 41 of the Water Act the water quality standards for, inter alia, groundwater shall be specified by a regulation which shall contain chemical and quantitative indicators for groundwater.

It is also prescribed that systematic monitoring of water status shall be conducted and monitoring shall cover the indicators needed for the establishment of quantitative and chemical status for groundwater (article 44).

A classification of the water bodies shall be made, based on the monitoring results upon which an assessment shall be made of the status of each particular water body (article 46).

For each river basin a programme of protection measures of, inter alia, groundwater shall be prepared and it shall be a part of the RBMP. Exemptions will be described in detail for exceptionally allowed discharges into groundwater (article 47).

A regulation prescribing the emission limit values for wastewater shall be enacted, and it will mention the exceptionally allowed discharges into groundwater (article 60). Otherwise the direct discharges of pollutants into groundwater are forbidden (article 64).

²⁴ Article 23 of the Water Law “Official Gazette of BDBiH”, Nos 25/04, 1/05 and 19/07.

²⁵ Article 35 of the Water Law “Official Gazette of BDBiH”, Nos 25/04, 1/05 and 19/07.

Cases of limitations of water use are specified, such as:

- if a temporary water shortage occurs to such an extent that it is not possible to satisfy the needs of all users in a given area
- if it is established that the reserves of bodies of groundwater or surface waters from which water is abstracted for the purposes of public water supply are reduced to such an extent that there is no possibility of their further abstraction or that there is danger of their total exhaustion
- if, due to current water abstraction, the chemical status of a body of water has deteriorated or might deteriorate
- if the reduction in the level of bodies of groundwater has threatened aquatic and forest ecosystems (articles 81-83).

Pursuant to the article 157 of the Water Act, a water rights permit for water use shall be issued for every use of water exceeding the limits of general water use and free use of water, except for water use for which a concession under article 163, paragraph 1 of the Water Act is issued or for use under article 158 of the Water Act.

3.1.2.4.2 Water Management Financing Act (OG 153/09, 90/11, 56/13 and 154/14)

The Act regulates the sources of funds for the financing of water management, and in particular water fees paid by the users of the water system or water polluters, including payment obligation, base for payment, method of calculation, determination of the fee rate, spending purposes of such funds, enforcement and other issues related to realizing and using such funds.

Legal and natural persons abstracting water from surface and/or groundwater bodies will pay a water use fee.

3.1.2.4.3 Groundwater/coastal aquifers regulations

- Ordinance on the conditions for identifying sanitary water source protection zones (OG 66/11 and 47/13)

The Ordinance stipulates the conditions for the determination of sanitary water source protection zones which are used for public water supply, and the measures and limitations taken therein.

Sanitary protection zones are identified by the type of aquifer for sources with groundwater abstraction and for sources with surface waters abstraction. Regarding sources with groundwater abstraction, there are two types of aquifers: intergranular aquifers and aquifers with fracture and fracture-cavernous porosity. According to the type of aquifer, sanitary water source protection zones are classified:

- zone of strict protection and supervision regime
- zone of strict limitation and supervision
- zone of limitation and supervision
- restriction zone.

The purpose of identifying sanitary water source protection zones is to reduce the risk of groundwater pollution by heavily degradable hazardous and polluting substances, or to reduce the risk of groundwater pollution by pathogenic microorganisms and other adverse effects that may occur

during the retention of water in the subsoil; and to protect sources, water-abstraction facilities and their surroundings from any damage, water pollution and other accidental or intentional adverse effects, to protect facilities and plants for water abstraction, etc.

3.1.2.4.4 Ordinance on wastewater emission limit values (OG 80/13, 43/14 and 27/15)

The Ordinance sets:

- the emission threshold values in industrial wastewater before discharge into the public sewage system, and of the wastewater discharged into the water
- the conditions of temporary permission of discharges above the prescribed amount
- the emission threshold values
- criteria and conditions for collection, treatment and discharge of urban wastewater and exceptionally allowed discharges into groundwater
- methodology of sampling and testing wastewater composition
- wastewater sampling and testing frequency
- a register form for discharged wastewater
- a register form for chemicals placed on the market for use in water in the territory of the Republic of Croatia
- form and method of keeping registers
- deadlines, detailed contents and methods for submitting data, etc.

3.1.2.4.5 Regulation on water quality standards (OG 73/13 and 151/14)

The Regulation stipulates water quality standards for surface waters, including coastal waters and territorial seawaters and for groundwater, the specific objectives for water protection, the criteria for identification objectives, water protection, the conditions for the extension of the deadlines for achieving the objectives of water protection, the elements for the assessment of water status, monitoring of water status and reporting on water status. The Regulation defines the following specific objectives for groundwater protection:

- prevention or limitation of the input of pollutants into groundwater and prevention of deterioration of the status of all bodies of groundwater
- protection, preservation and restoration of all bodies of groundwater, and ensuring a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater status
- alteration of any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater.

3.1.2.5 Egypt

In Egypt water falls under the following laws:

3.1.2.5.1 Law 12/1984 on irrigation and drainage

The Law regulates the use of water, including groundwater. It controls water rights, sets priorities between users, defines beneficial and harmful water uses and regulates financial aspects and penalties. The Law was amended by Law 213/1994 which legalizes private Water Users' Associations at the field irrigation canal "mesqa" level. It further includes provisions for the recovery of capital costs for improved irrigation facilities at the mesqa level over a period up to 20 years. The Law defines the use and management of public and private sector irrigation and drainage systems including main canals and drains. It also provides legal directions for the operation and maintenance of public and private waterways, and specifies arrangements for cost recovery for irrigation and drainage services.

According to this Law, the MWRI controls the land needed for irrigation. The Ministry is also responsible for determining the flow of water and the pattern of rotation among canals. No one may dig a well, or install a pump or waterwheel (saqiyya), without permission.

3.1.2.5.2 Law number 213, 1994

This Law provides the MWRI with the legal basis for participation of farmers in the operation and maintenance of the irrigation system at the field canal "mesqa" level. It regulates the establishment of a fund to finance projects related to irrigation improvement at that level. The Law was issued originally for water use on the lands newly incorporated into the irrigation system, and was adapted to include water users on lands that had previously been included. The Law regulates the establishment of Water Users' Associations and Water Boards. It also regulates cost recovery rules, and specifies the various penalties for violations of rules and regulations.

The legislation was primarily intended to address irrigation, being the dominant water use sector. Other sectors of water use are not specified. No priority rules are given in case of conflicts between various categories of water use sectors. The Law does not provide an adequate legal basis for the involvement of stakeholders.

The current applicable Law 12/1984 and its supplementary Law 213/1994 define groundwater aquifers and their use, protection and management. According to these Laws the Ministry of Water Resources and Irrigation is responsible for licensing well construction.

3.1.2.5.3 Laws relating to groundwater in Egypt

In Egypt, there is no specific, independent law for groundwater.

- Existing groundwater legislation
- Groundwater is recognized in Law No. 48/1982 (Article 1-C) and its supplementary Decree 8/1983 (Article 1-11) as one of the categories of water bodies in the country. Article 2 of Law 48/1982 and Articles 5&6 of its supplementary Decree 8/1983 set the legal basis for discharge of effluents into the water system and specifies quality standards for water bodies and related activities.

- Article 61 of supplementary Decree 8/1983 set the legal basis concerning the standards and licensing for draining liquid industrial wastes into freshwater bodies and groundwater reservoirs, as determined by the Ministry of Health.

3.1.2.5.4 Need for new groundwater law in 2010

A new law related to groundwater was developed in 2010. It has 35 articles with the following content structure:

- Chapter 1: Definitions
- Chapter 2: Licensing of new wells
- Chapter 3: Wells in violation of the regulations
- Chapter 4: Amendment of licences for existing wells
- Chapter 5: Groundwater wells monitoring and protection from pollution
- Chapter 6: Penalties

3.1.2.6 Lebanon

Under the French mandate (1918-1943) the following laws were adopted and are still in force:

- Order no. 144/S (10 June 1925), related to the public domain
- Order no. 320 (26 May 1926), related to the protection and use of the national waters. According to this order, the exploration and channelling of groundwater needs an authorization. No authorization is needed for the use of water from a well on a private property when the flow is less than 100 m³/day
- Order no. 3339 (12 November 1930), on the real estate code
- Provisions from the Mejlle (Ottoman civil code)
- Decree no. 14438 from 2 May 1970, organizing the exploration and use of groundwaters. The decree requires a permit before any groundwater exploration works or well drilling of more than 150 m depth takes place. A declaration is sufficient when the depth of the well is less than 150 m. Ministerial order no. 118 (13 September 2010) defines the administrative procedure for the permits. Five categories are identified for the wells: domestic, industrial, touristic, irrigation and "various". The procedure for the permits for the water use is also defined. The order also provides for the regularization of illegal wells
- Law no. 221 (29 May 2000), organizing the water sector. Amended by Law no. 241 (7 August 2000) and Law no. 377 (14 December 2001)
- Master management plan of the Lebanese Territory (Decree no. 2366, 20 June 2009), which rules for spaces under constraints (natural risks and vulnerability of water resources).

A draft water code was prepared, but has still not been adopted.

In Lebanon water is a public property, of which groundwater is a part, with the exception of rights acquired previous to Order no. 144/S (10 June 1925).

3.1.2.7 Libya

Law No. 3, 1982 (The Water Code), clearly defines the ownership of water, responsibility of control and management, licensing for drilling, exploitation and use, pollution control and penalties. Under Law No. 3, 1982, water is a public ownership and can only be exploited by a licence that defines the amount and duration of use. A region that witnesses over-exploitation resulting in heavy drawdown and deterioration in quality is declared a prohibited zone for further development. The "polluter pays" principle is clearly stated in the water law, along with necessary protective measures.

Complementary legislation that is directly or indirectly related to water conservation is in force. In addition, several decrees and decisions by the Council of Ministers and the Ministry of Agriculture and other concerned ministries have been issued. Among the laws and regulations of importance are:

- Law No. 142, 1970, on the tribal lands and wells
- Law No. 8, 1973, on the prevention of sea pollution by oil
- Law No. 112, 1973, on water well drilling
- Law No. 106, 1976, on the issuance of the health law
- Law No. 2, 1979, on economic crimes
- Law No. 2, 1982, on regulation of the use of ionizing radiation and the prevention of risks
- Law No. 3, 1982, on regulation of the exploitation of water resources
- Law No. 5, 1982, on the protection of rangelands and forests
- Law No. 7, 1982, on environmental protection (superseded by Law no. 15, 2003)
- Law No. 1, 1983, on the creation of the agricultural inspection force
- Law No. 13, 1984, on special hygiene provisions
- Law No. 17, 1985, on the regulation of grazing
- Law No. 14, 1989, on the exploitation of marine wealth
- Law No. 15, 1989, on the protection of animals and trees
- Law No. 15, 1992, on agricultural land protection
- Law No. 15, 2003, on the protection and improvement of the environment.

The protection of water resources in general and groundwater aquifers in particular is given unique attention by Libyan legislation as evident from both the Water Law (Law No. 3, 1982) and the Environmental Protection Law (Law No. 15, 2003).

Article (6) of the Water Law prohibits the disposal of solid or liquid wastes in water bodies. It obliges the Ministry of Agriculture to:

study in collaboration with concerned authorities, all sources of water pollution and propose necessary procedures for the control and removal of such pollution and to take necessary measures for treatment of discharge or use of polluted water for suitable purposes.

The protection of water resources is stressed in Article (5) of the Water Law which links the right of use of all water resources to the condition of introducing no damage to either their quantity or quality.

Article (9) of the same Law indicates that if a groundwater reservoir undergoes reduction or deterioration in the quality or quantity of water, the Ministry of Agriculture shall put the area under strict control and/or stop drilling operations and abstraction of additional water. However, if the deterioration is severe, the area will be subjected to a restricted water distribution system or absolute ban of additional water use depending on the local hydrogeological conditions.

Article (14) of the Water Law states that in case pollution is caused by the act of a person or body, that person or body shall bear the expenses for treatment and removal of such pollution.

Chapter 3 of the Executive Regulation of the Water Law (Decision No. 790, 1982) is dedicated to the criteria and rules of water use and prevention of pollution.

Article (34) of the Executive Regulation for the Water Law states that "The Licensee for water use shall take necessary measures to prevent exposure of potable water, mineral water, or water used in foodstuff industries to pollution or deterioration in quality".

Health authorities at municipal level are required to take necessary measures to isolate and treat polluted water resources.

The GWA may suspend or cancel the licence of anyone causing poisoning or pollution of drinking water.

Article (55) defines water pollution and requires licensees to take necessary measures for preventing it. All concerned authorities are required to isolate and treat polluted water for reuse.

No disposal of solid or liquid wastes is allowed without proper permission from the GWA. GWA is entrusted with detecting pollution cases and setting procedures required for wastewater discharge.

The new Environmental Protection Law (Law 15, 2003) dedicates a full chapter (Chapter 4) for the protection of water resources. Article (41) points out the importance of the cautious use of aquifers to ensure no intrusion of seawater or water from other formations of higher salinity or lower quality. Article (45) states that dumping or disposal of any waste that would cause direct or indirect water pollution is prohibited. Article (46) states that executive regulations and decisions of this Law will determine the bodies responsible for the disposal of liquid, solid and gaseous waste and the processing methods and the standards and specifications to be met which ensure the safety of water sources from pollution. Article (47) indicates that the disposal of liquid waste in places not connected to a sewerage network should be conducted according to approved technical specifications.

To cope with the quick changes in groundwater conditions in highly populated areas and areas of intensive groundwater abstraction, the government issued numerous regulations to protect and ensure proper use of water resources.

In accordance with the Council of Ministers Decree No. 791 for the year 1982, Libya is divided into five hydrographic zones (regions). The decree defined certain rules and regulations to address specific cases:

- Covering additional water demand for the existing or new projects within the Gefara Plain and the western coastal belt by extracting additional water from the first aquifer is totally prohibited. Water needed for such projects must be provided from other sources such as deep aquifers or seawater desalination (Article 3A)
- Drilling new or substitute water wells in the Gefara Plain region and the surrounding mountain areas is totally prohibited. It is, however, possible to grant licences to those farmers who apply the state-directed agricultural policy rules, which permits them to share existing water resources close to their farms. If it is technically impossible to provide any farmer with water from an existing source, a licence can be granted for a substitute water source if the following two conditions are met:
 - The farmer must have a licence for the water source already existing in his farm
 - The farm area should be at least 5 ha (Article 3B)
- The Benghazi plain area is put under “restricted water use” and drilling new production wells in the northern part of the Benghazi plain is totally prohibited. Licences for new drilling in the southern part of the Benghazi Plain can however, be granted under very strict conditions, and in accordance with the regulations set by GWA (Article 3C)
- Additional groundwater abstraction from the first aquifer in the area between Khoms and Misurata is totally banned, with the possibility of granting licences for substitute sources when certain conditions are met (Article 3D)
- Additional groundwater abstraction from the El-Marj Plain area is put under an “absolute ban” (Article 3E).

Water utilization for agricultural purposes is regulated as follows:

- Crop water requirement must be accurately determined through appropriate technologies, introducing improved irrigation practices, to secure high productivity with minimum quantities of water (Article 4A)
- Whenever possible, deep aquifers must be tapped to reduce pressure on the exhausted shallow water table aquifers, in addition to following collective irrigation systems to preserve water (Article 4B)
- Farms, irrigation networks and related water installation in all agricultural reclamation projects must be designed on the basis of collective irrigation (Article 4C)
- Collective irrigation have to be implemented first in the zones of water shortages as a result of continuous depletion in groundwater levels of the shallow aquifers, as well as in zones affected by seawater intrusion (Article 4D).

Controls on domestic water use:

- Pumping of groundwater in excess of the present rate of production for fulfilling domestic water demand of coastal cities is not permitted (Article 5A)
- Necessary measures must be taken to study the coverage of present and future water demand for coastal cities by desalination water (Article 5B).

Controls on industrial water use:

- Water demand for industrial projects should be met by seawater desalination or through deep aquifers either directly, or after treatment if necessary (Article 6A)
- No licences are granted for the use of potable water in the injection of oil wells (Article 6B).

The Decree also states that:

- emphasis is placed on the study of major groundwater aquifers, to assessment of the water balance and to determination of extractable volumes (Article 8A)
- GWA branches shall monitor well productivities and water level fluctuations to predict, with a high degree of accuracy, the possible changes in aquifer conditions. All production wells should therefore be equipped with water meters (Article 8B).

3.1.2.9 Montenegro

The Water Law (Official Gazette of the Republic of Montenegro, No. 27, 2007) regulates the legal status and means of integral management of waters, wetlands, coastal lands and water facilities; the terms and conditions for implementation of water management activities; and other issues related to implementation of management of water and water good.

As a legal framework, primarily in the water protection domain, the Law establishes main principles of waters and water management so they:

- prevent deterioration and protect and enhance the status of aquatic ecosystems, terrestrial ecosystems and wetlands directly, depending on the aquatic ecosystem
- ensure the good status of waters
- encourage economic and social development
- protect and improve the ecosystems through specific measures for the progressive reduction of pollutions of the priority hazardous substances
- promote sustainable water use based on long-term protection of available water resources
- ensure progressive reduction in pollution of groundwater and prevents its further pollution
- contribute to mitigating the effects of floods and droughts
- contribute to provision of a sufficient supply of good-quality surface water and groundwater to permit sustainable, balanced and equitable water use; a significant reduction in pollution of groundwater; the protection of territorial and coastal waters; and achieving the objectives fixed by relevant international agreements
- ensure public participation in making decisions related to waters
- create the conditions for meeting international obligations in the area of waters
- prevent and resolve conflicts related to water use and water protection.

To accomplish the above objectives, and others, in accordance with the Law, good management is to be based on the following principles:

1. The irreplaceable character of water as a resource and a condition for survival. As a natural public good, water must only be used in a way that does not endanger its substance nor exclude its natural role
2. Completeness. Natural processes, which have water as their significant component – as well as the connections and interrelations between aquatic and riparian ecosystems – must be respected
3. An integrated water system. The need for integral water management in a united water area in line with the development of the Republic and establishment of an integrated water information system; respecting the international agreements with the other countries in the basin regarding sustainable water management
4. Sustainable development, whereby the needs of present generations are met without threatening the ability of future generations to meet their own needs
5. Long-term protection of water quality and sustainable use of available water sources
6. The right to protection against adverse impacts of water following the need to protect the population and its assets, respecting the laws of natural processes, protecting natural values and economic justifications for protection
7. Economic evaluation of waters, which incorporates full recovery of costs of water production and treatment for different users; water regulation and protection from pollution based on the “user pays” and “polluter pays” principles
8. Continuous water management. Waters must be managed consistently at all levels of planning and at all stages of water regulation, use and protection
9. Public participation in the processes of preparation and adoption of water management plans
10. Adoption of the best technologies available and new scientific developments related to the laws of nature.

Water, being a natural resource and an asset of common interest, is state property (article 6). The Ministry of Agriculture and Rural Development is competent to manage water-related activities. The management of water of importance to the state is within the competence of the responsible administration authority (the Water Administration), and the management of water of local importance is within the competence of the local self-government (municipality), which aims at creating the conditions for a more significant participation of local self-government in water management. The following two water basins are the basic units for water management in the country: the water basin of the Adriatic Sea catchment area and the water basin of the Black Sea catchment area.

Under this law, water management duties are assigned to a separate state administration body.

In drafting the new law, an effort was made to harmonize it with the Water Framework Directive 2000/60/EC (WFD). Many by-laws envisaged by the new Water Law are being prepared. These will provide for implementation of the Law and for further transposition of relevant EU Directives – “daughter” directives – of the WFD, including:

- Groundwater Directives (2006/118/EC)
- Bathing Waters (2006/7/EC)
- Nitrates Directive (91/676/EEC)
- Urban Waste Water Treatment Directives (91/271/EEC)
- Directives on the assessment and management of flood risks (2007/60/EC)
- Directive on technical specifications for chemical analysis and monitoring of water status (2009/90/EC)
- Directives on environmental quality standards in the field of water policy (2008/105/EC).

Water management financing

The Law on Water Management Financing (Official Gazette of Montenegro 65/08) defines the sources of funds for water management financing and the method of accounting and payment of fees for protection and use of waters and water good. It applies to waters, water good and water facilities, and systems stipulated by the law regulating water-related issues.

Funds for the financing of water management comprise:

1. water fees
2. compensation for the acquisition of water rights
3. benefits from the lease of public water good and water supply facilities and systems.

3.1.2.8 Morocco

In 1995 Morocco adopted Water Law no. 10-95. Its objectives are to promote the management of water resources by basin according to the modern principles of their sustainable management, such as integrated management, user-pay or polluter-pay.

All water resources are part of the public domain and the use of water requires authorization. Both groundwater well drilling and water abstraction need to be authorized, depending on the depth of the well and the water flow. The threshold for the water flow is different depending on the water use:

- Domestic: 2 m3/day
- Supply of urban agglomeration: 40 m3/day
- Irrigation: 10 m3/day
- Other: 2 m3/day.

However, the threshold for the depth of the well is not the same throughout the country, and is fixed by individual agencies of the hydraulic basin.

Every 5 years each agency carries out an inventory of the degree of the pollution of the water resources (surface and groundwater) in its zone of action. The results of this inventory are used by the agency to develop vulnerability maps for groundwaters.

The Water Law establishes protection zones to protect the abstraction points of groundwater for domestic water supply.

Threshold values for water discharges are fixed by regulation. Wastewater discharge into the environment requires an authorization.

3.1.2.10 Palestine

In the absence of an independent Palestinian State, the scope of jurisdiction of the Palestinian legislature and government (and hence the scope of application of domestic Palestinian water legislation) are determined by the combination of (a) territorial, (b) functional and (c) water-specific parameters laid down in the Israeli-Palestinian Agreement on the West Bank and the Gaza Strip (Washington DC, 28 September 1995) (hereinafter "Interim Agreement"). Under the terms of the Interim Agreement, the Palestinian legislature and government – that is, the Palestinian National Authority (PNA) – has a (a) territorial and (b) functional jurisdiction. The former covers the Gaza Strip, with some limited exceptions, and Areas A and B of the West Bank, to the exclusion of Area C, which remains under direct Israeli occupation and control (article XVII of the Interim Agreement). The functional jurisdiction of the PNA in relation to land matters extends to all civil powers and responsibilities, including planning and zoning, in Areas A and B (article XI.2.b). Presumably "land" includes a reference to water resources, both surface and underground. These two general parameters are qualified by two sets of water-specific parameters:

4. Areas A, B and C make up 18%, 21% and 61% of the West Bank territory, respectively. They are home to 46%, 36% and 18% of the Palestinian West Bank population, respectively
5. The Interim Agreement allocated 18% of the estimated yield of mountain aquifer groundwater for use by the Palestinians, and the balance for use by Israel.²⁶

The PNA has qualified law-making, executive and judicial authority over a fraction of the water resources in the West Bank.

3.1.2.10.1 Review of water laws

The Palestinian legal framework for water and the water sector applicable to areas A and B of the West Bank and the Gaza Strip comprises:

6. New Water Law, No. 14/2014 replacing the Water Law of 2002 (WL)
7. Environment Law, No. 7/1999 (EL)
8. Local Authorities Law, No. 1/1997 (LA)
9. Agriculture Law, No. 2/2003 (AL)
10. Environmental Assessment Policy, approved on 23 April 2000 (EAP)
11. Waste Water Reuse for Agriculture Standards, approved on 23 January 2012.

3.1.2.10.2 Water ownership

All water resources, both conventional (i.e. the water of springs, wells, ravines, rivers, lakes and water collections) and unconventional (notably treated sewage water, desalinated water and brackish water) have public property status under the WL and the Palestinian Water Authority (PWA) has the power and responsibility to manage these resources.

3.1.2.10.3 Allocation and reallocation of water resources

The WL provides for licensing of water abstractions and use of surface water, well drilling and wastewater treatment operations. The PWA has authority to determine water allocation/usage priorities. Any modification in the change of scope of a given water licence requires the prior approval of the PWA. The PWA also keeps records of water usage and of licences. A licence may be cancelled if the licensee fails to make use of it within the specified period, or if it has been obtained on the basis of false information (WL article 32). The unlicensed drilling of wells is an offence punished with imprisonment for a term of between 6 and 12 months, and a heavy fine. The unlicensed abstraction of water, and the unlicensed operation of wastewater treatment facilities are also offences (article 58).

3.1.2.10.4 Prevention and control of pollution of water resources

The WL provides for the designation of groundwater protected areas where groundwater is at risk of pollution. An area designation triggers unspecified restrictions on water use. Removal of pollution is the obligation of the polluter or, in default, of the PWA. Unless it is remedied by the offender, pollution of water resources is an offence. The treatment of wastewater in general, and the construction and operation of relevant facilities in particular, are subject to licensing by the PWA.

The EL anticipates conditions and standards for the disposal of any solid, liquid or other material, and prohibits any such disposal which is not in accordance with such conditions and standards. Moreover, the EL anticipates prior environmental licensing/approval of designated projects in general, based on assessment of environmental impact. For water projects, generic information is required to determine the scope of, or necessity for, an EIA. In this particular regard, PWA is to participate in the process of formulating guidelines for the EIA of water-related activities or of water supply systems.

The LA Law charges the Local Authority Councils with, among other requirements, preventing pollution of springs, canals, aquifers and wells.

3.1.2.10.5 Drinking water and provision of services

The right to water of a quality suitable for human consumption is cast in the WL.

Under the LA Law, the provision for domestic/drinking water supplies to the public is one of the functions of the Local Authority Councils. This includes defining relevant standards, the regulation of service delivery and the setting of prices. Providing wastewater disposal services and their administration and monitoring are also the responsibility of the Local Authority Councils.

3.1.2.10. Designation of areas/water bodies in need of special attention

The WL empowers the PWA to designate groundwater at risk of pollution as a protected area that triggers, at the discretion of the PWA, unspecified restrictions on water use. However, the PWA

26 Trotter, J. (1999) *Hydropolitics in the West Bank and Gaza Strip*. PASSIA. Available from <http://www.passia.org/publications/Water%20Trotter.pdf>, p.66.

can only use such power on condition it provides an alternative source of water. Public notice requirements are provided for, including cancellation or amendment of an original notice.

3.1.2.11 Tunisia

Under the Water Code, all aquifers are part of the hydraulic public domain.

According to the Code the use of groundwater falls under the regime of the concessions. However private use water rights are recognized and maintained. These rights are linked to the land, and cannot be sold or separated from it.

The Water Code introduces the quantitative protection of groundwaters with the principle of water saving, which is considered to be the most important way to develop, preserve and rationalize the use of water resources.

Shallow wells (less than 50 m) need only to be declared to the administration.

For deeper wells, or for those on private property, an authorization is needed from the Ministry of Agriculture for either exploration or water abstraction. Authorization granted for purposes of exploration does not entitle the use of water, which can take place under a concession.

To ensure qualitative protection of groundwaters, the Code forbids any discharge, or any deposit likely to change the chemical, physical and biological characteristics of the water. However, in some cases, the administration can provide an authorization (e.g. for the discharge of treated domestic wastewater). All permitted discharges into the natural environment have to respect established norms, such as in the case of discharges to the natural environment regulated by Decree No. 85-56 of 2 January 1985. Regular controls of the discharges must be undertaken and the results of the analysis must be recorded in a specific register. External controls by the agents of the competent ministry can also be executed.

The Code has created protection perimeters:

- Prohibition perimeters: created when the quality of water resources is in danger because of over-exploitation. In these perimeters, drilling or transformation for increasing the flow is forbidden, and a permit is needed for any work on an existing well, without increasing the water flow
- Conservation perimeters: established when the current exploitation of groundwaters is risking their quality and quantity. All new works in such a perimeter is submitted to an authorization
- Water development and use perimeters: defined in zones where water resources are likely to be insufficient for current needs. In these perimeters, water distribution plans are defined; however, they were not really implemented.

The protection perimeters are delineated by an order of the Minister of Agriculture around any well drilling, water source or any work used for drinking water supply.

The protection zone of any perimeter protection includes:

- an immediate protection perimeter
- an area of close protection where it is prohibited to conduct any activity that might lead to the pollution source.

3.1.2.11.1 Incentive systems

The work of conserving water and soil, and creating investment incentives in the context of an overall development strategy, are among the activities promoted by the project plan, whose primary aim is to accelerate the pace of growth and job creation. The use of available natural resources, including the performance of wells and water wells, to increase agricultural production, is considered a water conservation activity benefiting from encouragement measures provided by the Investments Code under Agricultural Development.

3.1.2.11.2 The hydraulic system audit (Decree of 2002)

Water consumption is submitted to a technical diagnosis, regular and obligatory of equipment, work and production methods related to the use of water, and from a threshold fixed by decree upon proposal of the Minister agriculture. Notwithstanding the provisions of Article 158 of this Code, any consumer who does not make the technical diagnostics, periodic and mandatory is punishable by a fine ranging from 5000 to 10000 dinars.

The hydraulic audit mechanism established by this article of the Water Code seems to fit perfectly with the goal of saving water.

For agricultural use the consumption threshold is 5 million m³/year; for domestic use and hygiene the threshold is 2000 m³/year; and for industrial and manufacturing use the threshold is 5000 m³/year.

3.1.2.11.3 The repressive system

According to chapter II of the Water Code ("Conservation and water police of public hydraulic domain"), conservation is associated with police measures.

3.1.2.12 Turkey

There are numerous laws relating to water which regulate public sector activity by, for example, defining the responsibilities for the construction of water networks, operation and maintenance obligations, and their financing. Special legislation on the harmful effects of water have been enacted (e.g. for flood control, drainage and sewerage). Turkey is about to complete studies for the enactment of an integrated water law.

The major law for the management of coastal aquifers, and groundwaters, is Law no. 167 on Groundwater (*Yeraltı Suları Hakkında Kanun*).

3.1.2.12.1 Groundwater regulation/coastal aquifers

Law No. 167 on Groundwater came into force in 1960. According to this Law, groundwater is under the control and ownership of the government. The Law deals primarily with research, allocation, utilization, protection and registration of groundwater. The main institution responsible for the application of this Law is the State

Hydraulic Works (DSI), which determines the number, location, depth, amount of pumping water and other characteristics of wells to be drilled. Searches for and use of groundwater inside and outside of proclaimed groundwater operation areas are subject to permissions given by DSI. In the same manner, permission documents for rehabilitation and alteration are also granted by DSI.

3.2 INSTITUTIONS

3.2.1 Albania

In Albania, water resources management involves ministries and other institutions at regional and local level. The Council of Ministers is the executive branch of the Albanian Government, responsible for the approval of national policies, strategies and plans for water supply and wastewater disposal, and in the treatment sector. Institutions to manage protection and development of water qualities in the country are:

- Ministry of Environment (MoE)

The MOE is responsible for drawing up and implementing policies, strategies and national plans related to climate change, for the protection of aquatic resources, water resources, inland and temporary water surface, marine water and groundwater.

Under the supervision of MoE are:

 - The NEA,²⁷ which has as its main duties to monitor the environmental situation of the country, to monitor the quality and quantity of water resources and to develop new policies for their protection and improvement. It also supervises the monitoring activities of relevant institutes
 - 12 Regional Environmental Agencies (REAs), responsible for permitting and enforcing environmental legislation
 - The State Inspectorate of Environment, Forests and Water, which ensures the enforcement of legislation on environmental protection, forests, water and fishery.
- Ministry of Agriculture, Rural Development and Water Administration

This administration is responsible for water utilization for irrigation, for drainage, for the protection of flood systems and for the preservation of fishery resources. At regional level, the Ministry performs this duty through its regional Directorate of Agriculture and through drainage boards (DBs):

- 13 DBs, supervised by the Ministry of Agriculture, Rural Development and Water Administration (MARDWA). These are technical, specialized structures, responsible for operation and maintenance of drainage, flood protection systems and main irrigation infrastructure (large dams and main irrigation canals)
- The Fishery and Aquaculture Sector, within the Directorate of Water and Fishery Policies, has a range of responsibilities for the drafting of policies, strategies for fishery and aquaculture development and the preparing of the Fishery and Aquaculture Administration Plan. This sector is also responsible for directing and coordinating the monitoring and controlling system for scientific research projects that relate to sea fishery resources, the evaluation of internal waters, and fishery information and statistics systems.
- Ministry of Health

This is responsible for setting drinking water standards and monitoring the quality of drinking water, bathing water and curative waters, by protecting water sources and the chlorination of supply entering the distribution systems. Through its Institute for Public Health, it is responsible for monitoring the safety of water supply, including water chemical and biological monitoring.
- Ministry of Transport and Infrastructure

This is in charge of developing policies on water supply and sewerage systems, and for investing in waste management facilities. Within the Ministry, the General Directorate of Water Supply and Sewerage has a special status. Its structure is approved by the Council of Ministers and while it reports to the Ministry, it is not formally part of the structure of that Ministry. The Directorate is in charge of water supply canalization problems and sewerage. Through its General Maritime Directorate, it is responsible for maritime transportation of passengers and goods, monitoring of maritime traffic and hydrograph/surveillance, sea ports, and monitoring the protection of the sea environment and sea resources (fishing, gas/oil, tourism).
- Ministry of Energy and Industry

This is responsible for the electric power produced by renewable energy resources. The country currently relies on hydropower for almost all of its electricity, which creates difficulties when water flows are low. Through its National Agency of Natural Resources it implements government policies in the area of hydropower and energy, promotes renewable energy sources, supervises any mining when hydropower activities are involved, monitors concessionary contracts for hydropower plants, and compiles and publishes the annual energy balance sheet at national and regional level.
- Ministry of Interior

This Ministry implements tasks and competencies in the area of water resources management. Through the General Directorate of Civil Emergency, the Ministry monitors, manages and controls states of emergency, including floods and other emergencies, in the entire territory of Albania.

²⁷ Decision of the Council of Ministers (DCM) No. 46, dated 29 January 2014 "On establishment of Inspectorate of State for Environment Forestry and Water" – central and regional offices

- Ministry of Economic Development, Tourism, Trade and Entrepreneurship

Within this ministry, the tourism sector is responsible for the planning and approval of tourism policies, and has the duty to ensure and protect the sustainable use of water resources for tourists.

The following authorities prepare plans and implement national policies in the field of water resources:

- NWC

The NWC is a central decision-making authority, which determines national policy relating to water resources. The NWC can propose draft laws and by-laws on any kind of activity in the field of water reserves. It can establish the legal, technical and regulatory framework for application of the framework legislation, as well as issue guidelines and undertake other actions necessary for implementation of the water reserves national plan.

NWC is responsible for reviewing and approving inter-regional and national plans and projects relating to agriculture, urban issues, industrial and territorial development, to the extent that these plans and projects relate to planning, management and preservation of water reserves. The NWC is responsible for approval of concessions on water reserves when these reserves are of national importance. The NWC is chaired by the Prime Minister and its executive authority is its Technical Secretariat.

- NWC Technical Secretariat

This is responsible for implementing national policy on water reserves approved by the NWC; compiling the central inventory (of quantity or quality) of water reserves according to the rules decided by the NWC; issuing permits and authorizations for the use of water and for discharges, when the activity is performed outside the border of a single basin; and for promoting participation of water users in the management of water reserves. The Technical Secretariat is responsible for collecting information from different line ministries and institutions relating to water state, assessing it and publishing reports.

- At local level

Local authorities responsible for managing water resources and implementing issues of water resource management in the relevant basins are River Basins Councils. Albania is divided into six river basins: Drini-Buna, Mati, Ishmi-Erzeni, Shkumbini, Semani and Vjosa.

RBCs act as administrative bodies. Each is responsible for the protection, development, distribution and operation of water resources within its own basin boundaries.

River Basin Agencies (RBAs) act under the supervision of the General Directorate of Water Administration (GDWA). They are the executive and technical bodies of the RBCs, and are responsible for preparing the water resources plan and for drawing up the inventory of water resources, in terms of quantity and quality.

- Institute of Geological Science Energy, Water and Environment (GSEWE)

This is a national research unit comprising seven main departments and operating under the supervision of the Polytechnic University of Tirana. The institution is responsible for studying and evaluating the country's natural mineral and underground energy and water resources; for groundwater quality and quantity monitoring; for assessing surface water quality for rivers, lakes, underground and marine water; and for monitoring rainfall, temperature and other hydro-meteorological parameters.

- Albanian Regulatory Authority of the Water Supply and Waste Water Disposal and Treatment Sector (WRA)

The WRA is an independent public institution which regulates the water supply and sewerage sector, established by Law No. 8102 dated 28 March 1996 (as amended), to ensure protection of the public interest and to create a transparent regulatory framework. The Council of Ministers appoints the Chair and other members of the National Regulatory Commission (NRC). The NRC convenes regularly throughout the year to take decisions on all functions and tasks of the WRA.

The WRA is the only authority in the Republic of Albania that issues licences to all natural and legal persons delivering water and/or wastewater services to the public; and it ensures that service providers deliver good-quality and efficient services at a reasonable price by regulating service tariffs. It also monitors the performance of service providers and ensures implementation of measures that protect consumers' interests, and promote continuous service improvements, by setting challenging but achievable targets; analysing consumer complaints; and supporting complaint resolution between consumers and service providers. WRA contributes as a commentator to all relevant sector processes such as the drafting of national strategies, policies and legislation for the water supply and sewerage sector. It regularly reports and makes available information on the water supply and sewerage sector to all sector stakeholders and the general public, through annual and performance reports.

- Inter-institutional Maritime Operational Centre (IMOC)

IMOC is an inter-ministry, national institution that guarantees the sovereignty and sovereign rights of the Albanian state in the maritime space through an integrated management of national sources of the institutions that are responsible and have interests on the sea. It guarantees the management and control of Albanian maritime borders, life safety on the sea and interaction of state institutions that have responsibilities and interests within the maritime space. The participating institutions in the IMOC are the Ministry of Interior; Ministry of Defence; Ministry of Finance; Ministry of Environment; Ministry of Transport and Infrastructure; Ministry of Agriculture, Rural Development and Water Resources; and the Ministry of Economic Development, Tourism, Trade and Entrepreneurship. IMOC coordinates and leads coastal operations for the control of the maritime border against illegal trafficking and organized crime, anti-pollution operations, operations to protect fishing, to preserve the ecological equilibrium and maritime environment, and operations for the protection and good administration of fishing wealth (an etiological bio-measurement).

- **National Committee on High Dams**
The National Committee on High Dams is under the responsibility of the Council of Ministers. Its functions and responsibilities are provided for in Law No. 8681, dated 2 November 2000, On Design, Construction, Use and Maintenance of Dams and Tailings.²⁸ The National Committee on High Dams exercises state control on the safety of dams as work of special importance, in the review, design, construction, exploitation and maintenance stages. The National Secretariat on High Dams acts as the executive body of the Committee, while the National Inspectorate on High Dams acts as the body that exercises control over the construction, use and maintenance of dams.
- **General Directorate of Water Supply and Sewerage**
GDWSS is a public institution established by the Council of Ministers Decision No. 532, dated 20 August 1996, On Structural Changes and Staff Nomination. It is a legal, individual and budgetary unit under the Ministry of Transport and Infrastructure, and is the only specialized public institution in the water infrastructure sector. The capacities that the Directorate provides are:
 - to assure technical support to the water and wastewater policies of the Ministry of Transport and Infrastructure
 - to plan and manage the identification of new projects related to the water sector
 - to organize and administer the work of investment procurement (studies, designing, rehabilitation, new construction) in accordance with the legislation in force (only in cases defined as procurement entities)
 - to draw up a strategic framework of water and wastewater sector development and management
 - to prepare legal norms related to water supply administration and water sewerage
 - to draw up an annual planning platform of water infrastructure public investment.
- **Albanian Geological Survey (AGS)**
The AGS operates under the supervision of the Ministry of Energy and Industry. Its department for natural resources, hydrogeology and water assessment focuses on sustainable management of natural resources; monitoring the natural phenomena of erosion and exploitation of minerals in relation to water quality; and modelling and development of digital data in order to set up a Geographic Information System (GIS). Its main activities encompass the stability of riverbeds; coastal erosion; sedimentation; impact assessments; preventive measures; construction of permanent monitoring; and systematic observations on secondary flows and river networks downstream, as well as sustainable aggregates management.
- **Institute of Statistics (INSTAT)**
INSTAT is an independent institution under the authority of the Council of Ministers. Its themes include the use of waters;

monitoring of potable waters, rivers and beach waters; and the main reasons for water pollution.

- **The Water Supply and Sewerage Association of Albania**
This is a not-for-profit association of water supply and sewerage professionals formed by a group of representatives from eight water supply and sewerage enterprises in Albania, to represent the interests of the enterprises operating in the water sector, and to raise the level of professionalism. Its objectives are to improve the capacity of the people who work to deliver water supply and sewerage services, so they can perform their duties in a professional, reliable and cost-effective manner; and to represent the interests of water supply and sewerage utilities in Albania regarding laws, decrees and regulations that may be proposed for action by the Parliament or the Government.

3.2.2 Algeria

The Ministry of Water Resources operates at the central level and is in charge of:

- formulating the national strategy for water, following up and controlling implementation of its elements, carrying on studies and investigations on water resources initiatives and following up the implementation of all regulations
- carrying out studies and investigations into water resources
- initiating and following the implementation of all regulations
- conserving, preserving and promoting the rational use of water resources.

At the préfecture level (*wilaya*), the direction of water resources is in charge of:

- mobilizing water resources
- drinking water supplies
- sewage
- agricultural water.

The direction is in charge, inter alia, of:

- conservation, preservation and protection of the hydraulic public domain
- ensuring the rational use of water resources
- ensuring the development of works for the mobilization of water resources, conventional or not
- ensuring the implementation and execution of the legislative framework
- collecting and analysing data related to research activities, exploitation, production, storage and distribution of water for domestic, agricultural and industrial uses
- keeping the register of water points on the territory of the *wilaya* up to date.

The local governments contribute to the protection of land and water resources and ensure their optimal use.

Two other central ministries deal with water resources:

²⁸ Amended by Law No. 18/2013, For Changes and Additions on the Law No. 8681, dated 2.11.2000*.

- The Ministry of Territorial Planning and Environment, in charge of national policy for the protection of the environment (of which water is a part)
- The Ministry of Agriculture and Rural Development which contributes, in close cooperation with the minister in charge of water resources, to the definition of policy for agricultural water. The Minister of Agriculture defines the conditions of development, and use of water resources for agriculture.

The Consultative Council on Water Resources is headed by the minister in charge of water resources and is composed of representatives from state administrations, local assemblies, the public establishments concerned, and professional and users' associations. The Council gives its views on:

- long-term development objectives of water resources
- the national water plan
- evaluation of impacts of sectorial development plans
- all measures related to the economy and the valorization of water and its protection from risk of pollution
- promotion of technological R&D in the water domain.

The Regulation Authority for Water Public Services is an independent administrative authority. Its members are nominated by the President following the recommendation of the Minister of Water Resources. The Authority is in charge of the good functioning of the water public services and is responsible for:

- ensuring, through the public service delegate, that its obligations are respected
- examining users' claims and formulating recommendations
- observing and evaluating the indicators of the service provided to users
- the costs and tariffs of public water services
- contributing to a template to specify delegation of management operations.

The National Agency on Water Resources was established in 1987. Its main mission is to execute inventory programmes of water resources and irrigable lands.

The National Agency on Dams is in charge of producing and supplying water to establishments and local water boards in charge of distributing, managing and maintaining exploitation works.

The National Agency for Irrigation and Drainage is in charge of the exploitation and maintenance of hydraulic equipment and infrastructures in the irrigation perimeters of the state and of local governments.

The responsibility of Algeria Waters is to ensure execution of the national policy for drinking water across the national territory by managing the operations of production, transport, treatment, storage, conveyance, distribution and supplying drinking water.

The National Agency on Waters is in charge of executing the national policy on sanitation in consultation with local government.

The mission of the Agency for Hydrographic Basins is to undertake all actions that aim at the integrated and concerted management of water at the natural hydrographic scale.

The mission of the National Agency for IWRM is to undertake, at the national level, all actions contributing to the integrated management of water resources.

3.2.3 Bosnia-Herzegovina

In BiH, water management issues are not addressed in the Constitution so they fall under the following provision: "All governmental functions and powers not expressly assigned in this Constitution to the institutions of Bosnia and Herzegovina shall be those of the Entities" (article III, Paragraph 3 of the Constitution of BiH).

3.2.3.1 The Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MoFTER)

Certain competencies concerning the environmental protection are delegated to MoFTER, which has the authority to deal with issues of environmental protection and natural resources at the state level. MoFTER is also responsible for implementation of international treaties in the environmental field. Within MoFTER there is a Sector for Natural Resources, Energy and Environmental Protection, which consists of five departments including Department for Water Resources.

The Department for Water Resources performs normative, legal, information and documentation activities, and has analytical and operational expertise.

3.2.3.2 Inter-entity Coordination Body for the Environment

This body was established in 2006, and deals with all environmental protection issues that require a harmonized approach from the entities of both RS and the FBiH. It has eight members: four appointed by Federal Government and four by the Government of RS. The body is authorized for all environmental issues where harmonized approach of the entities is needed, including:

- coordinating the implementation and enactment of laws and other regulations
- providing recommendations for the establishment of harmonized standards for the quality of the environment at the entity level
- development of guidelines for coordination and cooperation relating to protected transboundary areas.

3.2.3.3 Advisory Committee of Watershed Areas

The Inter-entity Advisory Committees were established in accordance with article 164 of the Water Law of FBiH and article 18 of the Water Law of RS. At the level of river basins it is responsible for cooperation on all water management issues among the relevant ministries of both entities. Its goal is to prevent potential

disputes over water management. The Committee includes both government officials and private citizens from the two entities, as well as representatives from the donor community and the Office of the High Representative.²⁹

3.2.3.4 Memorandums of Understanding (MoU)

MoU are used to regulate relations between the entities in different fields. In the field of water they include:

- the MoU between the FBiH and RS on water-related issues (1998) establishes a commission for the cooperation in the area of water
- the MoU between FBiH, RS and the European Community Commission (2000) brings sustained support to the institutional reforms in the BiH water sector based on EU regulations and international conventions
- the Memorandum of Cooperation between the Ministry of Agriculture, Water Management and Forestry of the FBiH and the Ministry of Agriculture, Forestry and Water Management of RS (2001). The Ministries commit to strengthen their cooperation with the Inter-entity Water Management Commission and to harmonize the regulations and the organization of the enforcement and control of water protection.

3.2.3.5 Federation of BiH

The FBiH and the cantons are jointly competent for water issues. The primary responsibility for water resources at the entity level belongs to the Federal Ministry for Water, Agriculture and Forestry in FBiH.

In the FBiH the principal role for the water sector is assigned to the Federal Ministry of Agriculture, Water Management and Forestry, which is responsible for water policy development, issuing agreements, setting standards and regulations, and maintaining compliance with laws and regulations through licensing and inspections.

The Federal Ministry of Agriculture, Water Management and Forestry performs administrative and professional tasks relating to:

- water management plans
- water abstraction and usage
- ensuring water for the needs of the population and industry
- inspection in the fields of agriculture, water management and forestry, and other tasks identified by the law for federal ministries and other bodies of the federal government.

The Federal Ministry of Environment and Tourism is responsible mainly for the ecological and environmental protection of water, the ecological monitoring of water and developing water quality standards.

According to the law on federal ministries and other bodies of the federal administration (Official Gazette of FBiH No. 58/02, 19/03, 38/05, 2/06, 8/06, 61/06 and 48/11), the Federal Ministry of

Environment and Tourism performs administrative, professional and other tasks within the jurisdiction of FBiH relating to:

- ecological protection of the air, water and soil
- development of the environmental protection strategy and policy
- air, water and soil quality standards
- ecological monitoring and control of air, water and soil
- development of tourism policy and strategy
- following up touristic trends in the domestic and foreign markets
- mapping the long-term development of tourism in the framework of an integrated economic system and other tasks stipulated by law.

The Federal Ministry of Energy and Mining Industry performs administrative and professional tasks related, inter alia, to the mining industry and geological research, including the pumping of groundwater and surface water.

According to the law on federal ministries and other bodies of the federal administration (Official Gazette of FBiH No. 58/02, 19/03, 38/05, 2/06, 8/06, 61/06 and 48/11), the Ministry of Energy Mining and Industry performs administrative and professional tasks under the jurisdiction of the Federation that relate to:

- energy, mining and industry
- geological research and industry
- creating energy policy and undertaking geological research inspecting and monitoring exploitation of mineral raw materials and other tasks determined by relevant laws.

The Federal Ministry of Health is competent for safeguarding the quality of potable water and organizing water quality monitoring. The main water-related functions and tasks of this ministry are:

- safeguarding of the quality of potable water by coordination of expertise for development of relevant legislation, regulations and standards
- organizing water quality monitoring.

The Federal Agency for the Watershed Area of the Sava River Basin (in Sarajevo) and the Federal Agency for the Watershed Area of the Adriatic Sea Basin (in Mostar) were established under the FBiH Law on Water (Official Gazette of FBiH, No. 70/06), adopted on 20 November 2006. Their function is to implement the water management tasks placed under their jurisdiction by this Law and regulations. Their main responsibilities are:

- preparing an analysis of the characteristics of water areas
- preparing an overview of the influence of human activities on the condition of surface and underground water
- preparing an economic analysis of water usage
- establishing a register of protected areas (under article 65 of the above-mentioned Law on Water), as well as areas with special protection determined by decision of the federal government
- establishing a register of water bodies that are used or are planned to be used for water abstraction for human consumption

²⁹ Office of the High Representative, <http://www.ohr.int>

- organizing the classification of ecological, chemical and quantitative water status
- preparing a water monitoring programme and organization-relevant activities
- preparing water management plans and programmes of measures.

The Federal Geological Institute was established by the Law on Ministries of FBiH and other bodies of the federal administration (Official Gazette of FBiH No. 58/02, 19/03, 38/05, 2/06, 8/06, 61/06 and 48/11).

Its basic activities related to water are:

- participation in preparation of laws and by-laws relating to hydrogeological research
- hydrogeological research into drinking, mineral, thermo-mineral and thermal groundwater
- participation in preparation of proposals, for the Federal Government, of hydrogeological maps for development of the water supply
- undertaking research in the field of geothermal energy, and capacity building in this sector
- improvement and introduction of contemporary methods in the field of hydrogeological research
- preparation of studies on amounts and quality of all groundwater
- establishing cooperation with other federal bodies dealing with water supply problems and groundwater protection
- preparation of studies on water protection and making proposals for storage of dangerous and toxic materials underground
- drafting mid-term and annual working programmes.

The Federal Hydro-meteorological Institute performs expert and other activities under the jurisdiction of FBiH, according to the Law on Ministries of FBiH and other bodies of the federal administration (Official Gazette of FBiH 58/02, 19/03, 38/05, 2/06, 8/06, 61/06 and 48/11).

The basic programmes related to water are:

- development and undertaking of meteorological, air-meteorological, hydrological, seismic and environmental quality activities; researching the atmosphere, water resources, the quality of the environment (air, water and soil) and seismic processes
- collecting, processing and publishing data from the activity of interest to the Federation; performing other tasks in the fields of meteorology, air-meteorology, hydrology, life environment quality and seismology.

According to the Law on Water (Official Gazette of FBiH No. 70/06), the Federal Meteorological Institute is responsible for establishing a system to provide monitoring and prognosis of meteorological emergencies and to deliver such prognosis regularly to the water information system (WIS).

3.2.3.6 The Cantonal level at a glance

The Federation of BiH is subdivided into ten cantons, which makes water governance even more complex. Each canton has its own government and adopts its own laws (in accordance and fully complying with FBiH legislation). The main functions and tasks related to water assigned to the cantons include delivering permits and allocation of water resources under their competence (drainage, irrigation, water supply, hydropower and water protection). The relevant institutions in the FBiH at municipal or cantonal level are:

- Water Supply Companies. According to the Law on public companies ("Official Gazette of FBiH" No. 8/05), water supply companies perform certain activities in water management sector at local level, such as:
 - production and distribution of water
 - wastewater treatment and drainage
 - sanitary-technical activities and water quality control
 - management of public water supply and sewage.

3.2.3.7 Republika Srpska (RS)

The Ministry of Agriculture, Water Management and Forestry is the main institution in charge of water resources. The ministry is responsible for:

- organizing water protection plans
- protecting against negative water impact
- issuing permissions for water consumption and usage
- conducting and organizing water quality control
- taking measures for providing water for the needs of population and industry.

According to article 28 of RS Law on Republic Administration (Official Gazette RS No. 118/08), the Ministry of Agriculture, Water Management and Forestry RS undertakes administrative and other professional work related to:

- protection and usage of agricultural land, protection of agricultural plants and products from diseases, pests and weeds
- seed protection and trading, trading of nursery plants, production and improvement of cattle breeding
- control of animal food and water
- integral management over ambient waters
- organizing water protection plans; protection against negative water impact
- providing conditions for issuing permissions for water intake and usage
- conducting and organizing water quality control
- ensuring water supply for population and industry
- ensuring hydromelioration
- inspection/monitoring in the agriculture and veterinary medicine domain.

The Ministry of Physical Planning, Civil Engineering and Ecology performs administrative, professional and technical support

activities to protect, preserve and enhance the environment. According to article 29 of RS Law on Republic Administration (Official Gazette RS No. 118/08), the ministry conducts administrative and other professional activities related to:

- integral planning, and spatial planning and management
- preparation and implementation of the RS spatial plan; reviewing, administrative supervision and providing approval for spatial plans for cities, municipalities, special areas, and also for urban plans
- revision of spatial-planning documentation, developing programmes and investment-technical documentation of particular importance to RS
- urban planning and construction
- overall protection of the quality of the environment and its improvement through research, planning management and protection measures
- protecting assets of general interest, natural resources, natural and cultural heritage
- inspection and supervision of urban planning, civil engineering, utilities and environmental protection.

The Ministry for Industry, Energy and Mining is in charge of the geological survey of groundwaters and their exploitation according to article 23, RS Law on Republic Administration (Official Gazette RS No. 118/08).

Among other activities, this Ministry directs all issues related to the energy and mining industry and controls application of relevant laws, rules and regulations. The Ministry has competence for approval of project documentation with environment protection measures and regulations relevant to the energy and mining industry.

The Ministry for Economy, Energy and Development performs administrative and other professional activities in the field of activities of energy and mining. Some of these relate to:

- geological surveying of natural mineral raw materials – metals, non-metals, nuclear raw materials and underground waters (thermal, thermal-mineral and drinking water) and their exploitation
- collection and primary processing of industrial waste
- making annual energy balances
- making annual and medium-term geological survey programmes
- verification of mineral resources and maintaining the cadastre; maintaining a cadastre of survey and exploration rights and of other concessions.

The Ministry of Health and Social Protection manages the safety of water for human use. According to article 21 of RS Law on Republic Administration (Official Gazette RS No. 118/08), the Ministry of Health and Social Protection carries out administrative activities and other professional tasks related to:

- protection and improvement of citizens' health and monitoring of health conditions and health needs of citizens
- inspection and supervision of sanitary measures

- provision of information through the media and other public means, and performing other tasks in accordance with relevant law and other regulations of the RS and BiH.

In its 97th session on 11 January 2013 the Government of RS decided to establish the public institution known as Waters of Srpska. This resulted from the merging of two former RS water agencies: one for the Sava river Basin (in the town of Bijeljina) and one for the Adriatic sea basin (in the town of Trebinje).

The main activity of the Republic Survey for Geological Researches of the Republic of Srpska is geological research into natural mineral raw materials – metallic, non-metallic and energy, groundwaters (thermal, thermo-mineral and drinking water) and their exploitation.

According to article 62 of the RS Law on Public Administration (Official Gazette No. 118/08) and the Law on Geology of RS (Official Gazette No. 110/13), the Republic Survey for Geological Researches, as part of the Ministry of Industry, Energy and Mining, performs professional and other tasks related to:

- participating in preparation of laws and by-laws in the field of geological research
- preparing all types of basic geological maps (geological, hydrogeological, geological engineering, geoecological, geohazards, etc.)
- geological explorations of all kind of mineral resources (raw materials – metallic, non-metallic and nuclear; groundwater – thermal, thermo-mineral and drinking water, and their exploitation)
- estimating balances of groundwater
- developing annual and medium-term programmes of geological research
- verifying the reserves of groundwater and other mineral resources and establishment of their cadastres; maintaining the cadastres of research, exploitation rights and approved concessions
- establishing and maintaining the Geological Information System of RS, including all aspects of groundwaters
- establishing and maintaining the Central Geological Archive of RS, including all documents on exploration of groundwaters.

According to article 58 of the RS Law on Republic Administration (Official Gazette RS No. 118/08), the Republic Hydro-meteorological Institute performs professional and other tasks related to:

- developing and undertaking hydrological, meteorological and seismological activities
- researching into the atmosphere, water resources, air and water quality and seismological processes
- collecting, processing and publishing hydro-meteorological and seismological data of interest to RS and performing other tasks in the field of hydrology, meteorology and seismology.

Relevant RS institutions at municipal level include:

- Water supply companies

- According to the Law on Public Companies (Official Gazette of RS Nos 75/04 and 78/11) and the Law on Communal Activities (Official Gazette of RS No. 124/11), these companies perform certain activities at local level in the water management sector, such as:
 - production and distribution of water
 - wastewater treatment and drainage
 - management of public water supply and sewage.

The Government of Brčko District is divided into ten departments, three of which are concerned with water:

- Department for Agriculture, Forestry and Water Management, which performs professional, administrative and other duties of the government in relation to:
 - implementation of laws and regulations of competent bodies and institutions of BiH and Brčko District (BD) in the domains of agriculture, forestry and water management, under the supervision and according to instructions of the Mayor of BD
 - protection and effective utilization of forest and agricultural funds
 - agro-industry
 - veterinary and public veterinary services
 - protection of forests
 - proposing policies of capital development and pricing policy in the field of agriculture and forestry
 - market interventions and reserves in the field of agriculture
 - rural development
 - regulations, management and monitoring of activities related to:
 - (i) water systems
 - (ii) utilization of water
 - (iii) hydromelioration
 - (iv) protection from water
 - (v) management, maintenance, development, planning and research in the water sector
 - (vi) financing of water management installations.
- The Department for Public Affairs, which is responsible for the following activities related to environment and water:
 - Implementation of laws and regulations of authorized bodies and institutions of BiH and BD, in the field of communal activities, under the jurisdiction and guidelines of the mayor
 - Environmental protection and supervision of implementation of ecological standards.
- The Department for Communal Affairs is authorized for the development and maintenance of an efficient water supply system. It also implements the laws and regulations of authorized bodies, and of institutions in BiH and BD in the field of communal activities, under the supervision and instructions of the mayor.

Communal Utility of BD. According to the Law on Communal Activities (Official Gazette Nos 30/04, 24/07 and 09/13),

authorized departments of the Government of BD – and all legal and physical persons to which the Mayor consigns the provision for communal services – can provide such services in accordance with the regulations of this Law. The Communal Utility of BD performs activities related to water at local level, such as:

- production and distribution of water
- wastewater treatment and drainage
- sanitary-technical activities and water quality control
- management of public water supply and sewage.

3.2.4 Croatia

The Ministry of Agriculture and Croatian Waters are directly responsible for water management in Croatia. The Water Management Directorate of the Ministry of Agriculture is particularly responsible for:

- monitoring and adapting water management development with the needs of overall economic development of the Republic of Croatia
- protection from the adverse effects of water
- water estate
- irrigation and amelioration drainage
- water protection
- water use for various purposes
- activities of public water supply and public sewerage
- implementation of administrative and inspection supervision in the field of water management
- control of collecting fees and investments in water facilities development from national funds
- defining the national water management policy and coordination of such policy with the policies of other sectors
- coordination of drafting planning documents for water management
- organization and conduct of procedures for public participation in water management
- organization and implementation of the approximation of national legislation to the EU *acquis* in the field of water management
- activities regarding EU affairs in the field of water management
- ensuring the conclusion and implementation of international contracts and agreements and other international Acts in the field of water management
- coordination and supervision of preparation and implementation of projects from pre-accession programmes and structural instruments of the EU and other international sources of finance
- activities regarding approval and application to EU for project funding, and other activities within its scope.

The NWC, appointed by the Croatian Parliament, was established to allow the discussion of systematic issues in water management, coordinating different needs and interests, and proposing measures for the development and improvement of

the water system in the Republic of Croatia. It issues opinions, defines views and proposals, and proposes the enactment of regulations and taking of measures in relation to the issues under consideration.

The Water Services Council was established as an independent state authority to ensure legality in determining the price of water services under the Water Act, and of the development fee under the Act regulating financing of water management. Members of the Council are appointed and suspended by the Croatian Parliament at the proposal of the Government of the Republic of Croatia.

Other administrative bodies are involved in the field of water, including:

- the Ministry of Environmental and Nature Protection: this is involved in the protection of the environment, including water, and in preventing pollution. It is also the competent authority for marine and coastal zone protection
- the Ministry of Health (Sanitary Inspection Directorate), which is competent for control and supervision of the quality of drinking water
- the Croatian Geological Survey, the most prominent public research institute in Croatia in the field of geosciences and geological engineering
- units of local and regional self-government, which have competences and responsibilities over the protection of aquifers as sources of drinking water. They are obliged to enact decisions on protection of a water source with prior consent of Croatian Waters (article 91, paragraph 3, of the Water Act)
- Croatian Waters (Hrvatske vode) is established as a legal person for water management. It acts across the whole territory of the Republic of Croatia within the scope of work prescribed under the Water Act (article 186). Its main activities include:
 - preparing planning documents for water management, such as a draft of the Water Management Strategy or of the RBMP
 - water regulation and protection from adverse effects of water
 - water use: determining water reserves, concern for strategic water reserves, water research works
 - water protection: managing water quality and monitoring
 - calculating and collecting fees for concessions for the commercial use of water
 - calculating and collecting water fees pursuant to the Act regulating financing of water management.

3.2.5 Egypt

At the central level, the Ministry of Water Resources and Irrigation is the ministry that is primarily responsible for water resources management. The headquarters of the Ministry consists of two major departments and four main authorities, responsible for the day-to-day operation of the water system:

- The Irrigation Department provides technical guidance and monitors irrigation development, including:
 - reservoirs and great dams: management of all dams, reservoirs and major water structures
 - horizontal expansion and projects
 - management of publicly owned irrigation systems
 - control and regulation of groundwater use
 - improvement of water use efficiency and water savings
 - Nile protection sector
- The Mechanical and Electrical Department: in charge of the construction, operation and maintenance of pumping stations for irrigation and drainage
- The High Dam Authority: responsible for the operation and maintenance of the High Dam and Aswan Dam
- The Egyptian Public Authority for Drainage Projects (EPADP)
- The Egyptian Public Authority for Shore Protection
- The Egyptian Public Authority for Survey.

The Planning Sector is responsible for overall planning for water resources.

The Central Department for Water Resources and Irrigation coordinates water resources and irrigation development for the various geographic divisions of the country.

The Nile Water Sector:

The National Water Research Center (NWRC) is in charge of studying and proposing long-term policies for managing water resources in Egypt and carrying out applied research to solve technical problems associated with water resources development. The NWRC comprises 12 research institutes: Nile Research Institute (NRI), Drainage Research Institute (DRI), Hydraulics Research Institute (HRI), Water Management Research Institute (WMRI), Research Institute for Groundwater (RIGW), Construction Research Institute (CRI), Water Resources Research Institute (WRRRI), Coastal Research Institute (CORI), Mechanical & Electrical Research Institute (MERI), Channel Maintenance Research Institute (CMRI), Survey Research Institute (SRI) and Environmental & Climate Research Institute (ECRI).

The MWRI also contains decentralized irrigation directorates.

Other ministries involved in water management are:

- the Ministry of Agriculture and Land Reclamation (MALR), which is involved in improving agricultural activities and land reclamation, including water management at the farm level
- the Ministry of Housing, Utilities and New Settlements (MHUNS), which is responsible for the provision of water supply and sanitation services to municipal and industrial sub-sectors
- the Ministry of Health and Population (MoHP), which is responsible for sustaining the environmental status all over the country
- the Ministry of Local Development (MoLD), which is charged with improving local conditions and facilitating economic growth in both urban and rural communities.

The General Organization for Industrialization (GOFI), affiliated with the Ministry of Industry, is responsible for industrial wastewater drainage.

The Ministry of State for Environmental Affairs is in charge of environmental protection policies, and shares the responsibility for water quality with other ministries.

The Egyptian Environmental Affairs Agency (EEAA) of the Ministry of State for Environmental Affairs is responsible for operational functions.

Table 3.2.5.1. Institutions involved in groundwater management

Activities	Institutions
Research, studies and investigation	Research Institute for Groundwater (MWRI) Universities and consultants
Policy development and planning	Planning sector (MWRI) Horizontal expansion sector (MWRI) The groundwater sector (MWRI) Research Institute for Groundwater Relevant ministries
Project implementation	Owners of projects under supervision from: - the groundwater sector - the Research Institute for Groundwater
Monitoring and evaluation	The groundwater sector Research Institute for Groundwater
Public awareness	MWRI (communication unit) Research Institute for Groundwater
Legislation and enforcement	The groundwater sector Research Institute for Groundwater
Operation and maintenance	The groundwater sector Private sector

3.2.6 Lebanon

The Ministry of Energy and Water is in charge of:

- assessing and monitoring water resources and determining water needs
- monitoring surface water and groundwater quality
- preparing attribution and distribution plans for drinking water and irrigation, and a master plan for water and wastewater
- conceiving, building and putting into service major water works such as dams and distribution networks
- artificial recharging of aquifers
- adopting protection measures for efficient use of water and preventing its contamination
- authorizing drilling and water abstraction from the public domain
- undertaking data collection and periodically updating the water maps
- raising public awareness on water issues and the rationalization of its use.

The Ministry of Public Health is in charge of controlling the quality of water.

The Ministry of Environment is in charge of preparing plans and programmes for the sustainable management of natural resources, including water; it is also responsible for its protection from pollution.

At the regional level, there are four public agencies for water and wastewater, in charge of:

- the study, execution, maintenance and exploitation of water distribution projects for domestic supply and irrigation, and the collection, treatment and elimination of wastewater
- proposing tariffs for domestic and irrigation water supply
- controlling the quality of drinking and irrigation water, and of treated wastewater.

The National Agency for the Litani is in charge of executing multiple projects on the Litani River, from irrigation to water supply and hydropower.

At the local level, the municipalities are responsible for the preparation of sanitation and hydraulic plans.

Local committees, under the supervision of the public agencies, are in charge of the exploitation and maintenance of the network.

3.2.7 Libya

The water resources sector is a multidisciplinary field, the control of which is normally shared by different government institutions, depending on the stage of development of water management procedures and use.

In Libya, several institutions are directly involved in the development, management, operation and distribution of water resources and major water projects:

- The GWA
- The Ministry of Agriculture
- The Ministry of Housing and Utilities
- The Ministry of Energy
- The Man-Made River Project
- The General Company for Water and Wastewater
- The General Company for Desalination
- The General Authority for the Environment.

The GWA was formed in 1972 and has undergone several amendments in its organizational structure. In general, it is responsible for conducting studies and research into water resources, and implementing programmes leading to their protection, development and optimum use. GWA is also responsible for the construction of dams and ground reservoirs, proposing water legislations and issuing licences for water well drilling.

The GWA manages the five water zones of Libya through five branches:

- Western zone
- Central zone
- Southern zone

- Eastern zone
- Kufra and Sarir.

The branches are entrusted with the following duties:

- Observing, collecting, classifying and storing hydrological and hydrogeological data (quantitatively and qualitatively); monitoring the general use of water in the zone
- Analysing periodically collected data; following up changes in aquifer conditions
- Preparing annual reports on the water situation in the zone
- Studying applications for water well drilling or for use of existing water supply points
- Licensing exploratory and production drilling in view of the hydrogeological conditions in each region
- Preparing technical specifications and supervising drilling operations according to GWA standards; preparing a final report on each completed well
- Providing technical advice to local administration and agricultural committees
- Issuing regulations for proper and efficient use of water resources in the regions.

Other technical departments that contribute to the performance of GWA are the Survey Department (for the preparation of topographical maps), the Industrial Research Center (for the preparation of geological maps), the Meteorology Department and the National Oil Corporation.

The Ministry of Health and the National Center for Measures and Standards contribute to the protection of groundwater by setting the permissible limits for chemical and bacteriological concentrations for different uses. In addition, they determine the maximum concentrations of all elements that can be allowed for the recharge of aquifers.

3.2.8 Montenegro

The national institutional framework for the management of coastal aquifers and groundwater is complex, and so effective coordination mechanisms are prerequisites for effective outcomes and sustainable development. The coastal zone is seen as one of the key competitive advantages for the country's development yet has limited natural resources and fragile ecosystems. The capacities of the existing institutions are of vital importance for implementation of new policies, legislation and strategies for integrated management approaches. The most relevant ministries for the management of coastal aquifers and groundwater are the Ministry of Agriculture and Rural Development, Ministry of Sustainable Development and Tourism, Ministry of Economy, Ministry of Transport and Maritime Affairs, and Ministry of Health.

Other state administration bodies with important competences for the management of coastal areas and groundwater include the Real Estate Administration, the Directorate for Water, the Council of Water, the Geological Survey of Montenegro, the Statistical Institute (MONSTAT) and the Hydro-meteorological Institute.

Local governments are in charge of preparing plans for protecting water from pollution, and for protection against the adverse effects of water. They are also in charge of the public water supply and public sewage. In addition, there are a number of public enterprises, scientific institutions and other organizations at the national level that have relevance to coastal area. Those seen as having key roles for this project are:

1. Ministry of Agriculture and Rural Development (MARD) has a responsibility for forestry, agriculture and fisheries. MARD is competent for the development of the general water policy framework (including the water management strategy, water management plan for the water basins and programme of measures for each water basin); regulation of water resources, water use and water supply; protection from adverse effects of water; protection of water from pollution; water management information system; and water management registers, etc. The Ministry carries out its work in water management in cooperation with/through the Water Administration.
2. The Water Administration has wide competences in implementing the Water Law, as well as in preparing regulations, plans and programmes to be adopted by the Government and the MARD. Competencies of the Water Administration include protection from the harmful impacts of water; protection of water from pollution; use of water and materials from water courses; preparation of relevant plans and programmes, and drafting of water legislation; and calculation of water management fees and charges.
3. At present the Water Administration is mainly preparing by-laws under the 2007 Water Law, and is making steps towards preparation of integrated River Basin Management Plans. It was decided to start with a pilot project (for a river in northern Montenegro) to build capacities and to be able to replicate the process for other rivers and/or the two watersheds in Montenegro (the Adriatic and Black Sea watersheds).
4. The Marine Biology Institute (MBI) operates as a research institute within the University of Montenegro. Its main areas of work include researching marine animals and plants; researching and examining the chemistry of seawater; providing opinions on impacts of various activities on animals and plants that live in the sea; and occasional monitoring of seawater quality.
5. The Ministry of Sustainable Development and Tourism (MSDT) has several departments: Planning; Construction; Tourism development and standards; Tourism destination management; Housing development; Environment and climate change; Waste management and communal development; Programming and implementation; and EU funds. It also supports the National Council for Sustainability. The main responsibilities of the environment sector are to develop national strategies, policies, laws and standards for environmental protection, including:
 - environmental protection
 - approving or advising on the seven by-laws used to determine the quality of waters, sanitary protection and other issues of importance for environmental protection
 - advising in the preparation of water acts related to certain facilities and activities

- sustainable use of natural resources
 - nature conservation, national parks, protected areas and biodiversity
 - protection of air, climate and the ozone layer
 - protection from harmful effects of ionizing and non-ionizing radiation
 - protection of soil quality
 - EIA, Strategic Environmental Assessment (SEA) and Intergovernmental Panel on Climate Change (IPPC)
 - monitoring the environment and polluters' register
 - environmental economic instruments
 - waste management
 - export, import, transit and disposal of hazardous substances, including
 - radioactive material
 - coordinating wastewater municipal infrastructure systems (coordinating regional water supply scheme; international cooperation on environment)
 - inspecting and supervising, within its competency.
6. The Ministry supplies administrative supervision over the work of several public institutions including the Institute of Hydrometeorology and Seismology of Montenegro (IHMS), Centre for Eco-toxicological Research (CETI) and Public Enterprise (PE) National Parks of Montenegro.
 7. The National Council for Sustainable Development was founded in 2002. Its role is to oversee implementation of the National Strategy for Sustainable Development (NSSD), as well as to review strategic development documents, investment programmes (and similar), to provide for integration of sustainable development approaches into sectorial policies. The Office for Sustainable Development was opened in 2005 to provide operational support to the Council.
 8. The Environmental Protection Agency (EPA) of Montenegro collects and updates data on the quality of all segments of the environment, including water. It performs professional and related administrative tasks in the field of environmental protection, including:
 - environmental monitoring
 - preparing and analysing reports
 - issuing licences
 - providing communication with relevant national and international bodies and organizations, and the public.
 - The main objectives of the EPA are:
 - protecting and enhancing the natural environment in Montenegro for current and future generations, as a fundamental principle of sustainable development
 - performing a transparent and accountable implementation of laws, regulations and policies in the field of environment
 - providing reliable and timely information to the public, national and international bodies and organizations on the state of the environment in Montenegro.
 9. The IHMS is a state administration body that monitors and forecasts in the areas of meteorology, hydrology, air, water and soil quality; as such, it is the competent authority for monitoring the quality of seawater. It has relevant expertise in environmental monitoring and is one of the main monitoring institutions. The IHMS has also taken part in a number of international projects (research, monitoring etc.), and recently incorporated the capacities attached to the former the Hydrographical Institute.
 10. The Public Institution Centre for Eco-toxicological Research (CER) has considerable expertise in analysing pollutants in different media. It is well equipped and is one of the key implementers of the environmental monitoring programmes. CER has accreditations for several analyses and regularly participates in inter-calibrations with other European laboratories. Besides regular monitoring programmes, CER activities in the coastal area include analyses performed in cases of accidents, various ad hoc surveys and research, and participation in international projects.
 11. Under the 1992 Law on the Public Maritime Domain, a specialized agency – Public Enterprise (PE) Morsko dobro – was established. This is governed by a board of directors appointed by the Government, and is fully funded from the revenues collected based on its mandate, which is public maritime domain management. Specific tasks of Morsko dobro are:
 - protecting the public maritime domain (coastal and marine resources) and enhancing its use
 - managing the public maritime domain
 - leasing/handling contracts for the use of the public maritime domain
 - constructing and maintaining necessary infrastructure.
 12. The Ministry of Economy (ME) has competences in the areas of economic development, industry and energy. It submits suggestions to government, in cooperation with the Directorate for Water and with the prior opinion of the ministry competent for water issues, in the area of concessions for using water power for producing electric power. ME is an important actor in the integrated management of coastal aquifers and groundwater, and also supervises the Geological Survey of Montenegro.
 13. The Geological Survey of Montenegro (GSM) is an independent state institution and the most prominent in the field of geology in Montenegro for the past 70 years. It is organized into four departments (regional geology and mineral resources; hydrogeology and engineering geology; mining work and research drilling; and general, legal and financial work) whose activities include performing fundamental and applied geological research. Important areas of work include:
 - providing opinions on the scope and type of research on underground water springs
 - determining and maintaining limits of zones and belts of sanitary protection of springs
 - providing opinions on regulation of classification of waters and categorization of underground waters
 - providing opinions during the process of issuing water Acts for certain facilities and activities.
 14. The Ministry of Transport and Maritime Affairs (MTMA) has a wide range of competences related to the transport system.

Responsibilities particularly relevant for the coastal zone include planning and development of road infrastructure; maritime transport; and prevention, readiness and response in case of accidental pollution at sea. The Maritime Safety Administration 23 (an operational body that acts in case of pollution) and harbour masters' offices in Kotor and Bar (providing inspection and supervision) belong to the MTMA.

15. The Ministry of Health (MH) addresses health protection in the field of water, particularly drinking water. MH is responsible for:
- issuing regulations on the type, method and scope of water quality research and giving its approval or opinion on seven by-laws determining the quality of waters, sanitary protection and other issues related to health
 - providing opinion on decisions on water protection made by the authority competent for issuing water Acts
 - providing opinions during the process of issuing water Acts for certain facilities and activities
 - performing inspections and supervision, within its competency.

3.2.9 Morocco

The Water Department within the Ministry of Energy, Mines, Water and Environment is in charge of the management of surface and groundwater and is divided into:

- the General Direction of Hydraulics, responsible for the policy of the government regarding planning, mobilizing, managing and preserving water, and the planning, maintenance and management of important hydraulic works
- the Direction For Research and Planification of Water studies the master plans for water use in relation to the sectors concerned; studies, manages and controls the use of water resources; proposes draft laws and regulations; inventories and controls the evolution of water resources (surface and groundwater) and their quality
- the Direction of Hydraulic Works, which is mainly in charge of dams.

In the Ministry of Agriculture and Marine Fisheries, the department in charge of Agriculture takes the necessary measures to rationalize the use of water resources in irrigation.

The Ministry of Interior, in its capacity as local government administrative supervisor, controls local public water and sanitation resources.

Within the Ministry of Energy, Mines, Water and Environment, the Environment Department runs and promotes governmental action relating to environmental protection.

The Ministry of Health contributes to the global definition of priority objectives on planning, monitoring and execution of programmes concerned with supply of drinking water and sanitation, and to the programmes on public health.

There are nine hydraulic basins agencies across Morocco. Their competences extend to surface and groundwater and include:

- developing the master plan of integrated development of water resources
- delivering authorizations and concessions for groundwater abstraction
- providing financial and technical assistance to public and private persons; undertaking hydrogeological and quality measures
- proposing and executing adequate measures to avoid water shortage
- managing and controlling the use of mobilized water resources
- keeping the register of water rights, concessions and authorizations.

The mission of the National Agency for Drinking Water is to ensure domestic water supply, control of pollution of water for domestic use and, in some cases, sanitation.

Nine regional agencies across Morocco are concerned with agricultural development. They are entitled to authorize water abstraction (but not drilling a well) for irrigation, and also control law enforcement.

At the regional, provincial, prefectural and municipal levels, local governments play a role in water resources, and are involved in the preparation of the master plan for water management at the regional level or in controlling abstraction points of drinking water.

Coordination and consultation institutions include:

- the High Council for Water and Climate, whose role is to formulate general orientations for water and climate policy
- prefectural and provincial commissions for water, whose role is mainly encouragement and awareness of the protection and preservation of water resources and on water saving measures.

3.2.10 Palestine

Table 3.2.10.1. Institutional framework of the water sector

Cabinet of Ministries	Policy level
Palestinian Water Authority	Water policy and strategy level
Regulatory Water Council	Regulates the provision of W&WW services
National water utility	
Regional water utilities	Municipalities; Water users' associations
	Service delivery level

W&WW, water and wastewater

The PWA is a public institution and enjoys a legal personality. Its budget is part of the general budget of the state of Palestine and reports to the Cabinet of Ministries. PWA has full responsibility for managing water resources in Palestine, and applying principles of integrated and sustainable management of water resources. These responsibilities involve:

- preparing general water policies, strategies and plans, seeking their approval and ensuring their implementation
- surveying the available water resources, and proposing water allocations for various sectors and their utilization priorities on the basis of integrated and sustainable management principles, ensuring effective water demand management
- protecting water resources and their surrounding environment by establishing protection zones to prevent pollution, in cooperation and coordination with relevant authorities
- licensing and developing water resources utilization, in cooperation and coordination with the relevant authorities
- setting a general policy for the planning and evaluation of water and wastewater projects in terms of their economic and social feasibility; setting design and quality control standards, and technical specifications, and monitoring their implementation
- taking measures and developing plans as required to establish and develop the national water company and regional water utilities
- supervising the organization of water and wastewater awareness-raising campaigns
- developing plans and programmes for capacity building, training and qualification of technical staff in the water sector
- endeavouring to achieve equitable distribution and optimal use of water to ensure the sustainability of ground and surface water resources
- developing solutions and suitable alternatives in cases of emergency, and contingency to ensure the continuity of water provision services, in coordination with service providers and relevant parties
- coordinating and supervising scientific research and studies related to water and partaking in development of approved standards of water quality for various uses
- proposing draft laws and draft regulations related to water, and submitting them to the competent authorities for promulgation in due course
- issuing and implementing directives and instructions related to water resources
- establishing advanced systems to monitor precipitation, surface flows, groundwater levels, utilization quantities and water quality, as well as analysing data to determine the safe and sustainable yield of water resources and improving water resources planning
- developing principles and frameworks of water demand management with the aim of improving the efficiency of water supply, usage, conservation, recycling and reuse
- building institutional capacities for the management of shared water resources and deepening regional and international cooperation
- establishing the Water Sector Regulatory Council (WSRC) (a legal personality that is financially and administratively independent) in accordance with Water Law No. 14/2014 by

decision of the Cabinet of Ministries. Its essential functions include:

- approving water prices, costs of supply networks and other services required for the delivery of water and wastewater services
 - issuing licences to regional water utilities and any operator that establishes or manages the operation of a facility for the supply, desalination or treatment of water, or for the collection and treatment of wastewater, and the levying of licence fees
 - monitoring and inspecting compliance with the terms, requirements and indicators stipulated in licences and permits
 - developing performance incentives programmes for service providers
 - monitoring operational processes related to production, transport and distribution of water and operational processes of wastewater management
 - setting quality assurance standards for the provision of services to consumers by service providers, and monitoring compliance.
- establishing the National Water Company (NWC) in accordance with Water Law No. 14/2014. Its financial affairs are pursuant to a regulation issued by the Cabinet of Ministries upon the recommendation of the Ministry of Finance and PWA. NWC is responsible for supply to the water service providers and ensuring and guaranteeing smooth commercial relations with the customers and suppliers. It will undertake any related tasks assigned by PWA
 - establishing regional water utilities (RWU) and water users' associations (WUA) for the provision of water and wastewater, within its specified administration and geographical scope, in accordance with a regulation issued by the Cabinet of Ministries.

The Environmental Quality Authority (EQA) is the regulator of the Palestinian environmental sub-sector. Its responsibilities include safeguarding and protecting the environment; human health; controlling and limiting the degradation of natural resources; combating desertification; and ensuring environmentally sustainable development. It cooperates with PWA in the field of groundwater and surface water quality protection. In coordination with the Ministry of Health, the EQA also participates in setting water and waste standards.

The Ministry of Agriculture (MoA) is responsible for guiding and overseeing the agricultural sector, which represents a major Palestinian water user. The MoA provides planning for agricultural development and extension services influencing irrigation water use and protection of water quality. The MoA is responsible for reviewing and issuing permits (pending PWA approval) for new irrigation water wells.

The Ministry of Local Government (MoLG) is the key link between national government and the municipalities. In the water sector, MoLG is involved in the coordination of municipal water and, in some cases, wastewater operations. It is also involved in processing operator licence applications.

The Ministry of Planning and Administrative Development (MoPAD), through the Infrastructure Planning Directorate (IPD), interfaces with the water and wastewater sector. The directorate monitors infrastructure sector policies and programmes in coordination with relevant ministries and authorities. It has four departments, one of which is Natural Resources and Environment, in which a water section is housed.

Under the Public Health Law of 2004 the Ministry of Health (MoH) is a provider and regulator of the health sector. The MoH is also responsible for regulating standards for drinking water and guidelines for other uses of water. Among its other responsibilities are:

- cooperating with EQA on setting standards for drinking water
- setting standards for disinfection and storage of drinking water
- sampling, and microbiological and chemical analysis of well water
- defining standards for effluent reuse as far as public health and the quality of agricultural products are concerned.

The local authority councils are tasked with providing domestic and drinking water supply services, and wastewater disposal services. This includes defining standards, the regulation of service delivery and the setting of prices in accordance with the approved tariff system.

The bulk Water Utility (WU), as well as the West Bank Northern, Central and Southern Water Utilities and the Coastal Municipal Water Utility (CMWU) in Gaza, are autonomous regional water and wastewater utilities. They are responsible for the provision of water and wastewater services within their specified administrative and geographical scope, in accordance with a regulation issued by the Cabinet of Ministers. The objectives of WUs are:

- providing water and wastewater services to consumers for various uses in line with sustainable economic, social and environment principles
- meeting the need for water of suitable quality, and wastewater services, through implementation of the required and appropriate measures and the development of the necessary plans and programmes to develop these services.

3.2.11 Tunisia

The MoA manages the hydraulic public domain. The Ministry develops plans and programmes for mobilizing water resources and their use for the needs of the country, for the development of non-conventional water resources and for water savings. It has a department in charge of groundwaters which develops studies for evaluating groundwater resources and planning their development. The department develops the monitoring network, models the aquifer systems and ensures control and follow-up of all drilling activities.

The Department of Non-conventional Waters and Artificial Recharge mainly evaluates the quality and quantity of non-

conventional waters and plans artificial recharge works of aquifers with conventional and non-conventional water.

The Office of Inventory and Hydraulic Researches is under the authority of the General Direction of Hydraulic Resources of the MoA. In respect of groundwaters it is in charge of:

- their inventory, and developing new resources
- developing studies to evaluate their resources and characteristics, and planning their development
- monitoring the evolution of the aquifers and their development, to ensure sustainable management.

The MoA is assisted by:

- the Office of Planning and Hydraulic Equilibriums attached to the Cabinet of the Minister, which collects information and data on water. The office is responsible for:
 - allocating resources in conventional and unconventional water
 - determining the water needs of the different socioeconomic sectors
 - collecting information on available and exploitable water resources
 - gathering and analysing the various water demands
 - proposing plans and programmes for water resource allocation to different users, taking into account supply and demand.

It is also assisted by two consultative institutions:

- The Commission of the Hydraulic Public Domain, which gives technical advice on any issue related to the public hydraulic domain
- The National Council of Water, which advises on water strategies with due regard to water demand and climate change, and which presents proposals for the specific situation of over-exploited aquifers.

The Ministry of Environment is in charge of protection against pollution of the hydraulic public domain. At the level of each governorate is a Regional Committee for Agricultural Development (CRDA) under the MoA. Each CRDA manages the public hydraulic domain and the conservation of natural resources, ensuring the implementation of water legislation and regulations.

Regional commissions and Professional Organizations (CROP) exist at the level of each governorate.

3.2.12 Turkey

Several organizations are involved in water-related issues, namely:

- the Ministry of Forestry and Water Works, which manages most water-related issues. Its tasks are:
 - developing strategies to protect nature; designation of protected areas; and protection, improvement and management of national parks, natural parks, natural

monuments, natural protection areas, wetlands, biodiversity and wildlife

- protecting water resources, making policies for sustainable use and national coordination of water management
 - following up international issues on related subjects and realization of national coordination with related institutions.
 - the General Directorate of State Hydraulic Works (DSI), the main organization responsible for water resources management. Its major tasks are:
 - investigating water resources, projects and construction, management and services for flood protection, irrigation, drainage, land reclamation, energy production, stream improvement
 - investigating groundwater resources, well opening, well registration, well licences and protection of groundwater
 - ensuring potable, usable and industrial water supply to cities with populations exceeding 100,000; carrying out investigations, projects and construction for such purposes
 - the Ministry of Environment and Urbanization, established to take the necessary measures to protect the environment and prevent environmental pollution (including surface and groundwater pollution) and identification of the principles and policies needed to improve the environment; and the preparation of environmental plans on the basis of rational use of natural resources, based on both economic and ecological requirements
 - the Ministry of Agriculture and Rural Affairs, responsible for investigating and preparing projects to protect and improve soil, water, plant, animal and fisheries resources and products; to control wastewater discharges into fish production areas; and to monitor nitrates parameters in fresh water and groundwater
 - the Ministry of Health, responsible for determining quality standards for drinking water and water for consumption; monitoring these standards; and preparing legislation in these areas
 - the Ministry of Tourism and Culture, involved in the potable water supply, sewage collection and similar infrastructure of all facilities located in tourist regions
 - the General Directorate of the Electrical Power Resources Survey and Development Administration (EIEI), responsible for surveys related to electric power including hydropower, and for the rational use thereof
 - Special Provincial Administrations (SPA), working under the auspices of provincial governors (Law No. 5302). Their responsibilities in relation to water issues include supplying potable water to rural communities
 - metropolitan municipalities, which have their own authorities to ensure the protection of surface and groundwater water basins in harmony with the principle of sustainable development. The water and sewage administrations within the border of all metropolitan municipalities are responsible for taking legal, technical and administrative measures to distribute water and prevent water pollution. Municipalities are responsible for supplying
- potable water supply, and collection, treatment and disposal of sewage
 - the General Directorate of Rural Services, responsible for efficient use of water resources, the supply of potable water, design and construction of treatment plants in rural areas (cities and municipalities with populations below 100,000). It also carries out small-scale irrigation projects.

4.

FINDINGS AND RECOMMENDATIONS

A study of the summary of the countries' policy, legal and institutional frameworks allows to draw the following conclusions and findings, and to provide recommendations with a view to improving management of coastal aquifers.

4.1 NATIONAL FINDINGS AND RECOMMENDATIONS

4.1.1 Policy/legislative level

Any new water legislation needs to systematically consider protection and management of coastal aquifers, and to introduce provisions related to limits on pollution levels in discharge of solid and liquid waste.

4.1.1.1 No consideration of coastal aquifers in national policies and legal frameworks

In most of the national policies and legal frameworks of the participating countries, groundwater in general receives limited coverage, and coastal aquifers are not mentioned. Groundwater is regulated in a uniform way, and the same management considerations are provided for very diverse situations.

4.1.1.2 Lack of awareness of coastal aquifers and their importance

Coastal aquifers are forgotten even more than groundwater in the national frameworks related to water. There should be plans to raise the awareness of decision makers about the importance of aquifers as water resources in the coastal zone, and of their specificities due to their interaction with the sea. There should also be plans to develop and improve capacities in the ministries in charge of water on the issue of coastal aquifers, and to disseminate this knowledge to the various institutions/agencies involved in the management of water resources in the coastal zone.

4.1.1.3 Developing knowledge and capacities

The countries face the general problem of the lack of available, reliable data that are needed to assess groundwater potential, as well as the quality and quantity of groundwater resources. They also face the general problem of a lack of monitoring systems, which require financial resources.

The number of qualified personnel to perform the monitoring of groundwater resources is limited, and the available technical qualifications are insufficient. Considerable capacity building needs to be considered in this area, as well as enhancement of existing training. Close relations need to be developed between the academic water community and decision makers in order to improve water resources management. Planning of groundwater

management should be based on available knowledge (quantity and quality) and the anticipated needs of the end users of water.

4.1.1.4 Developing water savings

Excessive use (and waste) of water can be linked to the lack of valuation of groundwater resources, and very low tariffs (or even absence of any fee or tariff). Reasonable and equitable water tariffs should be introduced.

Considering that agriculture is the highest water-consuming sector, the introduction of crops requiring less water has to be considered, as well as the adoption of water-saving irrigation techniques. Guidelines from organizations specialized in agriculture are available and could be disseminated in the participating countries.

4.1.1.5 Developing alternative (non-conventional) water resources

Alternative water resources such as the use of treated wastewater for irrigation, artificial recharge or desalination (including the extraction of brackish water from coastal aquifers, and the disposal of brine) can reduce pressure on groundwater resources and coastal aquifers. Guidelines and examples of good practices could be prepared and disseminated through regional workshops and training.

The general introduction of new technologies to help maintain equilibrium between the aquifer and the sea is worth considering, as well as proposing prevention measures that draw on best practices identified in other projects at the level of the Mediterranean basin.

4.1.1.6 Considering the effects of climate change on coastal aquifers

So far, national policies and legislation have not integrated any consideration of the effects of climate change on coastal aquifers. The role of aquifers as water reservoirs in the case of climate change is now well acknowledged; however, coastal aquifers – with their close relation to the sea – might also be affected by sea-level rise. New evaluations and studies on these possible effects should be planned in the near future.

4.1.1.7 Introducing modern principles of water management to legislation

Most national legislation on water resources in the participating countries lacks overall legal principles related to sustainable use, pollution prevention, the precautionary approach, 'user pays', 'polluter pays' and public involvement (the participatory approach). In addition, the legislation does not consider specific ecosystems such as coastal wetlands dependent on groundwater, which need a special framework for their management (e.g. as protected areas). The introduction of environmental principles into national legislation is strongly recommended. A tariff structure needs to be adopted, based on the costs and volumes of groundwater consumed, and which considers the principles of social equity.

4.1.1. Enforcing/acceptability of the legal measures

Existing groundwater provisions in national legislation are often ignored and not respected. Lack of enforcement of these provisions is a general problem. Issues such as illegal wells or broken water meters are widespread, and cause serious threats to and mismanagement of coastal aquifers.

4.1.1.9 Integrated Coastal Zone Management (ICZM)

Any legislation or policy related to integrated management of the coastal zone should integrate the management of coastal water resources, pay special attention to coastal aquifers and consider the harmonization of all existing instruments relating to the coast and the marine environment. With reference to coastal aquifers, such legislation or policy should integrate an obligation for monitoring (as required by article 9 of the ICZM Protocol).

4.1.2 Institutional level

4.1.2.1 Overlapping and gaps in responsibilities between ministries in charge of water resources

This situation is common in most of the participating countries. It creates barriers to effective actions for promoting groundwater management because of the conflict of jurisdiction in water management and the lack of communication between institutions in charge of water management. This results in limited coordination among the various agencies involved in the management of coastal aquifers.

The governance of the water sector needs general improvement. A high-level water board, including all ministries directly and indirectly involved in water management, could be established to coordinate actions and agree upon water policies and legislation.

To improve the management of coastal aquifers, we recommend setting up specific entities for them within the existing institutions in charge of groundwater.

Best practice needs to be disseminated and incorporated into the institutional working modalities.

4.1.2.2 Encouraging public-private partnerships in the water resources domain.

Services such as the treatment of wastewater and its distribution to farmers, or desalination, can be handled by the private sector. Example of such practices and success stories could be disseminated to the participating countries for development in coastal zones, where different economic interests are competing for water resources.

4.1.2.3 Encouraging stakeholder engagement in the water sector (water governance)

Managing the size and nature of water challenges in the future requires a coordinated effort among policy makers and the wide range of stakeholders who play a role in, and are affected by, actions and outcomes in the water sector.

Stakeholder engagement is a deciding factor in the ability of governments to successfully address and overcome the challenges they are facing in supplying and managing water. In time of financial constraints, the public sector is particularly challenged by increased demands from citizens who wish to be more engaged in how public policy decisions are made. Accordingly, we strongly recommend highlighting the importance of stakeholder engagement when designing and implementing water policy and projects.

4.1.3 Regional level

The Barcelona Convention has been extended to address the coastal areas. The Protocol for the Protection of the Mediterranean Sea against Pollution from LBS and Activities deals with groundwater as a land-based source point of pollution to the Mediterranean Sea, and so covers a limited aspect of the management of coastal aquifers. The objective here is protection of the sea (as indicated in the Protocol's title) and not the proper management of the coastal aquifers as an important source of water in the coastal zone. The Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA) offers protection for areas such as coastal wetlands, which in the coastal zone often depend on coastal aquifers, but does not cover coastal aquifers as such. The ICZM Protocol is the one dealing the most with water resources in the coastal zone and mentions coastal aquifers as such and specifies a monitoring requirement for the Parties.

However even if this progress of the consideration of coastal aquifers is to be fully acknowledged, there are still gaps to be filled. To raise awareness of coastal aquifers at the regional level, and to integrate their specificities in coastal zone management strategies and plans, we recommend:

- encouraging the countries concerned to deposit their instruments of ratification, acceptance, approval or accession of/to the ICZM Protocol
- that countries take up the Integrative Methodological Framework (prepared in the frame of the MedPartnership project by UNESCO-IHP, PAP/RAC and Global Water Partnership-Mediterranean (GWP-Med)) and its consideration of coastal aquifers in the establishment of management plans
- creating a platform for the exchange of knowledge and technologies adapted for coastal aquifers between countries in the region
- using and continuing the development of the online coastal aquifer database for the Mediterranean region
- considering the findings and recommendations of the Coastal Aquifer Supplement prepared by UNESCO-IHP in future actions in the region, and pursuing its adoption as a main document under the MAP process
- disseminating and adopting the recommendations of the Action Plan at a high level.

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MANAGEMENT OF COASTAL AQUIFERS AND GROUNDWATER

LEGAL, INSTITUTIONAL AND POLICY ASPECTS OF COASTAL AQUIFER MANAGEMENT

In the framework of the GEF/UNEP-MAP Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem, UNESCO-IHP executed the sub-component on “Management of coastal aquifers and groundwater” with the aim of reversing the trends of over-extraction and degradation in the quality of coastal aquifers through policy interactions to provide appropriate capacity and technology for groundwater management.

In view of improving the understanding of the different water management contexts of the region, UNESCO-IHP has undertaken an assessment of the legal, policy and institutional aspects of coastal aquifer and groundwater management in collaboration with designated representatives of the participating countries of the MedPartnership project. The results of this assessment are set forth in the present report, which provides a summary of the different national situations as well as a set of findings and recommendations at the national and regional levels.

It is hoped that the knowledge generated from this activity will contribute to informed decision making about future interventions for the protection and sustainable management of coastal aquifers in the Mediterranean region.