



WATER STRATEGY in the WESTERN MEDITERRANEAN

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WATER STRATEGY in the WESTERN MEDITERRANEAN

1. Preamble

Water is essential to sustain life and develop societies. In the Western Mediterranean, water is a scarce and threatened resource. The Strategy for Water in the Western Mediterranean (WSWM) aims at providing a guiding document with orientations and objectives on water resources management and protection agreed by the Western Mediterranean countries, supported and enriched through inputs from stakeholder groups.

The long-term WSWM's objectives are to preserve water quality and to balance quantity of used and available water to achieve regional sustainable economic growth, social prosperity, access to water for all and environmental protection and rehabilitation. The WSWM aims at stimulating the development of policy, cooperation and technological tools, promoting the exchange of knowledge and contributing to share prosperity.

The WSWM is structured around 13 priority issues, grouped in three thematic blocks: starting on the cross-cutting subjects and widely accepted basic orientations on water management, followed by regional interest issues adapted to the specific context of the Western Mediterranean, and the last one focuses on more technical objectives, according to the specificities proposed by the 10 countries in order to improve water management.

In order to address specific water challenges and help achieve solutions to problems of regional concern with a focus on sustainability, an Action Plan will be developed and followed-up. The Action Plan will assist in the successful implementation of the WSWM and will be annexed to the Strategy and will compile the proposals from the 5+5 Members. It will detail projects and initiatives with specific objectives, geographical scope, financing plans, foreseen indicators and schedule, and it will allow to visualise the most pragmatic part of the Strategy.

2. Background

The Western Mediterranean Forum, commonly referred to as 5+5 Dialogue, was officially launched in Rome in 1990 as an informal sub-regional forum of countries geographically situated on the western rim of the Euro-Mediterranean littoral and comprising of Algeria, France, Italy, Libya, Mauritania, Morocco, Portugal, Spain and Tunisia. Malta became a member in 1991.

As a trans-Mediterranean security initiative, the rationale of the 5+5 Dialogue is to secure closer cooperation between the five EU member states and the five Arab Maghreb countries through political dialogue and economic cooperation and by encouraging more efficient management of resources as a means of enhancing regional interdependence and development.

The importance of achieving a closer and action-oriented cooperation among the Mediterranean riparian states is reflected in the development and implementation of several regional processes including in the efforts of consolidating the Union for the Mediterranean (UfM). Water and Environment form one of the six priority work areas of the UFM Secretariat. The UfM aims at making substantial contribution to depolluting the Mediterranean Sea, promoting environmental sustainability. Water within this framework represents an essential resource to protect and manage.

In that context, the Euro-Mediterranean Ministerial Conference on Water (Dead Sea, Jordan, 22 December 2008) agreed to prepare a shared and long-term Strategy for Water in the Mediterranean and approved guidelines for its elaboration. Despite the fact that there was general consensus from all the countries and experts involved on the technical contents, the references to the main geographical conflicts in the region made it impossible to adopt the Strategy.

Spain and Algeria consider that the adoption of a water strategy for the Western Mediterranean basin is a necessary step to promote a common policy that could help prevent conflict, foster development and contribute to the respect of the human right to water and sanitation by meeting water demands in water scarce

environments in a sustainable manner. To this end, they have joined forces to launch a joint initiative in the 5+ 5 Forum context.

This proposal was endorsed at the Malta Summit held in October 2012 by the Heads of State and Government of the 5+5 Dialogue. The 5+5 Foreign Ministers agreed in Nouakchott in April 2013 to ask for the support to the European Union to develop this strategy.

The initiative was announced during the 68th Session of the UN General Assembly in New York and officially launched at the first 5+5 Economic Forum held in Barcelona on 23 October 2013.

The first Workshop to launch a Water Strategy for the Western Mediterranean took place in Valencia on 25-26 February 2014, a second one in Oran on the 26th of June and a third one in Valencia on the 9th September, all with the participation of the official delegations and relevant regional entities and organisations.

During these workshops the main interest issues common to the 10 countries and regional entities have been broken down, synthesised and prioritised. These reflect, firstly, the characterization and current problematic of our common area in relation to water and, secondly the main joint priorities presented by the different national delegations.

3. Rationale

The constraints associated to water management in the Mediterranean, although well-known, are subject to a huge dynamism due to global changes such as climate change that will aggravate extreme phenomena (floods, droughts....) and regional variations such as population and tourism-related pressures in the coastal areas.

Beyond general considerations, a common strategy on water issues is necessary to identify, face and compare the specific challenges of the 5+5 Dialogue countries.

Thus, the 10 countries share a very sensitive physical environment (touristic coastal areas, water courses with severe droughts, catastrophic floods, saline intrusion sensitive aquifers, etc.) and the same growing threats (permanent and seasonal population growth, economic development, irrigation surfaces increase, etc.).

More specifically, most of the countries within the 5+5 dialogue share the Mediterranean coasts which determine very similar characteristics. These countries are generally mountainous, sensitive to erosion, with highly populated coastal areas which demand more and more water and discharging all kinds of residue (whether treated or not) to the same sea, the Mediterranean.

Moreover, they are under the total or partial climatic influence of the Mediterranean. The Mediterranean climate, characterised by warm and dry summers and mild, humid winters together with a particular rainfall regime form a unique bioclimatic space that has favoured the intense development of its agriculture.

The following issues should inspire a common strategy and are linked with the afore mentioned global characteristics:

- The awareness of a water demand growth and the discharge production linked both to population and economical development, within the context of a scarce resource that might be reduced by the foreseen climate changes.

- The concurrence of water uses, particularly between water for urban supply, agriculture, energy and industry, with political priorities (food security, industrial development, etc.) and environmental priorities (renewable energies, climate change prevention, resources protection, etc.). All these links will be intensified by the importance of the agricultural sector and rural spaces within the territorial balances and by the need for economical development in the Mediterranean countries. Nevertheless, it must also be taken into account that agriculture can impact on the condition of all natural resources and depends on the sustainable use of natural resources for long term productivity and profitability.
- Seasonal management of the resources, from severe summers to floods and from dry to humid years.
- Prevention and protection of water resources quality, whose scarcity increases its vulnerability. It is necessary to protect all water bodies: frequently overexploited aquifers, water courses (intermittent or not) and wetlands, essential for bird migration between the two shores of the Mediterranean and between the North of Europe and the South of the Sahara.
- Prevention and protection of floods, often catastrophic due to population concentrations in lower areas, and lack of sustainable urbanisation and land use plans.

But beyond these common problems, the 5+5 countries must also face other challenges related to water that differ from one another due to the particularities of natural environments or the geopolitical areas where they are located.

Thus, most of the 5 European countries of the 5+5 dialogue are in a globally rich area in regards to water resources. Institutionally, they have a long and solid experience in implementing common water-related policies and regulations, under the European Water Framework Directive. The European

Union is present as a higher stakeholder in water policy amongst the Member States and their orientations and/or directives must be taken into account within any actions these States might want to initiate or coordinate.

The 5 Southern countries are, on the contrary, in an area with much less water and are often required to use non-renewable groundwater resources to meet their needs. Through the Arab Maghreb Union they constitute a geopolitical space under construction, where progress needs to be made in the water policies integration in order to harmonise them and make them more coherent.

These different scenarios refer also to different questions that should not invalidate collective exchanges and approaches. The long term construction of a more integrated Euro-Mediterranean geopolitical space will only be possible through the convergence of approaches and policies. Thus, the 5+5 dialogue could be the laboratory, particularly in regards to water in the Mediterranean context. The results of this “living lab” would have the objective of being exported to Mediterranean and multilateral Fora and to the most important water-related Fora in the World.

Within this space “under construction” each country has certain knowledge that must be shared and certain responsibilities that go beyond their borders. This feeling of collaboration with neighbour countries is an obligation and the base of solidarity between the Northern and Southern shores of the Western Mediterranean.

With political support and based on the agreed priorities, a Water Strategy in the Western Mediterranean presents opportunities to efficiently face water challenges in the region.

For this reason, it will be necessary to appoint a national focal point in every country within the 5+5 Dialogue and partners to follow-up the implementation of the strategy and to assess the progress made.

4. Major priority issues for the Strategy

The countries, organisations and regional bodies involved in this process have identified 13 priority issues, for which the objectives to reach and challenges to face through this Strategy have been defined.

The order of the 13 priority issues does not respond to a higher importance of some before others, but to the grouping of the issues into three thematic blocks from more general principles to more specific interests in water management in the Western Mediterranean.

Based on this criterion, three thematic blocks have been defined, starting on the cross-cutting subjects and widely accepted basic orientations on water management. The second block describes the regional interest issues adapted to the specific context of the Western Mediterranean, and the third block focuses on more technical objectives, according to the specificities proposed by the 10 countries in order to improve water management.

These three thematic blocks are aimed at:

- 1- Enhancing Western Mediterranean country policies' convergence towards the general principles of a sustainable water policy.
- 2- Fostering cooperation on regional interest matters.
- 3- Promoting water management improvement.

4.1. Enhancing Western Mediterranean country policies' convergence towards the general principles of a sustainable water policy:

Priority 1: Developing and starting up clearly defined legal frameworks

a- Governance development and/or consolidation

Progress on design and implementation of water governance reforms can be documented in most of the Western Mediterranean countries. However, more sustainable governance approaches need to be established at local, national and transboundary levels, inspired by appropriate and internationally accepted IWRM principles and practices, including management at the appropriate local (catchment, basin, sub-basin) level. In this respect, many Mediterranean countries still suffer from lack of planning capabilities, effective operational strategies, fragmentation of responsibilities between authorities including decentralisation concerns, weak policy implementation and law enforcement.

The basins of rivers, lakes and aquifers are the relevant natural geographical territories in which to organise an integrated and sound management. River basins are the natural territories in which water runs on the soil or in the sub soil, whatever are the national or administrative boundaries or limits crossed.

Furthermore, water administration depends not only on the specific institutions that directly manage water resources but also on the overall governance context in which the reforms occur. Decentralisation, access to information, participatory approaches, gender equity, transparency in decision making and accountability are among the key elements for good water governance. Local authorities play an increasingly active role in provision of water and sanitation services to the public though their role need to be further strengthened and assisted. Decisions concerning the appropriate degree of decentralisation need to consider also the presence of economies of scale in service provision.

Water governance-related objectives need to:

- Ensure that water is managed as a primary/basic human need and that water supply and sanitation are essential social services.
- Promote and strengthen decentralisation to the most appropriate level (“principle of subsidiarity”).
- Promote collaboration at transboundary and sub-regional level as a means for avoiding conflict and promoting peaceful cooperation.

To reach these objectives it is recommended to:

- Reform institutional settings supported by the clear definition of roles and responsibilities to reach a balance between central and river basin management.
- Facilitate citizens’ access to information and their understanding of decision-making mechanisms to increase confidence in institutions and policy formulation.
- Encourage statutory institutions to provide stakeholders with sufficient information and incentives so they can have an active participation.
- Establish legal frameworks and use existing ones to provide solutions that guarantee users’ rights, developing an effective legal framework and appropriate institutions that impose clear obligations on public authorities regarding access to information and public participation and access to justice.
- Encourage public organisations to consider citizens’ needs and uphold their main rights on: gender equity, pro-poor policies, human rights and integrity.
- Develop and/or update management and protection plans of IWRM and river basin management plans that bear in mind national development strategies under a perspective of long-term sustainability, to serve future as well as present users of water services.

- Apply economic and financial tools for investment, cost recovery and behaviour change to support the goals of equitable access and sustainable benefits.
- Provide support in regards to knowledge to the countries involved in the necessary phases of the reform process for efficient water governance, through public policies dialogues between decision-makers at different levels.
 - Offer a technical platform to discuss analytic works on water governance through knowledge exchange and sharing.

Priority 2: Establishing governance adapted to integrated water management

a- Integrated resources management

Integrated Water Resources Management is the practice of making decisions and taking actions bearing in mind multiple points of view on how to manage water in order to harmonise demand satisfaction and the definition and achievement of environmental objectives for water bodies.

Sectorial approaches have been dominant in the past in regards to water resources management, but they result in a fragmented and uncoordinated development and management of the resource. Consequently, inefficient governance of this finite resource aggravates the increasing competition related to water resources. The lack of inter-sectoral relations leads to conflicts, waste and non-sustainable systems. IWRM allows the coordination and collaboration amongst individual sectors and promotes stakeholder participation, transparency and a profitable local management.

Public and users' participation in water management is a key element. Its proactive approach can deliver optimal decisions that are more acceptable and better implemented on the ground.

Planning of land use, agriculture, urban development, hydropower, navigation, flood protection all have potentially important impacts on water resources. The River Basin Planning process offers a unique opportunity to interact with these sectors and to develop a framework within which these activities should take

place in a sustainable way. This requires integration of water policy objectives into the development and planning of economic activities that rely on water.

Actions to be developed for a better IWRM could include:

- Contemplating IWRM principles in national water management frameworks in particular through the conjunctive planning and use of water supply augmentation and water demand management measures.
- Preparing and regularly updating the River Basin Plans incorporating user associations and stakeholder participation as a basis for decision making.
- Enhancing consolidation of integrated multidisciplinary water management; look for solutions that balance environmental protection and sustainable economic development in the long term and, when necessary, adapt legal and administrative approaches.
- Ensure major water users are known and are managed through a licensing or permit system. Implement water allocation in accordance with sustainable use, economic efficiency and social equity principles.
- Securing gradual convergence between the set objectives of water quality improvement and water scarcity mitigation.
- Implementing effective monitoring systems that provide essential management information and identifying and responding to infringements of laws.

b- Transboundary resources governance

Regional cooperation on transboundary waters is a public good that benefits all parties and can open new opportunities for riparian states to sustainably develop water resources.

In the Western Mediterranean countries many of its resources are shared between several countries and it is necessary to promote equitable and

cooperative development in transboundary water management, both in individual basins and globally, by:

- Promoting the formation of management frameworks for transboundary waters, building on existing international frameworks serving as mechanisms to strengthen international cooperation and national measures for the sustainable management of transboundary waters.
- Developing tools and methods to unpack the development opportunities in a transboundary water setting, outlining the incentives and benefits of deepening cooperation between parties sharing transboundary waters.
- Using existing institutional platforms and facilitating new ones for sharing experiences, knowledge and perspectives and tools, to better equip managers and institutions of transboundary waters to collaborate effectively.

c- Coastal water management

Coastal waters are valuable resources. Their massive habitation and growing migration to the sea edge has brought with it serious side effects. More people have increased the need for infrastructure such as roads, sewers, sewage treatment facilities, bridges. The exploitation of the oil and gas resources from ground under oceans is a high risk activity. Development, as well as contamination from pesticides and herbicides, industrial pollutants, sewage spills, and other sources of pollution, are degrading the quality of coastal ecosystems. Construction and intensive development are threatening fresh groundwater that is especially vulnerable at sea level.

Coordinated management is needed to protect the land and water quality of coastal environments. The following themes are identified to be the main challenges for the Coastal Water Management for the coming future.

- Effective application of Integrated Coastal Zone Management, widened to coastal sea areas and clearly linked to statutory planning and regional development.

- Coordination of the different use demands in sea areas.
- Foster protection intensity to maintain biodiversity at coastal zones.
- Establish risk management tools for coastal zones: both risks from human activities and from natural induced hazards (climate change, sea level rise, etc.).

Priority 3: Implementing cost-recovery

a- Water service financing

Sufficient and sustainable financing is a prerequisite of a functioning water sector, which ensures the sustainability of public water services, which itself is necessary for human and economic development, social stability and peace. Improved management of water resources and services induce major economic and environmental benefits and may create more jobs.

Insufficient funding leads to the deterioration and eventual collapse of water infrastructure resulting in large populations without access to the water services of the appropriate quality and an inadequate protection of water resources.

In the Western Mediterranean Region, as anywhere else, there are only three sources of revenue for the water sector: tax-based public spending, tariffs from users, and transfers from other sources.

Today, in a number of Mediterranean countries the water sector and related institutions are seriously underfinanced. Current trends indicate that tariffs for water services and state subsidies are mainly used for operation and maintenance costs of the infrastructures related to water supply and sanitation.

Optimising water financing in Mediterranean countries is of paramount importance to achieve water and sanitation policy objectives, and to achieve the associated socio-economic and environmental benefits.

To establish and support the principle of cost recovery it is necessary to:

- Develop socio-economic models for national strategic choices for water allocation between agriculture, industry and domestic uses, taking into account environmental, social aspects and economic development needs.

- Carry out cost effectiveness and cost benefit analysis, which are of utmost importance for the choice of water demand management measures and ensure the implementation of effective and proportionate pricing policies.
- Develop sustainable strategies for cost recovery by combining three sources of revenue: public funds, tariffs from users and transfers from other sources (including official development assistance, remittances and all other transfers that do not need to be repaid).
- Ensure transparency and fairness of water pricing policies and base them on metering.
- Promote systems accountancy and implementation of block tariffs where appropriate to avoid over-consumption in populations. Using satellite remote sensing for regional monitoring of irrigated areas in agriculture
- Use pricing structures adapted to social circumstances such as poverty, income level and family size. This will ensure access to clean water and sanitation for the most disadvantaged sections of the population at a reasonable price.

b- Polluter-pays principle

The polluter pays principle as an important foundation underlying for the development of normative frameworks for sustainable water management. Polluters are responsible for the pollution they have caused and should bear the cost of measures aimed at preventing and reducing pollution.

Negative environmental impacts of the use of our resources consist of both pollution and depletion of natural resources. Therefore, sustainable water management should not only concern the prevention and remediation of pollution caused by emissions of pollutants, but also encourage a prudent use of scarce water resources.

The implementation of this principle in Mediterranean countries is fundamental in order to achieve the objective of a good status of their water bodies and associated systems. To reach this objective, it is suggested that the countries promote introduction of environmental standards including the 'polluter pays

principle'. For this purpose it is necessary to establish inspection and monitoring mechanism with an emphasis on effective law compliance and enforcement system.

4.2. Foster cooperation in relation to regional matters.

Priority 4: Capacity building

a- Improving knowledge and training

Water resources are an integral compartment of our environment, whilst water projects and users are an essential catalyst for all socio-economic activities. The coherent dialogue between water users and decision-making agents is a key factor for the water governance and must be based on knowledge and information of good quality.

Organising the access to the necessary data and information for water management is often difficult due to many reasons. As a result, the capital of data which already exists and has been produced at a high cost is under exploited and the capacities for producing information necessary to an efficient water policy implementation are limited. In many cases this situation generates negative economical impact due to the non access to data and duplication of works, but it can be even more negative in case of wrong decisions taken due to lack of important information.

The efforts aimed to improve the knowledge on water should be directed at:

- Ensuring the capacity building of water management and environmental protection administrations, technicians, users and all competent stakeholders in order to empower them to better fulfil their roles.
- Education and training on data production and exchange.
- Fostering water information systems and platforms about Mediterranean knowledge on water to allow a water status diagnose in the region.
- Ensuring the optimal use of available tools.

b- Exchanging experiences

It is necessary to disseminate and promote the application of knowledge, tools and methodologies to improve water resources management and water related services by documenting and distributing good practices. It is also necessary to provide tailored capacity building programmes and build knowledge platforms for actors to share experiences, insights and perspectives on water management.

In order to face the current and future challenges in regards to knowledge and experience transfer it is necessary to:

- Facilitate knowledge and expertise exchange at national, local and regional levels.
- Make use of regional organisations and networks in the Mediterranean to share and disseminate experiences and knowledge in the region.
- Establish agreements with border countries for integrated water management approaches for data exchange, education and training in the sector.

Priority 5: Innovation development in the water sector.

a- Optimisation and innovation in water uses

Research, development and innovation (R+D+I) are the engine of technological progress and, therefore, of social and human well-being in all their dimensions. Water is not an alien environment to this reality and, as an essential good for any type of life, its R+D+I must be addressed as a priority.

Periods of extreme scarcity or excess rainfall occur more and more frequently in our region and good quality water demand for different uses must be met in order to ensure a balanced and sustainable development in the Mediterranean. Policies encouraging the development of infrastructures and modern, efficient technologies must be put in place.

- The efforts aimed to improve the innovation in water should be directed at:

- Strengthening networks for sharing knowledge through a water use / innovation network as a tool for regional integration.
- Developing technical strategies for a better efficiency of water systems by assessing the current status, formulating adequate goals and establishing the necessary and most appropriate measures.
- Ensuring that new investments in wastewater reuse are properly assessed and prioritised by conducting state-of-the-art economic analysis of water reuse projects.
- Fostering research and training to develop wastewater treatment technologies to adequate water to its use.

- Increasing regional R&D cooperation on desalination technology to ensure that the Mediterranean becomes an innovation hub in desalination technology.
- Establishing policies and encouraging the development of technologies to minimise the polluting impact of hydrocarbons exploitation plants.

Priority 6: Water-energy-food nexus

Water, energy and food are strongly interlinked: the systems that help produce and bring fresh food and energy as well as clean, abundant water to all of us, are intertwined. It takes water to create food and energy, it takes energy to move and treat water and to produce food, and sometimes we use food as a source of energy. These systems have become increasingly more complex and dependent upon one another. As a result, a disturbance in one system can wreak havoc in the others, so it's important to achieve a sustainable balance between the three.

Water is required to produce, transport and use all forms of energy to some degree; and energy is required for the extraction, treatment and distribution of water, as well as its collection and treatment after use. Water and energy are also highly interdependent, with choices made in one domain having direct and indirect consequences on the other.

Growing demands on water resources resulting from food production, population growth, economic development and urban expansion will create additional pressure on water intensive energy production. Climate change will add to the pressure. Droughts, heat waves and local water scarcities of the past decade have interrupted electricity generation, with serious economic consequences. At the same time, limitations on energy availability have constrained the delivery of water services. Growing demand for finite water resources is also leading to increased competition between the energy sector and other water-using sectors of the economy, principally agriculture and industry.

In the Western Mediterranean Area, water scarcity, hydrological variability and the impacts of climate change on water availability and energy production are increasingly recognised as critical. Targets set to increase the share of renewable energies have led to renewed interest in developing pumped storage.

The development of new hydropower capacity is not always compatible with other water uses. The benefits of hydropower as a highly reliable CO₂-free and renewable source of electricity production but also the need to maintain the ecological functions of hydropower-affected water stretches have to be taken both into account to achieve a proper and well-balanced approach to meet climate, water & nature protection objectives.

Permanent efforts in terms of technological advances and developed solutions are observed to mitigate the uncertainties on water quality, human health and long-term environmental sustainability from the development of unconventional sources of gas ('fracking') and oil ('tar sands'), both of which require large quantities of water.

The countries are struggling to meet growing demands for water and energy services directly linked with food security.

It is necessary to:

- Coordinate and include programmes, plans and projects affecting the water environment (such as hydropower, land planning, agricultural development...) in the River Basin Plans and use Strategic Environmental

Assessment as valuable mechanisms while developing these plans and programmes.

- Highlight the opportunities for synergies in infrastructure development, operation and maintenance.
- Settle the challenges and response options faced by food and agriculture, including biofuels, in relation to water and energy.
- Analyse the role of industry as a potential leader in the development of innovative approaches to efficiency, and the introduction of water saving measures and techniques that use renewable energy sources in the water sector.
- Analyse the costs of market food supplies in terms of water and energy consumption.

Priority 7: De-pollution of the Mediterranean

Around 150 million people are concentrated on the 46,000 km of Mediterranean coastline, with 110 million of them living in cities; some 200 million tourists arrive in the Mediterranean region every year; more than 200 petrochemical and energy installations, chemical industries and chlorine plants are located along the Mediterranean coast.

These figures represent the major challenge for the preservation of the environment to which Mediterranean countries have been devoting specific attention over the past decades, engaging themselves to prevent, halt, reduce and ultimately eliminate the main sources of pollution for the marine environment, 80% of which originate from human activities on land: industrial emissions, municipal waste water treatment and disposal.

The preparation and adoption by the Contracting Parties of the Barcelona Convention of a Strategic Action Programme of regional and national activities to address land-based pollution is one of the major breakthroughs in the

Mediterranean countries' efforts to combat land-based pollution. In line with these targets, National Action Plans have been developed, describing policies and actions that each country intends to undertake to reduce pollution.

Among other organised efforts, the Horizon 2020 Initiative to depollute the Mediterranean aims at tackling the most significant related challenges. Scattered pollution sources are affecting streams, groundwater, coastal areas and the marine environment representing a growing threat for ecosystems and public health.

It is necessary to take concrete actions to combat water land-based pollution, among others:

- The establishment of legal and national political frameworks in order to promote wastewater treatment.
- The set-up of discharge inspection and control systems and the application of the polluter-pays principle.
- The creation of synergies with the already ongoing initiatives of the MedPOL Programme (Strategic Action Plans-SAP MED, implementation of the National Action Plans) and the Euromed -now UfM- initiative "Horizon2020" to mobilise more national and international funds.
- The establishment of a regional programme to set up a chain of integrated management of industrial liquid effluent discharges.

Priority 8: Mobilising water-related innovative financing solutions for the application of the Strategy

Given that water resources are becoming more and more scarce while water demand and pollution of waters continue to increase, Mediterranean countries must become involved in investment projects in order to improve the efficiency of their different water uses.

Delivering exemplary projects in the region is a core objective, implying reliable and updated information to select and support the best projects mainly aiming

to minimise water demand, to modernise irrigation techniques, to promote watersaving behaviour among the users, to develop non conventional resources, to mobilise available resources, to carry out water transfers, to fight against pollution and to rehabilitate water or sanitation networks. All the above actions have to take in due account social and environmental considerations as well as technical and economic data.

The objectives associated to the Strategy financing must:

- Create an investment friendly regulatory frame.
- Develop financing strategies to improve the overall financing of the water sector through sustainable cost recovery policies, transparent financing mechanisms and realistic targets.
- Encourage private investments in the water sector by promoting public-private partnership and strengthening public regulation of the sector.
- Improve the supply, effectiveness and accessibility of bi- and multilateral finance at a regional, national and local level and improve the quality of subsequent projects and activities.

4.3. Promoting water management improvement

The order of the priorities described within this block responds to the importance shown by the countries on how to face in an operational manner the particularities of water management in the Western Mediterranean.

In many regions of most Western Mediterranean countries, water resources are heavily exploited and some of them reach water exploitation indices over 20%, which identifies stressed and severely stressed systems. Access to good quality water in sufficient quantity is fundamental for sustainable livelihoods and to most economic activities. With rapid population growth, environmental degradation and climate change impacts, it is difficult to satisfy all water demands by increasing the supply. Therefore, an integrated approach for water resources management, based on water demand management and the sustainable use of non-conventional water resources is absolutely vital if the

Mediterranean community is to ensure that enough water is available to all Mediterranean citizens, economic activities and the environment.

Priority 9: Climate change adaptation

Impacts of climate change on the Mediterranean region, and particularly on vulnerable countries, have been identified as a major climate change hotspot and challenge. The Mediterranean faces aggravating climate-related vulnerabilities and impacts on freshwater resources, water security, extreme weather events such as floods and droughts, farming systems and food security, human health and urban infrastructure, energy, tourism, and economic growth

Phenomena such as recurrent and persistent droughts, overall decrease in precipitation, followed by river flow decrease, more intense rainfall over fewer days causing floods and soil erosion, serious long-term decrease of soil moisture accelerating desertification are expected to intensify significantly. Other serious impacts of climate change, notably global warming, will result on the impact of the sea temperature and the rise in sea level resulting in increasing the susceptibility of coastal aquifers to salt intrusion in response to aquifer overexploitation. It will also produce the loss of inhabitable and arable land as well as serious alterations of natural habitats in a Region already experiencing increasing developmental pressures in the coastal areas.

The impacts produced by climate change can be aggravated when occurring in regions that already present low water resources levels and frequent droughts, and, hence, imbalances between water demands and available resources. The Western Mediterranean is very vulnerable to climate changes due to the high spatial and temporal irregularity of water resources, the elevated degree of water use and linked socio-economic impacts, in addition to its location in an area projected to have temperature increases and precipitation decreases.

The range of related existing institutional instruments to address these challenges is wide. However, it has proven inadequate to fully address a complex phenomenon with no boundaries: adaptation policies and operational tools including capacity building have not yet been properly developed at national level, while at the moment national and local water management plans do not always take climate change impacts adequately into account.

Adaptation of water resources to climate change impacts-related objectives need to:

- Provide an integrated and strategic regional approach to existing and emerging challenges, reversing the current spontaneous and fragmented practices followed in most cases.
- Ensure effective measures that are fast, extensive, focused and integrated, at regional, national and local levels, enhancing the resilience of water resources to droughts and reducing risk of floods, through improved integrated resources management.
- Be based on enhanced scientific evidence and an enlarged knowledge-base regarding the evolution of climate and its impacts.

Actions to be developed in order to attain these objectives should:

- Develop methods, models, data sets and prediction, and acquire early-warning tools and vulnerability indicators to enhance the knowledge-base on climate change effects and vulnerable areas.
- Establish national plans for climate change adaptation including the measures to mitigate its effects. Ensure a less vulnerable development path, adopt proactive rather than reactive measures of risk management and promote the establishment of institutions that are capable to decide the acceptable level of risk, to analyse it regularly and to provide measures to reduce it.
- Take into account climate change impacts in the river basin management plans and in water infrastructure plans, programmes and projects.

- Promote incentives as risk insurance approaches for scarcity and flood protection.
- Create a regional financing instrument to fight climate change.
- Support investment projects that positively contribute to climate change adaptation.

Priority 10: Increasing and mobilising the available resources

Due to its strong sun exposure, there is a high demand of water for agriculture in the Mediterranean, as well as larger population densities along the coast, extreme tourism-related pressures and elevated evapotranspiration. Moreover, the scarce precipitation is unevenly distributed in time and occurs with a high inter- and intra- annual variability. All these factors result in the water deficit in the Mediterranean region that cannot always be solved by an appropriate demand management. In these cases and, in order to meet the high water demand, it is necessary to increase and mobilise the available resources, which requires important investments in infrastructures.

a- Dams and/or transfers

The most conventional infrastructures for this purpose are the construction of dams and the water transfers. Regulation dams allow to increase the available resources in order to meet existing water demands and are more necessary the higher the variability of the hydrological regime.

Water demands can be met through water transfers from surplus basins to deficit basins. These transfers must be developed under a strategic territorial planning in the framework of sustainable development, in order to obtain a robust, long-term solution. The environmental impact of these infrastructures cannot be overlooked, so measures will have to be taken in order to minimise this impact.

Actions to achieve these objectives should focus on:

- Promoting the elaboration of strategic territorial planning models and hydrological planning, in the framework of sustainable development so that they can solidly back up the decisions of implementing water dams and transfers.
- Encouraging the elaboration of rigorous, objective and comparative analyses with reliable data that allow to have an objective baseline in order to make decisions on where water should come from and what demands should be met through dams and water transfers to areas of different basin districts.
- Ensuring optimal use of available instruments and tools e.g. Best Available Techniques and Best Environmental Practices which are environmentally friendly as well as Environmental Impact Assessment and Strategic Environmental Assessment as valuable mechanisms while developing infrastructure plans and programmes.

b- Groundwater resources mobilisation

Water scarcity in most Mediterranean countries, especially in the Maghreb implies a serious threat to sustainable and balanced socio-economic growth. However, the region is endowed with, large, and for many parts under-utilized, groundwater resources, often the only source for fresh water.

Many countries in the Western Mediterranean region have arid and semi-arid climates, experiencing frequent droughts that threaten agriculture, causes severe shortages of drinking water and food. In these cases, groundwater is an essential resource to respond to these extreme situations

These aquifer resources are able to contribute to human development, alleviation of poverty and improved food security, but, in many cases the development of long-term management plans for fossil aquifer systems results in its depletion as an inevitable reality.

Groundwater is a valuable natural resource and as such should be protected from deterioration and chemical pollution. This is particularly important for groundwater dependent ecosystems and for the use of groundwater in water supply for human consumption. Groundwater is the most sensitive and the largest body of freshwater in the Mediterranean and, in particular, also a main source of public drinking water supplies in many regions.

The objectives and priorities of this aquifer mobilisation are:

- Implementing management programmes and measures to benefit from the value of these resources.
- The integrated water resources policies and programmes should include groundwater resources, but always focused to sustainable development and with a sustainable exploitation of the aquifers.

The possible measures to achieve a sustainable aquifer management are to:

- Foster the development of increased conceptual understanding of the aquifer inventories, develop detailed studies of their regeneration capacity and monitor them.
- Manage aquifer resources, jointly with surface water resources, in an integrated manner based on defined hydrological units and water bodies and considering risk and uncertainty.
- Create users' associations so they can collaborate in implementing sustainable exploitation strategies.
- Develop managed aquifer recharge schemes to sustain stressed aquifer systems, taking into account that the quality of the water recharged does not compromise the water quality from the aquifer and its potential for further use.

- Avoid, prevent or reduce detrimental concentrations of harmful pollutants in groundwater in order to protect the environment as a whole, and human health in particular.
- Establish and apply operational Environmental Impact Assessment procedures for protection of aquifers.

c- Treatment and reuse

Treatment and reuse of wastewater can provide solutions when there are problems to meet demands. However an uncontrolled use of insufficiently treated water may cause risks to users and the environment.

It is necessary to assess the possibilities and the risks of treating and using wastewater and mobilise the use of low-cost and low maintenance wastewater treatment techniques so they can be implemented in rural and periurban areas. In any case, they must meet the established quality standards and existing regulations on public health in regards to the use of non-conventional resources.

The way forward to achieve these objectives is to:

- Set up legal and national political frameworks in order to promote this type of projects.
- Establish quality standards and use-guidelines to protect public health and environment, taking into account national policies.
- Consider grey water recycling systems as a potential and easier option to implement on a low-cost small-scale basis.
- Establish upstream discharge controls to reduce the pollutant loading in the sewer systems so as to reduce the level of treatment needed to ensure the quality of supply required for re-use. This will ensure that treated water is produced at the lowest possible cost and thus increase its affordability.

- Promote upstream technologies for industrial wastewater treatment through a water reuse system, to obtain regenerated water with health guarantees in order to give it a subsequent use.
- Set up an action plan for mud management with an improvement of the sludge processing, to develop the recovery of water treatment sludges.

d- Desalination

The production of desalinated water is a huge opportunity to mobilise resources in countries where chronic water scarcity strongly limits conventional resources availability. The most prevalent use is to produce potable water from saline water for domestic or municipal purposes, but use of desalination and desalination technologies for industrial applications is growing and the desalination of underground water is an opportunity that can help to diversify supplies.

Today, developments in desalination technologies are specifically aimed at reducing energy consumption and cost, as well as minimising environmental impacts. There is also a push to utilise renewable energy to power desalination plants. Energy consumption has been significantly reduced in the past two decades, reducing also a plant's carbon footprint, and in addition, new technologies are being used successfully to lessen disruptions to marine life during the intake and outfall processes. The International Desalination Association has specifically challenged the desalination industry to achieve a further reduction of 20% in energy requirements for seawater desalination by 2015.

There is a need to:

- Promote the use of more efficient technologies that also minimise environmental impacts as well as the utilisation of renewable energies in the desalination plants.

- Encourage the development of desalination programs from a legal and political scope, allowing for private sector investments to adapt to the rapidly increasing demand.

e- Rainwater harvesting

It is also necessary to take into account the characteristic Mediterranean dry-valley systems, where there is no surface water, where groundwater is deep or inaccessible due to hard ground conditions, or where it is too salty, acidic or otherwise unpleasant or unfit to drink. Another source must be sought in these cases; the development of dry dams to retain storm water runoff and the “rainwater harvesting” could be options to capture the scarce resource.

The rediscovery and adaptation of ‘old’ or traditional water management technologies can help optimise the utilisation of water in a region where a rich history exists with regards to water-culture.

The measures to implement in this regards would be to:

- Encourage the rehabilitation of existing and development of new water retention measures in dry-valleys such as field terracing and dry-stone-wall constructions, water damming systems and rainwater runoff management systems.
- Increase the on-site collection of rainwater runoff in cisterns by the agricultural sector.

Priority 11: Water use efficiency improvement

The sustainable use of Mediterranean water, especially its quantitative aspects, is a real challenge for water managers, given global phenomena such as climate change and demographic developments. To respond to this, in addition to improving water allocation based on ecological flow, water efficiency measures should be taken in order to save water and, in many cases, energy.

a- Irrigation efficiency improvement

Agriculture is considered the largest consumer of water in the Western Mediterranean. For this reason, an appropriate strategy must be reflected upon, to promote the rational use of water and to achieve the satisfaction of the elementary water needs for agricultural production but taking into account the preservation of natural resources and the environment.

For this reason, facing the aridity that has been on-going for decades due to an intense mobilisation of all forms of water resources, the use of available water must be optimised through forecasting, agro-climatic and hydrologic actions as well as modernising transportation, distribution and water supply systems. We need to choose strategic cultures that constitute the food base and need less water or use alternative water resources such as desalinated or regenerated water. It is also necessary to overcome the existing duality between the modern and highly technological irrigation in the most competitive agricultural exploitations and the obsolete irrigation with a low water efficiency that causes huge losses of a scarce resource.

On the other hand, irrigation modernisation implies the creation of quality jobs, the ability to manage water for irrigation differently and the development of a powerful services sector related to the agro-industrial system associated to irrigation.

The main actions suggested in this regard are to:

- Improve cooperation with the farming community in the preparation of the River Basin Plans to ensure feasibility and acceptance.
- Promote implementation of best agricultural practices adapted to each geoclimatic area, promote modernisation of irrigation systems, and apply sustainable agricultural patterns to produce more “crop per drop”, with less pollution and impacts on the environment.
- Set standards for irrigation with the conventional and non-conventional water like treated wastewater and brackish water.
- Sensibilisation and incentive to irrigation water savings through the use of water saving irrigation systems and the progressive implementation of tariff structures as well as the encouragement of collective water use, by creating water users’ associations.
- Elaborate plans to improve the use of water resources for irrigation through extending and developing irrigation water saving technologies, increasing awareness and training among farmers

b- Reducing leaks in networks

Fresh water is a limited resource and the fast global changes such as population increase, economic development, migration and urbanisation are creating new pressures for water resources and for the drinking water supply infrastructures for citizens, businesses, industries and institutions. Ensuring a secure, sufficient and affordable water supply is becoming an even more pressing matter for water politicians and professionals.

An aggravating factor in developing and transition countries, particularly, is the large amounts of water lost through leaks in the water supply network, known as real or physical water losses, as well as the non-metered water volumes, known as apparent water losses.

The reduction of water losses, in general, and pressure management, in particular, could play a significant role in improving this situation. Reducing the amount of lost water would result in a higher availability of the resource to meet the demands of the population.

To achieve leak reduction in networks we need to take into account that:

- Water losses in supply systems should be monitored and the use of comparable standards for assessing the efficiency of water distribution systems is recommended.
- Assess the environmental and economic benefits of reducing the leakage levels. Collaborate with the water industry to accelerate the development and spread of best practices on sustainable economic leakage levels.
- The possibility of installing pressure management systems must be assessed.

c- Citizens' awareness

Water resources are not inexhaustible and the health status of our environment is not completely satisfactory, therefore it is necessary to collaborate in the definition and collective construction of a new social culture with responsible personal attitudes towards environmental conservation.

It is necessary to start-up citizens' awareness and education programmes to contribute to a change in the public understanding of the environmental problems related to water.

The main objectives and priorities of the Western Mediterranean countries on this subject are to:

- Promote changes in use habits to reduce the misuse and wastage of water.
- Increase awareness on the proper use and management of water and sanitation systems.
- Foster education on the value of the environment, the water and its culture.

- Support the media so that they can play a more systematic and constructive role with regards to water-related problems.

Priority 12: Flood prevention

Despite the fact the average rainfall in most Mediterranean countries is rather low, sometimes the values reached after certain heavy rains exceed the average amount of a whole year. This extraordinary rain provokes an extremely high flow in rivers which burst their banks and overflow into the fields, affecting people and property. Even if floods are, from the point of view of its origin, a natural phenomenon which is mainly physical and hydrological (high flow as a result of heavy storms), when they occur in areas with human activity they become a territorial problem, with relevant socio-economic effects.

It is feasible and desirable to reduce the risk of adverse consequences, especially for human health and life, the environment, cultural heritage, economic activity and infrastructure associated with floods. However, measures to reduce these risks should, as far as possible, be coordinated throughout a river basin to be effective.

In developing policies referring to water and land uses Public Authorities should consider the potential impacts that such policies might have on flood risks and the management of flood risks.

Regarding pressure on land and water from flood protection, it is necessary to take into account that it can be mitigated or prevented by using classical and also green infrastructures.

Actions to be developed in order to minimise damage should be:

- Identification of flood prone areas through the elaboration of hazard and risk maps.
- Promotion of assessment plans and flood risk management plans.

- Development of action programmes including structural measures (lamination dams, channelling, storage areas, soil conservation and reforestation) and non-structural measures (forecasting and alert systems, territorial planning in risk areas, insurances, civil protection plans).
- Use, whenever possible, green infrastructure to prevent floods, such as the restoration of riparian areas, wetlands and floodplains to retain water, support biodiversity and soil fertility.

Priority 13: Protection of water quality and biodiversity

Sources of pollution are numerous all over the Mediterranean region. Mediterranean climate allows multi-cropping seasons which results in increased pressures from the use of nitrates and pesticides. Furthermore, the relatively low recharge rates in the region result in a lower dilutory effect and thus higher levels (concentrations) of contaminants.

Reduce and prevent water pollution, expand the scope of water protection and avoid overexploitation of water resources, by aiming all countries to reach, in the medium term, a good status for all waters based on a comprehensive monitoring system for water quality and quantity, as well as for ecosystems and biodiversity status. In addition, control the use of fertilisers and pesticides should be limited to appropriate and recommended levels.

The measures to implement in this regard would be to:

- Protect and safeguard the functioning of natural ecosystems as a key condition for good quality water as well as for ensuring and enhancing the necessary goods and services they provide, including ecological ones, and a thriving biodiversity.
- Foster methods which provide biological continuity between rivers and their banks (i.e. buffer strips) which support biodiversity and soil fertility.

- Improve and expand monitoring and assessment tools to ensure a statistically robust and comprehensive picture of the status of the aquatic environment for the purpose of further planning.
- Apply ecological flow regimes to ensure that authorities and users know how much water and which flow regime is needed to achieve the objective of good ecological status and to maintain biodiversity.
- Develop and implement programmes for introducing adequate wastewater treatment, by establishing minimum quality requirements for effluents and secure adequate treatment of wastewaters.
- Set environmental objectives for water bodies, and avoid groundwater overexploitation.
- Foster the establishment of pollution control systems and their impact, with the objective of guaranteeing the good ecological status of water bodies.

5. Action Plan

An action plan should be developed based on the objectives and priorities of this strategy.

The action plan will promote financing opportunities through well-targeted and sustainable projects according to following criteria:

- Level of response and contribution to the Strategy objectives.
- Level of compliance with and integration to ongoing and/or planned national or regional plans and framework programmes.

- Complementarities with other processes.
- Consistency with IWRM approaches and practices.
- Contribution to achieving water efficiency targets.
- Consistency with environmental protection objectives.
- Contribution to poverty reduction objectives, job creation and education of young people.
- Consideration of social, gender and cultural aspects.
- Level of secured co-financing.
- Economic and financial sustainability.
- Level of foreseen operational synergies, including with competent stakeholders.
- Projected sustainability of outcomes after completion of implementation.
- Possibility of replication.
- Defined geographical scope, either national or regional, within the western Mediterranean region.

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