

CO-EVOLVE

Promoting the co-evolution of human activities
and natural systems for the development of
sustainable coastal and maritime tourism

Deliverable 3.10.1

*Water resources management and
Tourism in the Mediterranean
(Synthesis V2)- 2017 December*

Activity 3.10

Enabling factors for sustainable co-evolution
in touristic areas - Mediterranean scale:

Water supply and depuration

WP3

Département Hérault

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TABLE OF CONTENTS

1	Context	3
1.1	The Mediterranean Context	4
1.2	Water and its uses	14
1.3	Tourism	21
1.4	The effects of Climate change	23
2	Water and Tourism in the Mediterranean	26
2.1	The situation as things stand	26
2.2	What makes the Mediterranean unique: seasonality and artificialisation	27
2.3	Types of tourism	28
2.4	« Water and Tourism » : key issues	29
2.6	Tourism in the context of marine ecosystems	34
3	Water and Tourism : state of play and outlook.....	Erreur ! Signet non défini.42
3.1	Context and current situation	42
3.3	What are the lessons for CO-EVOLVE ?	43
3.4	Prospects of failure... in the medium term ?	44

References

Annexes 1, 1bis & 2 : French reports in extenso



1 Context

GLOBAL ISSUES AND TRENDS

Water is essential to life on Earth. It can be found everywhere on the planet – in the oceans, underground and on land.

Continental surface water, and the associated aquatic environments, account for less than 1% of water on Earth. Yet this water, which is vital to ecosystems and human societies alike, is under pressure on multiple fronts. We depend on it for food, energy and drinking water.

At every level – domestic, European and international – WATER is treated as a priority issue, as seen, for example, in the French acts on water on aquatic environments, the EU Water Framework Directive and Floods Directive, the COP 21 and COP 22 conferences, and the United Nations' Sustainable Development Goals. These issues are nothing new, but they remain as vital now as they have ever been.

GLOBAL CONTEXT

The UN's Sustainable Development Goals (SDGs), adopted in late 2015, place the emphasis very much on water, pollution, ecosystem conservation, biodiversity, health and risks to human society.

One of the SDGs focuses specifically on water – “Clean water and sanitation” (Ensure availability and sustainable management of water and sanitation for all). Yet water is a common underlying theme of many of the 17 SDGs, playing a vital, cross-cutting role.

According to UN Water for Life, demand for water is rising at twice the rate of population growth.

“By 2025, 1.8 billion people will experience absolute water scarcity, and 2/3 of the world (5.3 billion people) will be living under water-stressed conditions” (United Nations Convention to Combat Desertification, UNCCD).

In May last year, the World Bank warned that water demand could exceed 40% of planetary resources by 2030, raising the prospect of “water wars” (*Les Echos*, 30 August 2016).

In 2007, there were as many people living in towns and cities as in the countryside. By 2050, meanwhile, city-dwellers will make up 75% of the world's population. One of the consequences of population increase is so-called “coastalisation”, i.e. the migration of people to the coast, attracted by fisheries resources, the warmer, sunnier climate, coastal tourism, or access to globalised markets (“maritimisation” of the economy). Yet this phenomenon brings its own problems in terms of water supplies and pollution. More than two-thirds of the world's population currently lives less than 60 km from the coast. And estimates suggest that, 30 years from now, this figure will have risen to 75% (UNESCO, 2012).

“Three out of four of the jobs worldwide are water-dependent. In fact, water shortages and lack of access may limit economic growth in the years to come.” (United Nations World Water Development Report, Water and Jobs, launched on 22 March 2016, World Water Day).

According to Bank of America Merrill Lynch (2012), the global water market, currently worth \$500 billion, will swell to \$1 trillion by 2020 on account of ageing infrastructure, urbanisation, industrial innovation and climate change.

Water Supply and Sanitation Technology Platform (WSSTP) figures, meanwhile, indicate that the water sector accounts for 1% of GDP in Europe, is growing at double the average rate of European GDP, and employs 600,000 people. In France, water infrastructure (networks) represents capital

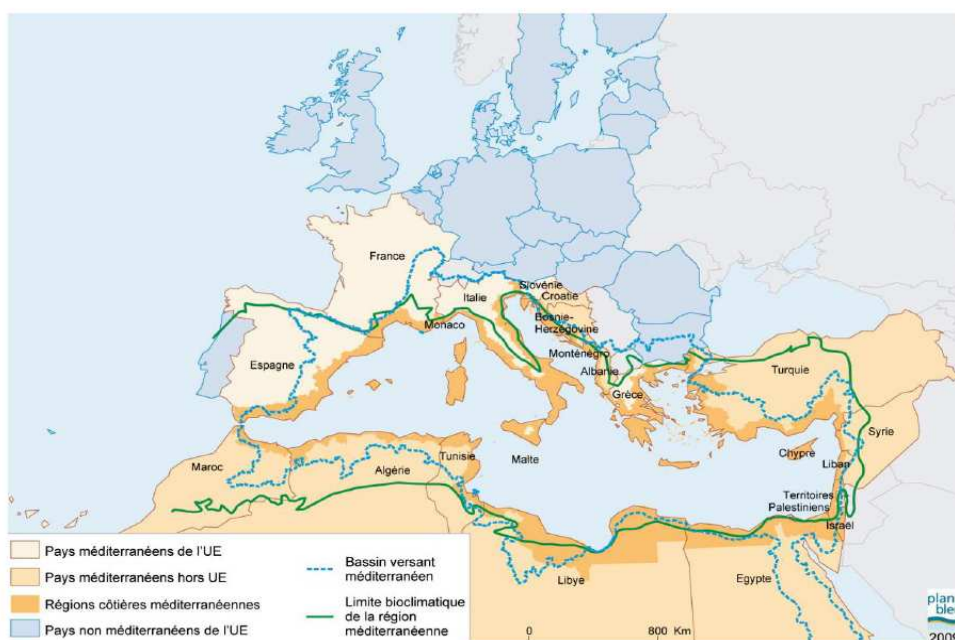


investment of around €300 billion. Major energy, transport, water and sanitation networks are vital to economic growth.

According to the OECD, investment in these sectors currently accounts for 4% of global GDP but is expected to rise to 60% by 2030.

1.1 The Mediterranean context

This report supplements the Component 1 report, “**Freshwater**”, which provides an overview of water management issues, looking at the current situation and based on the most common indicators. The report contains an initial assessment of water policies in the various countries around the Mediterranean, based on a review of current knowledge and forecasts for the future of the Mediterranean region. This knowledge, in its broadest sense, will inform the “**Recommendations**” for the CO-EVOLVE pilot areas. These Recommendations are covered in this document.



Source : Plan Bleu

It was not possible to arrive at a unified vision of the Mediterranean area using bioclimatic data, coastal region depth data, or watershed data.

In some cases, the coastal region is limited to the immediate coastline. In others, meanwhile, it stretches much further inland.

Although the bioclimatic boundaries are more consistent, they may extend as far as ocean coastlines (Spain) or to the Black Sea (Turkey), i.e. several hundred kilometres from the Mediterranean coast.

And what about the networks of waterways that might lead some observers to class as “Mediterranean” the Jura and Alp mountain ranges where the Rhône and the Pô begin their courses, or even Lake Victoria, the source of the Nile, more than 6,000 km from Alexandria?

The scope of this study is limited to the countries and territories that surround the Mediterranean basin, divided into two groups, from west to east along the northern coast – those along the northern shoreline (Spain, France, Italy, Greece, Slovenia, Croatia, Bosnia-Herzegovina, Montenegro,



Albania, Turkey, Cyprus and Malta), and those along the southern shoreline (Syria, Lebanon, Israel, the Occupied Palestinian Territories, Egypt, Libya, Tunisia, Algeria and Morocco).

1.1.1 Geographical framework

a) Physical data:

The Mediterranean is not the world's only semi-enclosed continental sea (the Black Sea and the Baltic Sea also fall into this category).

Yet there are two factors that make it unique:

- its surface area – at 2,501,000 km², it is almost 5 times the size of France (by comparison, the Baltic Sea is 372,000 km², and the Black Sea is 451,000 km²);
- its depth, which quickly reaches more than 2,000 m across the entire basin, with trenches more than 5,000 m deep (by comparison, the Baltic Sea reaches a maximum depth of 459 m).

b) Marine hydrography:

Each year, the Mediterranean loses more water through evaporation (3,130 km³) than it receives from rivers (430 km³) and rainfall (1,000 km³) combined. This shortfall is offset by water from the Atlantic Ocean (1,520 km³) and, to a lesser extent, the Black Sea (180 km³).

Comparing the Mediterranean's total volume with these inflows and outflows gives a water replenishment period of approximately one century.

These water movements create currents, driven primarily by temperature and salinity differences (saltier or colder water tends to sink to the bottom).

c) A diverse, impoverished and fragile marine environment:

The Mediterranean Sea is one of the world's most biodiverse regions.

It accounts for just 0.8% of the Earth's surface area and holds 0.3% of the planet's saltwater, yet is home to 7-8% of known marine species (12,000 species have been described to date) and has a substantial endemic population (25% of the total).

This biodiversity is unevenly distributed by location and depth.

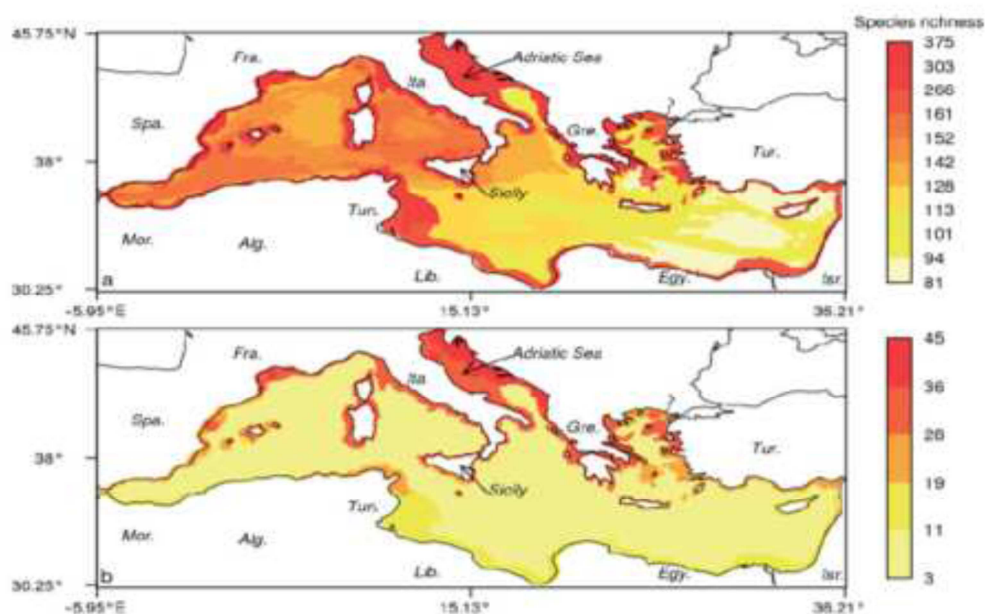


Figure 3. Carte des gradients de richesse spécifique (a : richesse totale ; b : richesse en endémiques) des poissons de Méditerranée (Lasram, Guilhaumon & Mouillot, 2009).



The sea's diversity is fragile and under threat from invasive species. Moreover, rising coastalisation and polluted soil run-off pose a direct threat to coastal environments.

As well as being vulnerable to the inflow of pollutants from land, all coastal environments experience relatively frequent extreme weather events (heavy flooding, long droughts). This, in turn, causes small rivers (or *wadis*) to turn into sudden torrents, carrying large amounts of matter with them.

1.1.2 The influence of human geography

The countries around the Mediterranean basin represent:

- 5.7% of surface land;
- 7% of the world's population;
- 13% of global GDP;
- and 31% of international tourism.

The diversity of the Mediterranean's physical geography is also reflected in human geography statistics, with significant differences between the "North" on one hand and the "South" and "East" on the other hand – in terms of cultural heritage, political regimes, economic growth trajectories, demographic trends, and natural resources (and water resources in particular).

a) Population

Population figures show that, around the entire Mediterranean basin, the population has risen sharply over the last 30 years – from 285 million people in 1970 to 427 million people in 2000 (an increase of around 50% – 14% in the "North" and 101% in the "East" and "South"). Yet the data also reveal two phenomena: **coastalisation and urbanisation**.

Coastalisation has gone hand-in-hand with growing urbanisation.

According to the above-mentioned sources, the urban coastal population (coastal towns and cities of more than 10,000 people) has also risen:

- from 41 million in 1970 to 51.1 million in 2000 in the North;
- and from 19 million to 48.5 million over the same period in the South and East.

In 2000, 99.5 million people lived in coastal towns and cities (out of a total coastal population of 145 million, i.e. 68%).

Spontaneous urban expansion coupled with uncontrolled urban development has several consequences:

- properties are connected to water and sanitation networks after they have been built, which pushes up costs;
- the lack of urban planning, coupled with urban sprawl, has given rise to fly tipping, causing leachates to enter the sea.

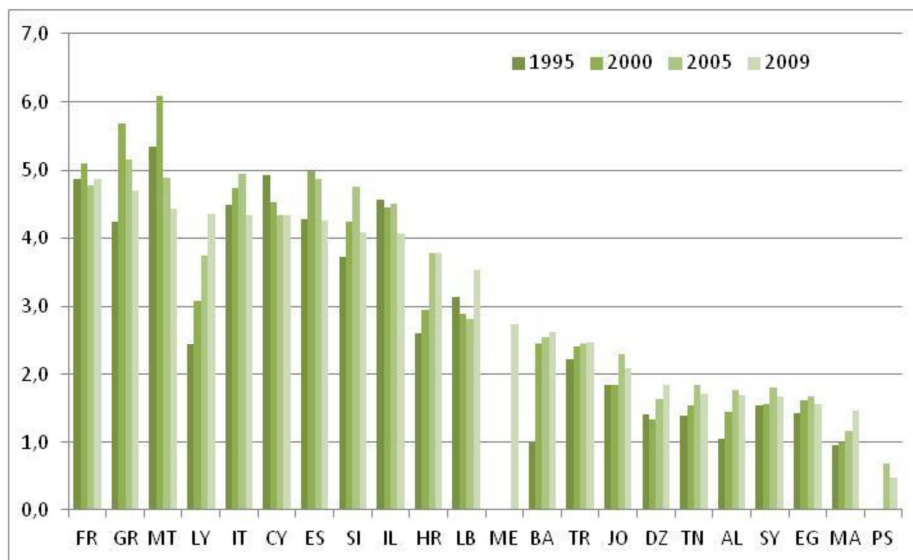
How does human activity impact the environment?

Environmental Footprint expresses the consumption of available resources through human activity. Unlike biocapacity, this indicator can be used to calculate a given region's or country's Environmental Deficit (or Surplus).



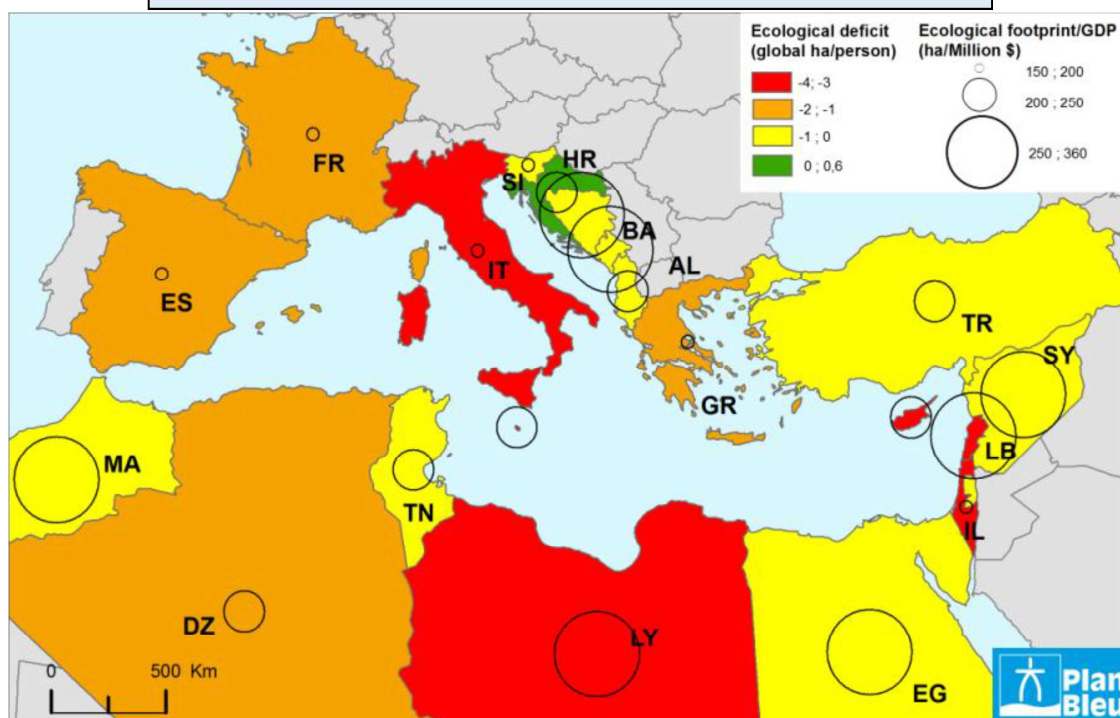
Environmental footprint: measures the quantity of organic matter (land or water) that an individual, population or activity requires to produce the resources it consumes and to absorb the carbon dioxide emissions that it generates, using current technologies and resource management methods.

Ecological Footprint per capita 1995 – 2009 (Global ha/inhab)



Source : WWF, Zoological Society of London, Global Foot print Network

Ecological Footprint /GDP and ecological deficit (2009)



Source : WWF, Zoological Society of London, Global Foot print Network

b) Tourism

The Mediterranean is the first tourist region in the world.

According to the World Tourism Organization, the Mediterranean welcomed 313 million tourists in 2014 (58 million in 1970), with a forecast of 500 million by 2030. This sector, mainly focused on a seaside and seasonal model, represents for all countries a major challenge in terms of jobs and income.

This is not without creating imbalances between, on the one hand, the search for income maximization and, on the other hand, the necessary preservation of natural ecosystems and the valorization of local actors and assets.

The tourism sector poses very specific problems in terms of the use of water, its discharges

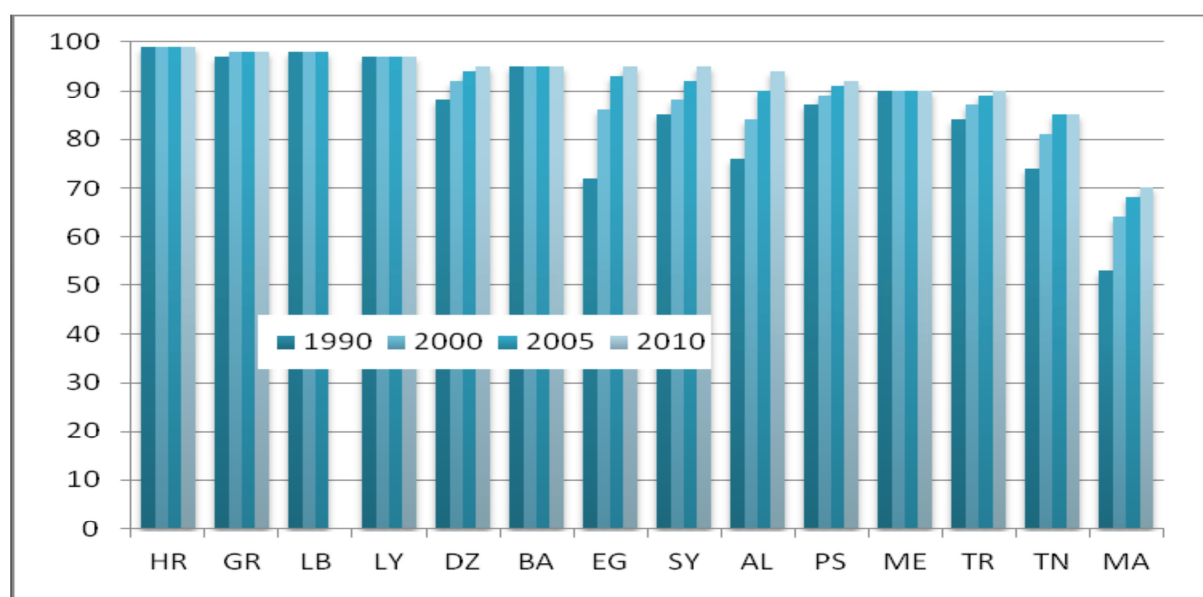
- a seasonal concentration, peaks coinciding with periods of low water resources (summer);
- a tourism activity often based on equipments that represent excessive water consumption (golf courses, swimming pools or aquatic centers);
- infrastructure needs for water transfer, increasing use of unconventional water sources (desalination, reuse of treated wastewater), oversizing of water supply equipments and wastewater treatment;
- an attack of compromised receptor environments in summer, by the overcapacity of the treated wastewater.

Has access to sanitation systems improved?

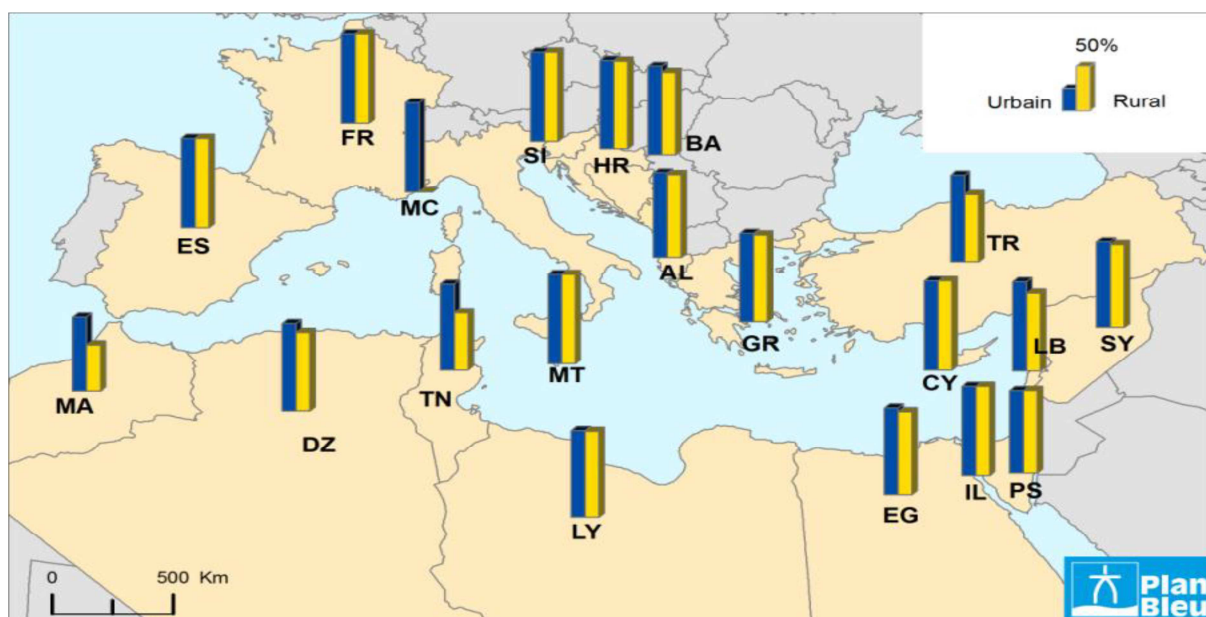
Percentage of people with access to a sanitation system:

Around 27 million people across the Mediterranean have no access to an adequate sanitation system. In 2010, approximately 70% of people in Morocco had access to a sanitation system, compared with 100% in most of the northern countries.

Share of population with access to an improved sanitation system, 1990 – 2010 (%) - source : UNSD



Share of population with access to an improved sanitation system (Rural and Urban) 2010



Source : UNSD

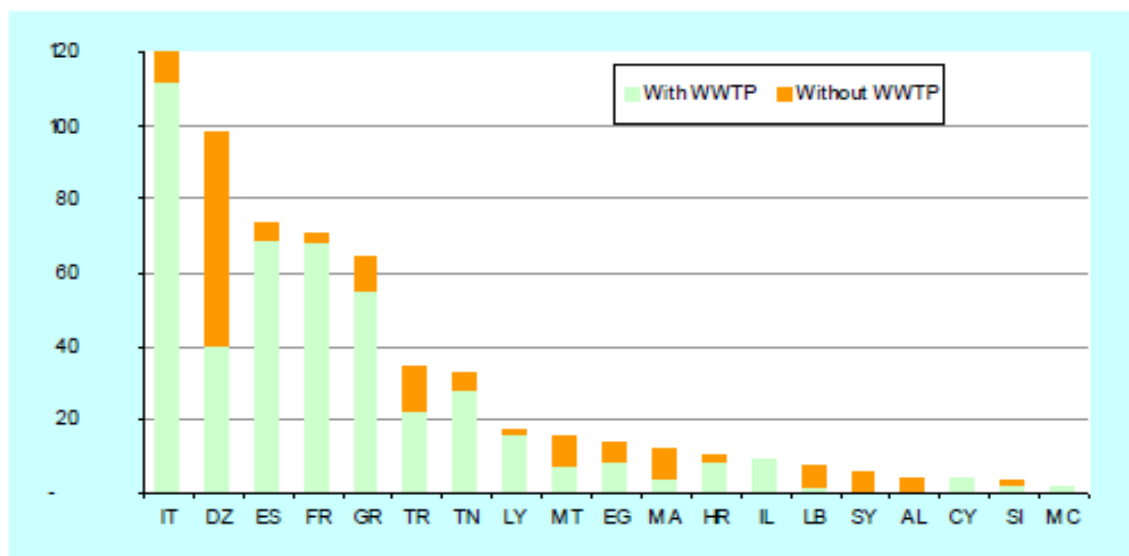
Does land-based pollution come from coastal towns and cities?

The Protocol for the Protection of the Mediterranean Sea against Pollution from Land Based Sources addresses the issue of reducing land-based pollution in the Mediterranean. Halving the number of urban city-dwellers without access to sanitation systems by 2015 is one of the goals of the Mediterranean Strategy for Sustainable Development (MSSD).

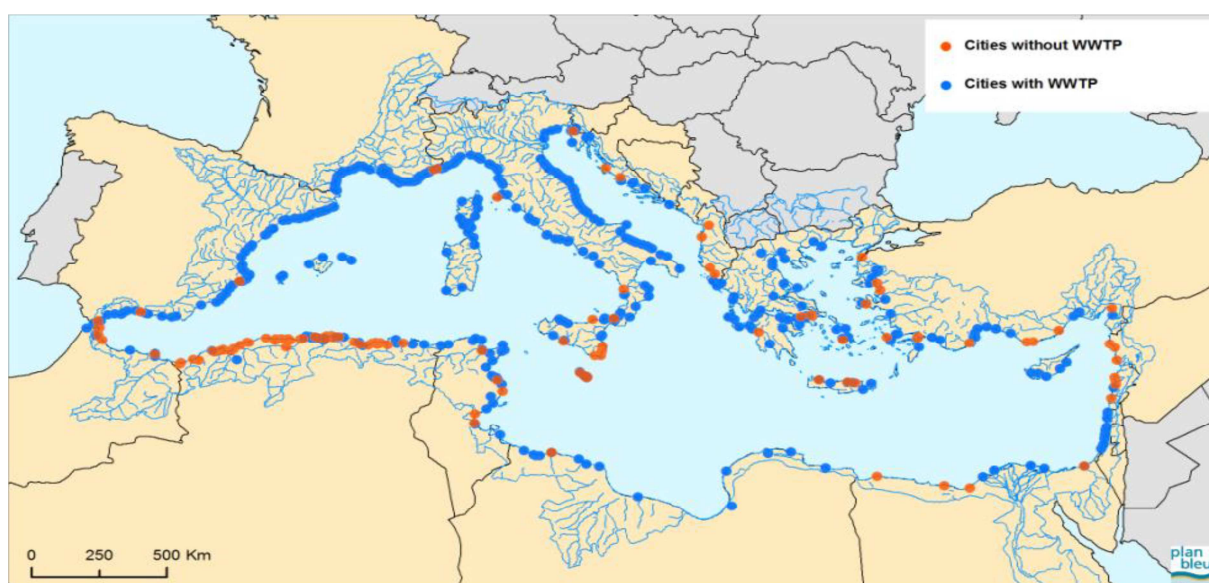
In the Mediterranean, 69% of coastal towns and cities with a population exceeding 10,000 are connected to wastewater treatment plants. Some 21% are not connected to a plant, 6% are in the process of building one, and 4% do not have one for other reasons. Of the existing plants in the Mediterranean, 15% use tertiary treatment, 55% use secondary treatment, and 18% use primary treatment.



Number of coastal cities of more than 10 000 inhabitants with and without a
 waste water treatment plant, 2003



The coastal cities (>10 000 inhab) with and without a waste water treatment plant, 2003



Source : MEDPOL/Plan Bleu



1.1.3 Primary and industrial activity

a) Primary sector:

a1 - Agriculture:

Mediterranean agriculture is no stranger to modernisation. The sector has undergone restructuring, and farmers use nitrate and phosphate fertilisers and pesticides, all of which end up in the sea.

While fertiliser and pesticide use is on the decline in the North, it remains highly prevalent in the South and East.

Yet the issue goes beyond pollution from modern-day agriculture.

The legacy of the past continues to have an effect today.

The United Nations Environment Programme carried out a study into fertiliser and pesticide stocks. Although the figures date from 2002, the situation is unlikely to have changed much in the interim :

Stocks de pesticides dans la région méditerranéenne

Pays	Lieu	Pesticide	kg
Algérie	Alger, Tipaza Algiers, Ain Tremouchent, Mascara, Mostaganem, Sidi bel Abbes, Tizi Ouzou	Aldrin	345
		DDT	189 400*
Libye	Tripoli-Bengazi	Dieldrin	20**
Maroc		DDT	2 062*
		Dieldrin	880
		Endrin	2 626
		Heptachlor	2 062
Syrie	Hamah	DDT	1 500
Turquie	Kirikkale	DDT	10 930
Tunisie		Pesticides	882

*Pour la lutte contre les sauterelles, **Notifié

Source : PNUE Produits chimiques, 2002

The study found that, when these stocks are not used covertly, they are often stored in insecure conditions and that some of these fertilisers and pesticides end up in waterways through leaching.

a2 - Fisheries:

Fishing places direct pressure on natural environments. Yet it also indirectly impacts biotopes and food chains in the Mediterranean, despite the region accounting for just 1% of global catches.

a3 - Aquaculture:

Sea water, saltwater and freshwater aquaculture is growing rapidly across the Mediterranean – at a rate of around 10% per year – in response to stagnating fisheries catches.

This growth – particularly high in Greece, Spain and Croatia – may be degrading the host environments (effluents, antibiotics, epizootic diseases, domesticated strains escaping into natural environments).



b) Industry:

The Mediterranean coastline is not one of the world's most heavily industrialised regions, and industrial pollution is far from the scale seen in the US Great Lakes, the Baltic Sea or the Baie de la Seine.

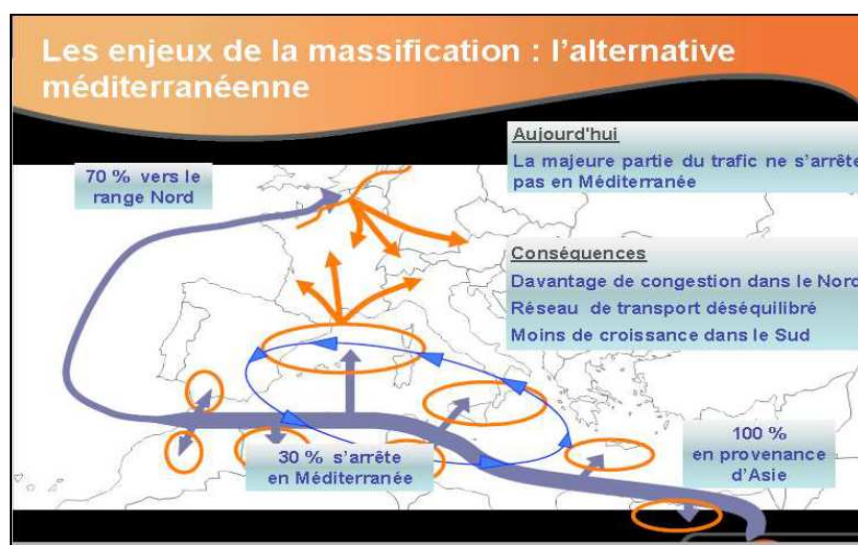
Yet, even as things stand, industry poses a real threat to the Mediterranean from land-based marine pollution. This situation may well stem from the region's unique feature, in that it encompasses all industrial eras – past, traditional, transferred and future.

c) Shipping:

Shipping is less of an issue than pollution from land-based sources (which is estimated to account for between 80% and 90% of marine pollution). Yet shipping still poses a very real chronic pollution risk that cannot be overlooked, due to the nature of the products concerned (hydrocarbons) and the devastating impacts that a major oil spill in a semi-enclosed sea would cause.

Transit shipping is the area of strongest growth.

Some 70% of shipping traffic in the Mediterranean from Asia (oil tankers from the Middle East and container ships from China and south-east Asia) passes through on its way to northern Europe. The remaining ships stop at ports along its coast, mainly to the west (Genoa, Marseille, Barcelona and Tangier).



Source : Préfecture maritime Toulon

Because of the sheer (and growing) scale of both cargo and passenger shipping, the activity presents a very real risk in terms of both accidental and chronic pollution.

**Principaux déversements accidentels d'hydrocarbures par des navires-citernes
(> 700 tonnes) 1990-2005**



Source : PNUE – WCMC, 2004

d) Offshore drilling:

While there are only a small number of oil rigs in the Mediterranean, they nevertheless pose a significant current and potential pollution risk.

First and foremost, oil rigs are a cause of chronic pollution that stems from drilling itself.

But the more worrying threat comes from potential accidents.



1.2 Water and its uses

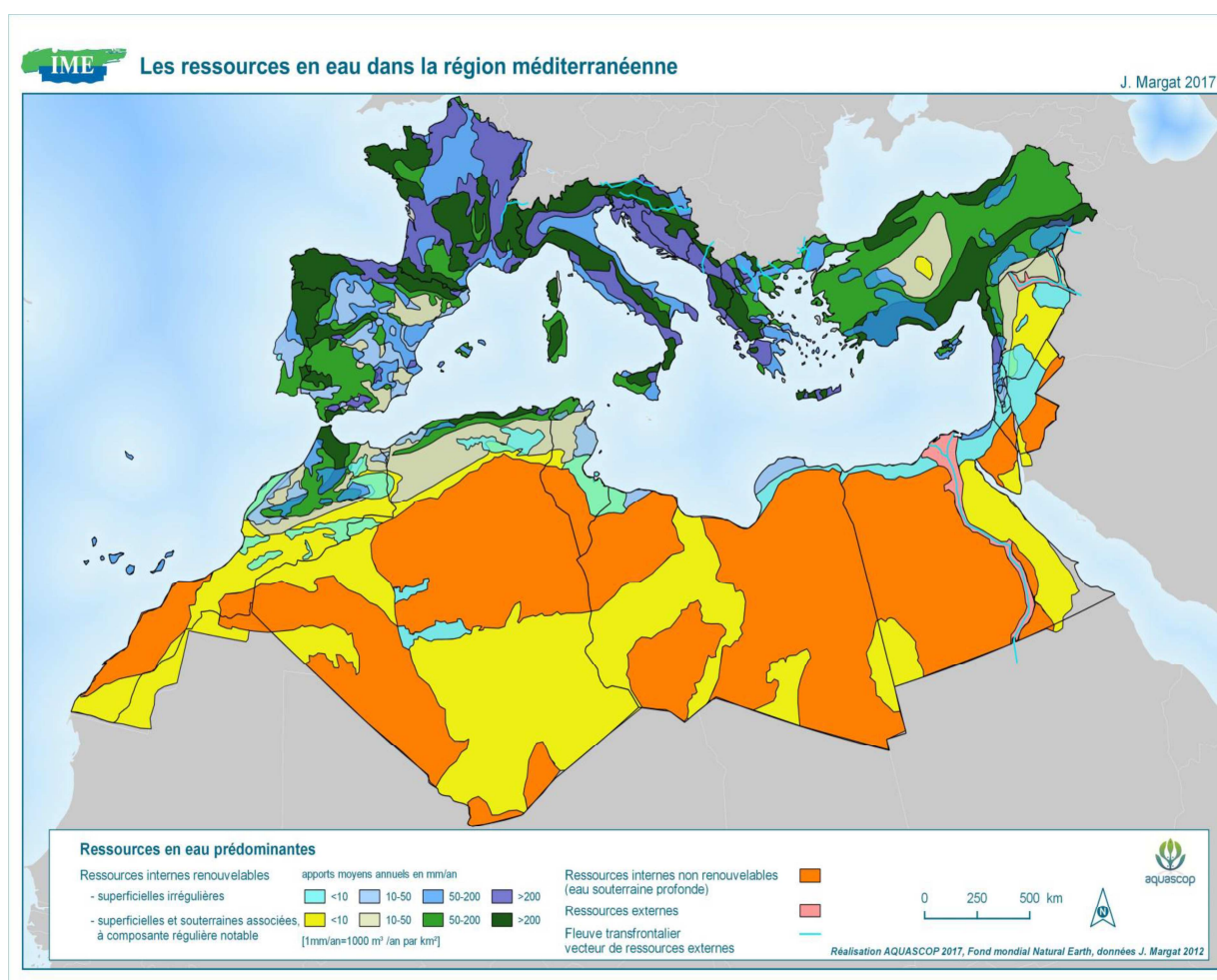
1.2. 1. Water resources

The main challenges encountered in the Mediterranean Region, even if they come from various sources, all have a direct or indirect impact on water management.

Subject to many ecological disruptions to the effects of climate change and increasing water scarcity, the countries of the Mediterranean region are facing major challenges such as recent socio-political upheavals on its southern and eastern shores, a deep economic crisis to the north, in addition to the existing problem of poverty.

The hydroclimatic conditions and the water regime characterize the Mediterranean basin. Very irregular rainfall, sometimes at very high intensities (western Balkans), is combined with pronounced cyclical droughts (Sirtes - Libya), leading to a climate that is extremely diverse, hyper-aridity, and abundant resources.

Conventional (exploitable and available) water resources are offered by surface freshwater and groundwater.



The main issues that make water management even more difficult, by amplifying demands, come from the water stress already present in the Mediterranean region.

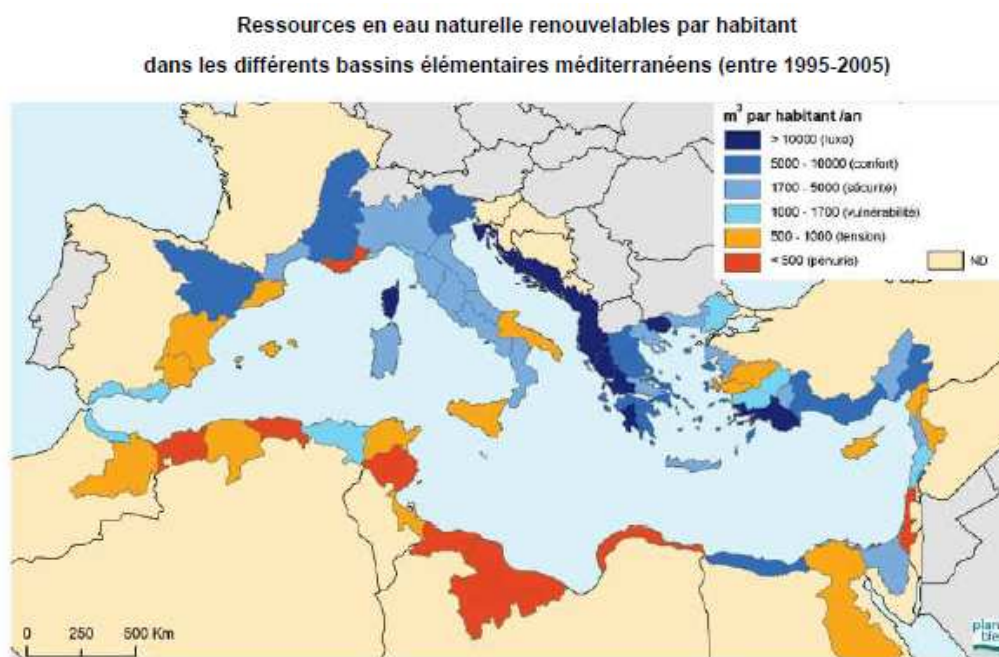
These can be underlined as follows:

- the territorial distribution of resources is very uneven in each country, which has already determined large transfers of water between basins, in the countries of the North and the South,
- extensive reservoir dams have been constructed to regulate watercourses. In 2011, 4088 "large dams" (with a retention of more than 10 million m³) in service in the Mediterranean countries combined to 460 billion m³, including 3 giant reservoirs on the Nile and Euphrates, Egypt, Syria and Turkey, forming more than half.
- The Mediterranean climate also accentuates the water needs of crops, which generally require irrigation (65% of water demand in the Mediterranean countries now, 84% in the South) and those of summer and coastal tourism (the Mediterranean region is the world's leading tourist destination).

However, it is between countries of the North (Europe, Turkey) and South (Maghreb, Egypt, Levant) that already the situations are the most contrasted, both in terms of resources and demands for water.

This diagnosis explains that on a global scale, the Mediterranean includes 60% of the population of water-poor countries.

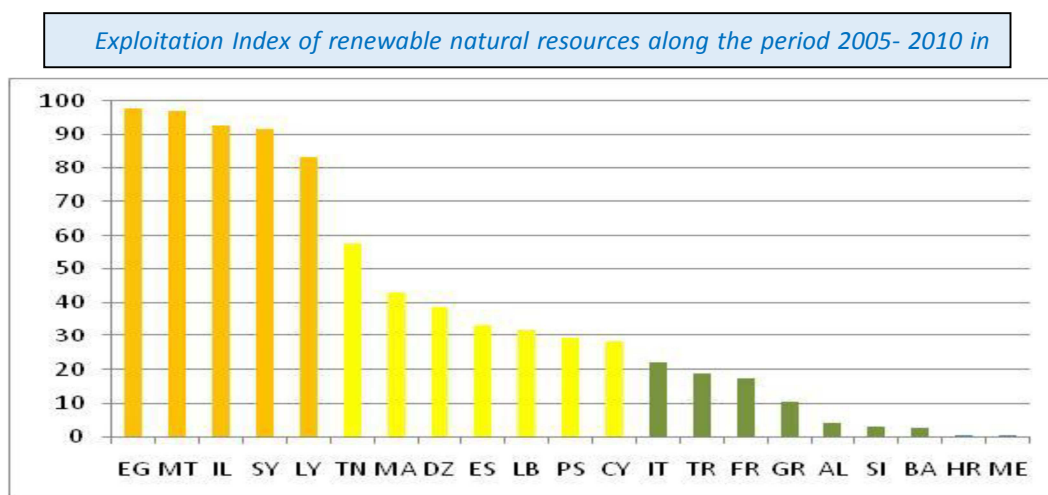
The water-poor population (less than 1,000 m³ / h / year) has a population of 180 million, and the population in need (less than 500 m³ / h / year) represents 60 million people. inhabitants (South bank except for Egypt which is "poor in water").



Source : Plan Bleu d'après sources nationales

There are 180 million people living in water scarcity (less than 1,000 m³ per capita per year), and 60 million people along the South shore living in acute water scarcity (less than 500 m³ per capita per year), with the exception of Egypt, which is classed as “water-scarce”.

In addition, in several Southern countries, the main conventional water resources are external and therefore dependent (97% in Egypt, 58% in Israel and Syria), or the current sources of supply are partly unsustainable (overexploitation). renewable groundwater, fossil groundwater mining: in Algeria, Libya, Tunisia).



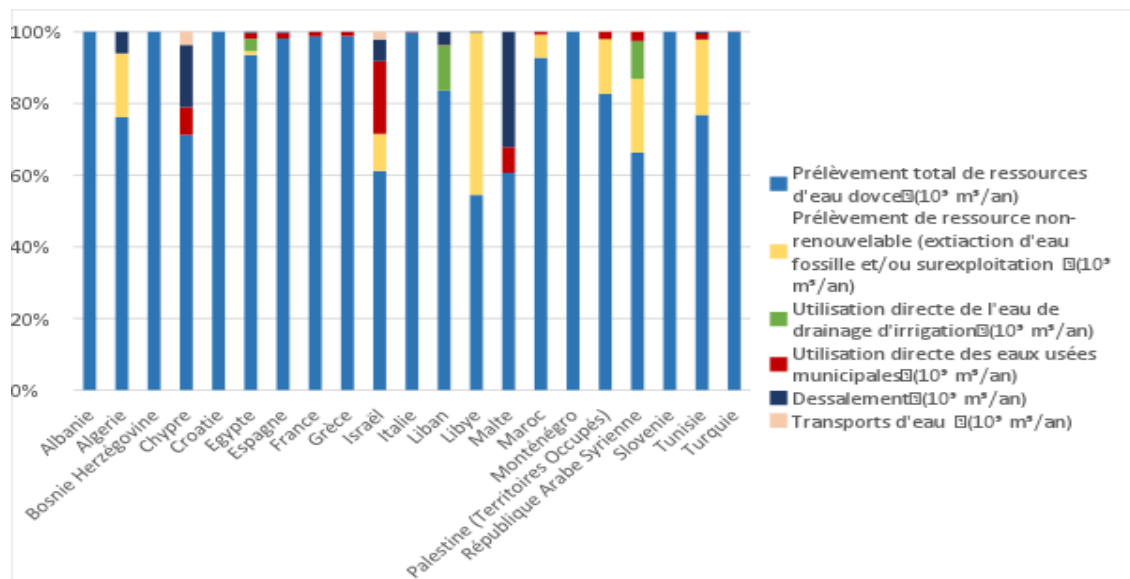
Source: Plan Bleu from national sources

The pressures on conventional resources are also very different between North and South. In almost all countries in the South, demand is already in excess of average renewable resources, and part of the water supply is not sustainable.

To meet the needs: The production of freshwater by desalination of seawater is already developed in the South (Algeria, Israel, Libya, Tunisia) and even in the North (Cyprus, Spain, Malta), the recycling of wastewater and the mandatory water savings.



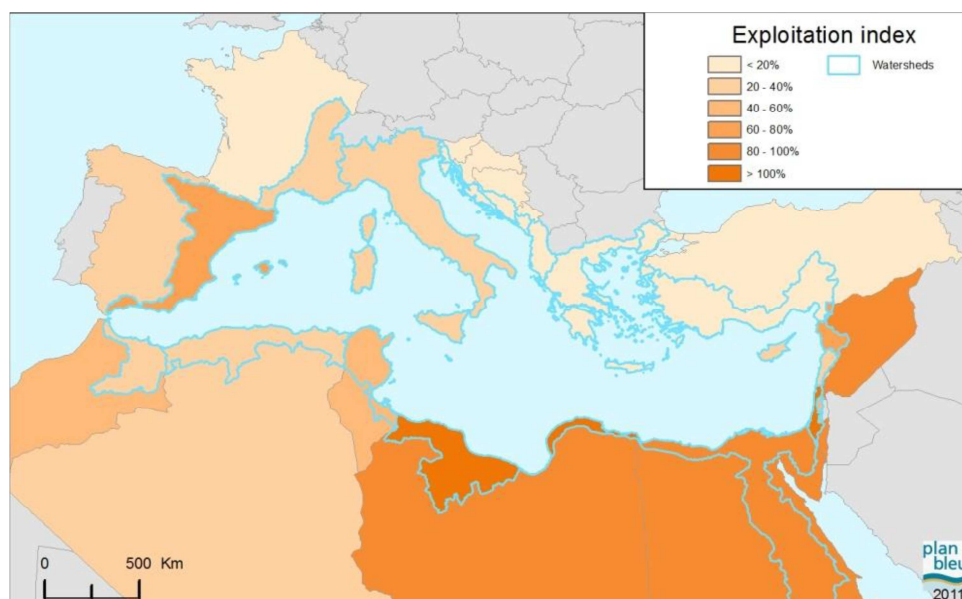
Prélèvements par rapport à la ressource (Burak & Margat, 2016)



The situation of countries with regard to available resources per capita is slightly different: This observation is recalled in the report (2011) of the french Senator Roland COURTEAU "Pollution in the Mediterranean: state and perspectives in the Horizon 2030":

- ♣ Countries facing acute water scarcity (less than 500 m³ per capita per annum): Malta (82 m³ per capita), Libya, Occupied Palestinian Territories, Algeria and Tunisia (403 m³ per capita).
- ♣ Countries facing water scarcity (between 500 and 1,000 m³ per capita): Morocco (694 m³ per capita), Egypt, Cyprus and Syria (980 m³ per capita).
- ♣ In those countries with more than 1,000 m³ per capita per annum, water is not a factor limiting economic development.

Exploitation Index of renewable natural resources (countries and watersheds) along the period 2000- 2010 in %



Source: Plan Bleu from national sources

Predictions of future water demands, based primarily on population projections and trend scenarios, and limited to 2025 or 2050 horizons, accentuate the north-south contrast.

As the demand for water has already tended to stabilize or even decrease in Europe, like the populations in many of these countries, it is mainly in Turkey and in the south that projected demand according to population and urbanization should continue to grow and exceed those of Europe by head, with the risk of worsening the situation of scarcity in the countries of the South, even without deterioration of the climate.

The likely decrease in renewable water resources due to climate change, in the face of growing demand, may aggravate imbalances and cyclical and structural shortages.

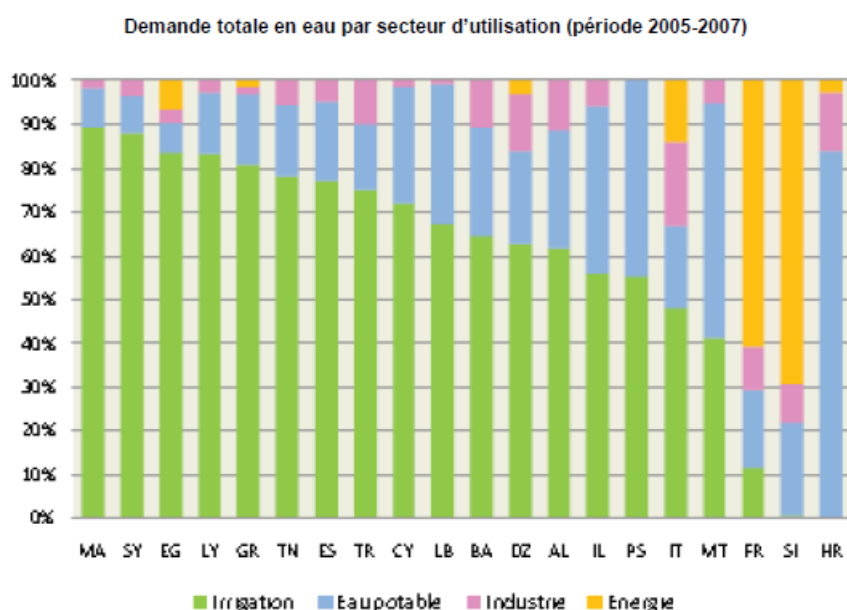
1.2. 2. Water use

Even in 2017, 20 million Mediterranean people have no access to drinking water, particularly in the countries to the south and east of the Mediterranean.

According to the Blue Plan, tensions over water are expected to worsen with population growth in the South and East, the development of tourism, industry and irrigated land, as well as the impacts of climate change. Existing studies and projections specify that Mediterranean populations "water-poor", below the threshold of 1000 m³ per inhabitant per year, should increase from 180 million people today to more than 250 million in 20 years.

Moreover, in a context of high agricultural production to feed populations in the Mediterranean basin and the lack of rainfall, irrigation is the dominant sector in water use in most Mediterranean countries, with 60% of total amounts of water used, but 82% in the South.

The fairly accurate and complete knowledge of water uses for all economic sectors, is the necessary basis of demand projections, and a condition of resource management. This knowledge is, however, still imperfect and the statistics available on applications and levies are based more on estimates than on censuses. They are affected by various uncertainties, especially in the agricultural sector.



Source : Plan Bleu



This situation is linked to yet another aspect of water use – the fact that losses and waste account for an estimated 40% of total water demand.

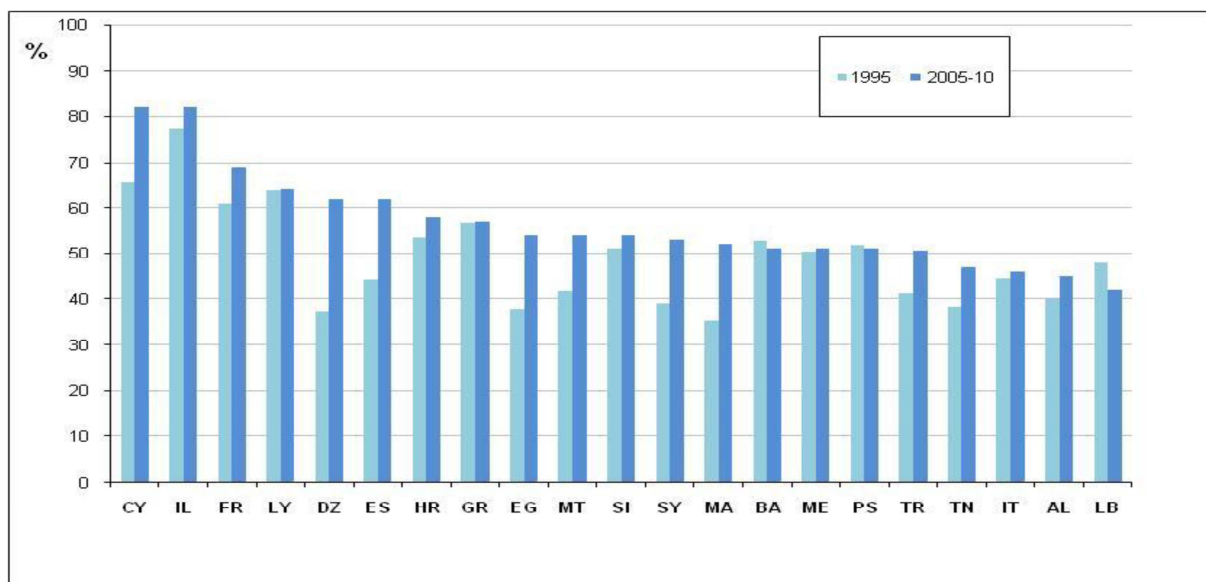
These losses stem from several factors:

- significant losses during pumping;
- leaks caused by ageing and poorly maintained urban pipe networks;
- theft (e.g. in Istanbul and the wider conurbation);
- and waste from irrigation systems. Plan Bleu records show that, in like-for-like circumstances, agricultural water use can vary by a factor of 20 (from 21 m³ to 420 m³) according to the types of irrigation technique used.

Is water-use efficiency (total and per sector) improving?

Between 2005 and 2010, water-use efficiency in the Mediterranean was between 40% and 80%.

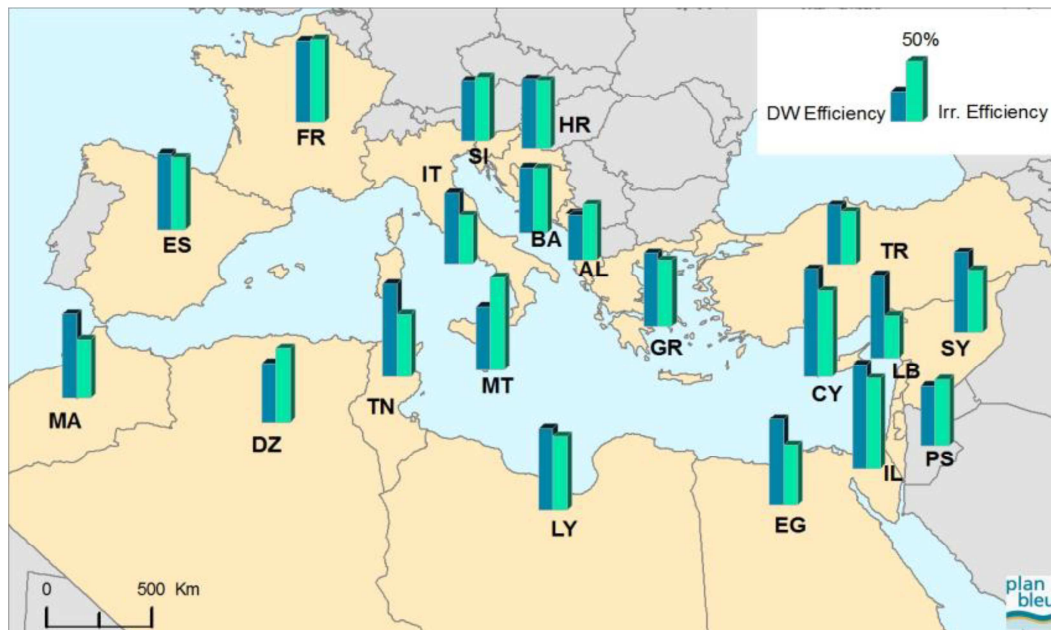
Total water use efficiency in Mediterranean countries (1995, 2005-2010)



Source: Plan Bleu



Water use efficiency in two sectors (drinking water and irrigation) in 2010

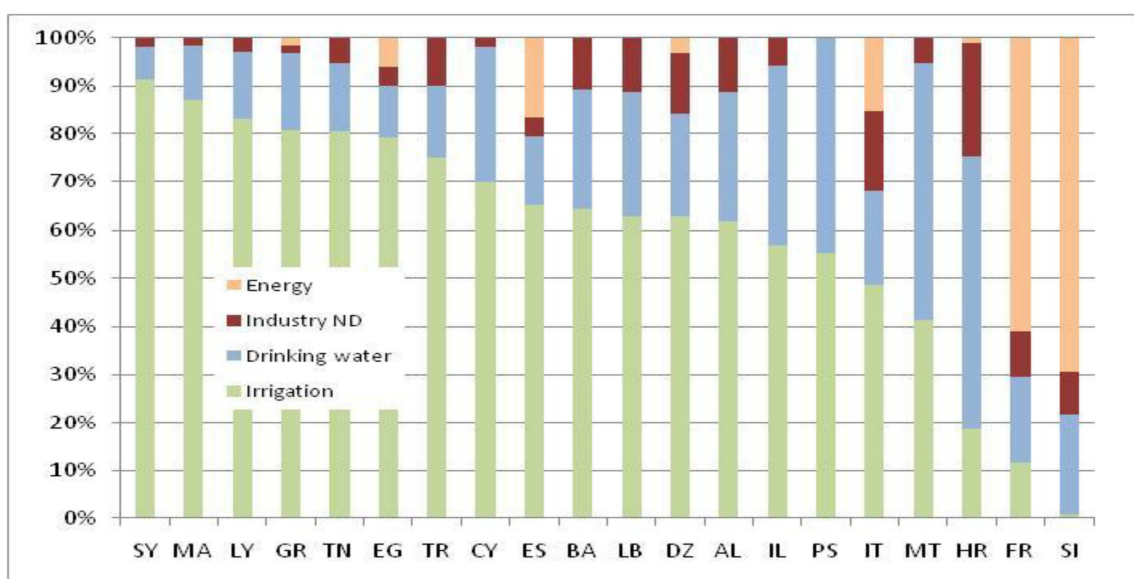


Source: Plan Bleu

Is water demand falling?

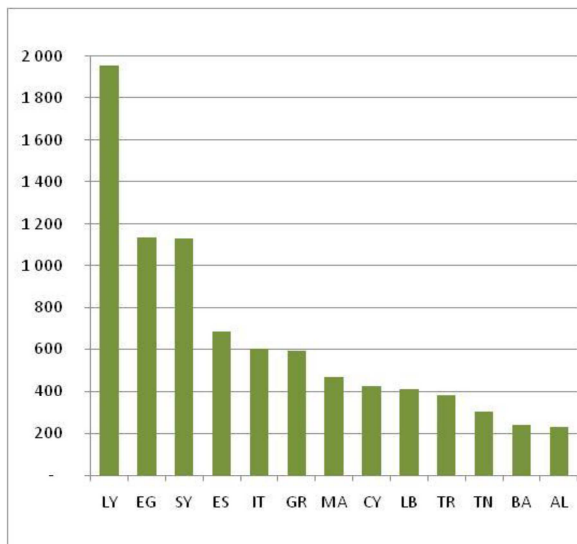
Drinking water demand per capita varies considerably from one country to the next, from around 36 m³ per household per annum (100 litres per day) in Tunisia and Morocco, to approximately 150 m³ per household per annum (410 litres per day) in Albania.

Water demand by sector (period 2005-2010)

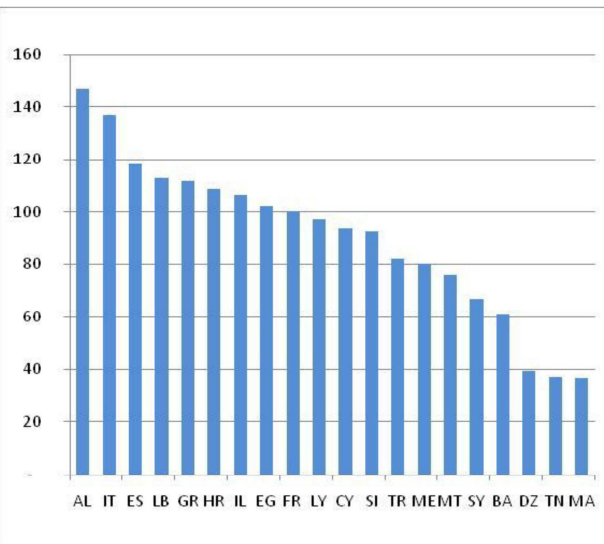


Source: Plan Bleu from national sources

*Water demand in agriculture / Added value in
Agriculture 2005-2009 (m3/ 1000 US\$)*



*Drinking water demand per capita,
2005- 2009 (m3/year)*



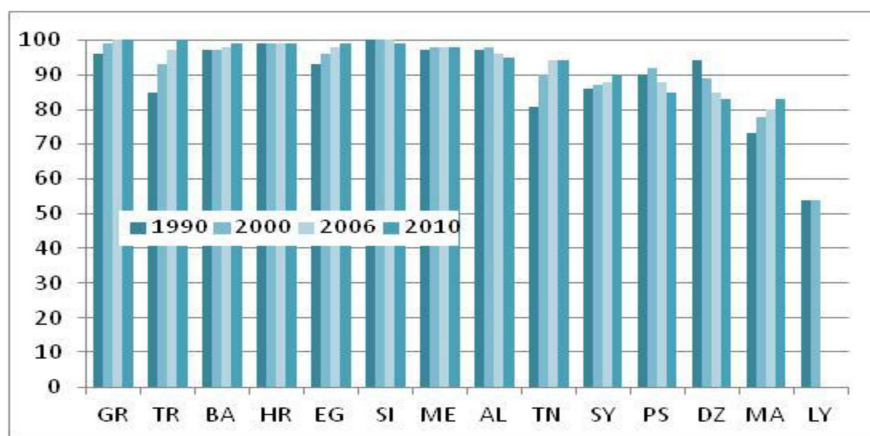
Source: Plan Bleu from national sources

Is access to drinking water increasing?

Providing sustainable access to an improved water source (i.e. drinking water) is one of the targets of the Millennium Development Goals – “halve, by 2015, the proportion of the population without sustainable access to safe drinking water” (compared with 1990 levels).

In 2010, more than 83% of people had sustainable access to safe drinking water in the majority of Mediterranean countries. Around 19 million people across the Mediterranean – mainly in rural areas – are still without access to drinking water.

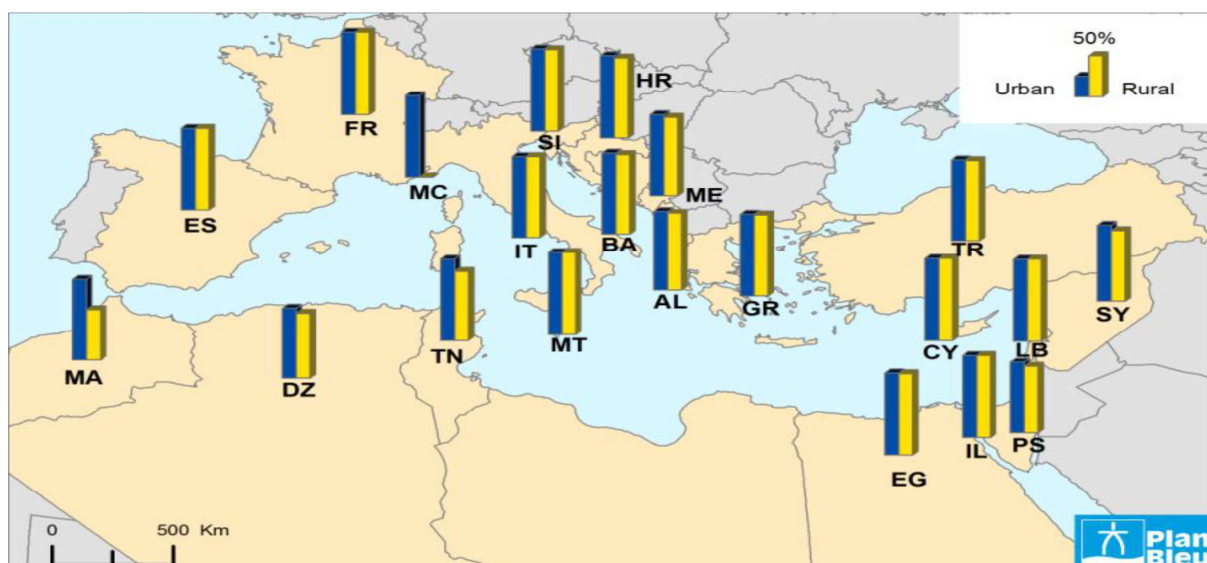
Share of population with access to an improved water source, 1990-2010 (%)



Source: UNSD



Share of population with access to an improved water source, 2010 (Rural and Urban)



Source: UNSD

This brief snapshot of the situation in the Mediterranean basin, its performance on human development indicators, and its activities, reveals the juxtaposition of a complex, fragile natural environment and rapid growth in human activity along the coastal strip around the sea.

Given that the majority of marine pollution, other than shipping-related pollution, comes from the land, the extent to which marine environments are contaminated will be dependent on the interplay between the land and the sea.

This is why the Pilot Sites need to develop the least polluting activities and generate water and material recycling processes.

Meanwhile water resources, which are under immense pressure, will need to be managed, shared and protected at the Pilot Sites at the relevant scale, with a governance system capable of managing (resources, leaks, conflicts, etc.) and overseeing the equipment.

1.3 Tourism

Mediterranean tourism grew from 58 million international arrivals in 1970 to 283 million in 2011, an increase of 386% over 40 years (source: World Tourism Organization).

The Mediterranean is a major tourist market on a global scale: it represents about 30% of international arrivals for more than 40 years.

Nevertheless, the tourism sector is not really connected to the levers of sustainable development, and in fact countries and territories do not fully benefit from a tool that can, when well controlled, increase the positive impacts on the economy, and employment, and support the preservation of protected areas and local heritage.

Public and private operators are, however, aware of the need to better calibrate tourist activities so that they do not constitute, through the overconsumption of resources and the space they may entail, irreparable damage to environmental assets (biodiversity, landscapes) and cultural (heritage and local traditions) which represent the capital on which rests the tourist attraction of a destination.

The need for regulation is also in the social register, particularly in developing countries, to clean up relations - tourist - "local" - and to prevent the risk of tensions.

These considerations are to be put in perspective with the weight of tourism in the Mediterranean countries: more than 160 billion euros of expenditure (Compendium 2014, World Tourism Organization).

Tourism, source of environmental degradation:

The "monoculture" of mass seaside tourism, which remains predominant, generates because of its concentration and seasonality of conflicts of use (water, energy, soil) and accentuates pollution on the environment and the sea.

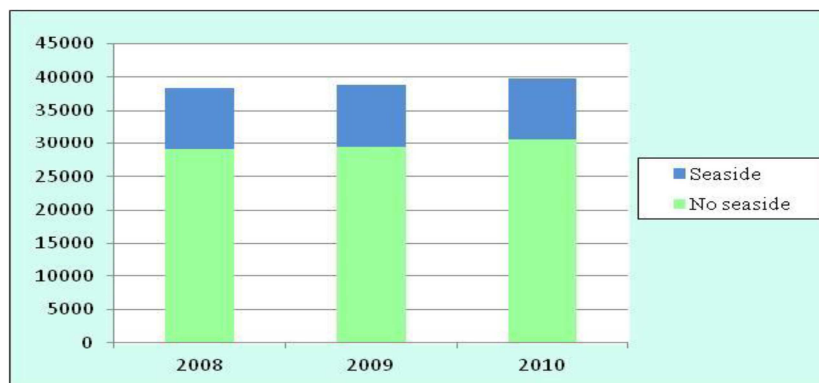
The main degradations of ecosystems and natural resources are:

- ♣ Soil degradation and land fragmentation due to the construction and operation of tourism and transport equipment (tourist complexes, hotels, ports, airports, etc.), as well as the supply of products and services (excursions ...); linear and coastal urbanization (littoralisation).
- ♣ Alteration of coastal ecosystems and loss of biodiversity due to the construction and use of tourism facilities.
- ♣ Waste production and pollution of the water and the sea, caused by tourism and transport equipment (tourist complexes, hotels, cruises ...), wild dumps.
- ♣ Atmospheric pollution and greenhouse gas emissions, due to the use of fossil fuels for transportation and for air-conditioning installations.
- ♣ Sound and light pollution in urban areas and natural environments, due to transport, population densification and equipment operation.
- ♣ Exhaustion of natural resources, especially drinking water, energy and food products, by tourist facilities (tourist complexes, hotels).



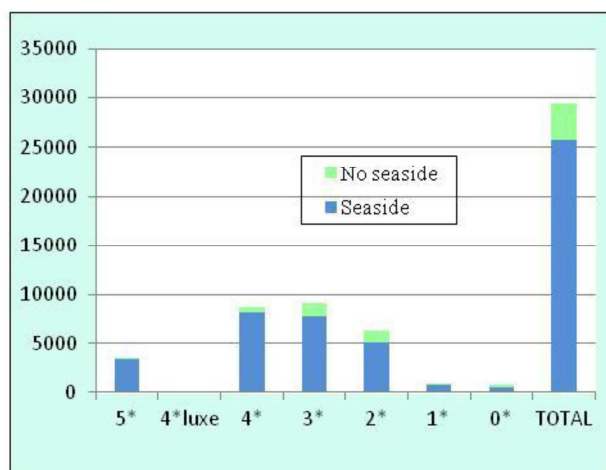
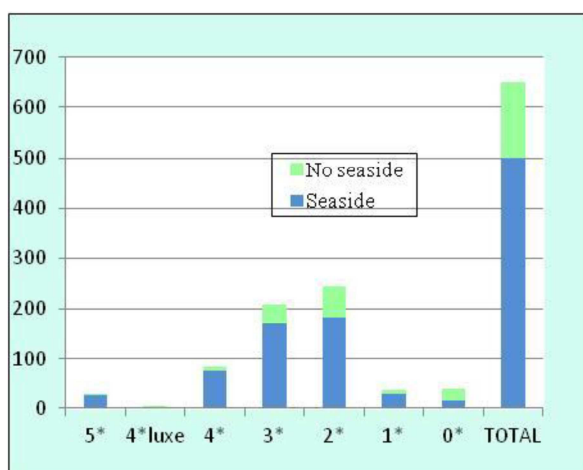
Is tourism becoming diversified ?

"Beds outside coastal resorts" as a percentage of total tourist beds
Distribution of tourist beds in Slovenia



Source: Statistical Office of the Republic of Slovenia

Distribution of hotels and rooms per category in Côte d'Azur (France) (2012)

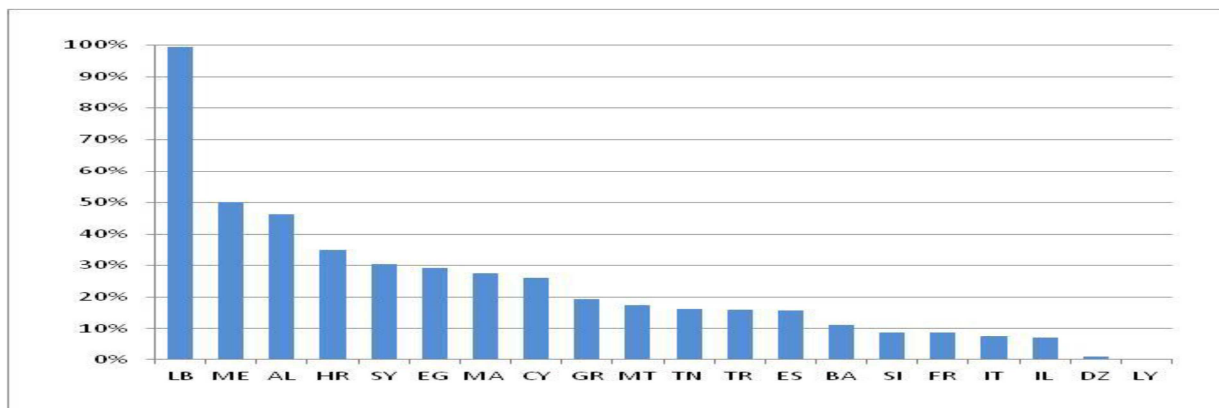


Source: Observatoire du Tourisme de La Côte D'azur, Comité Régional du Tourisme Riviéra-Côte-D'azur



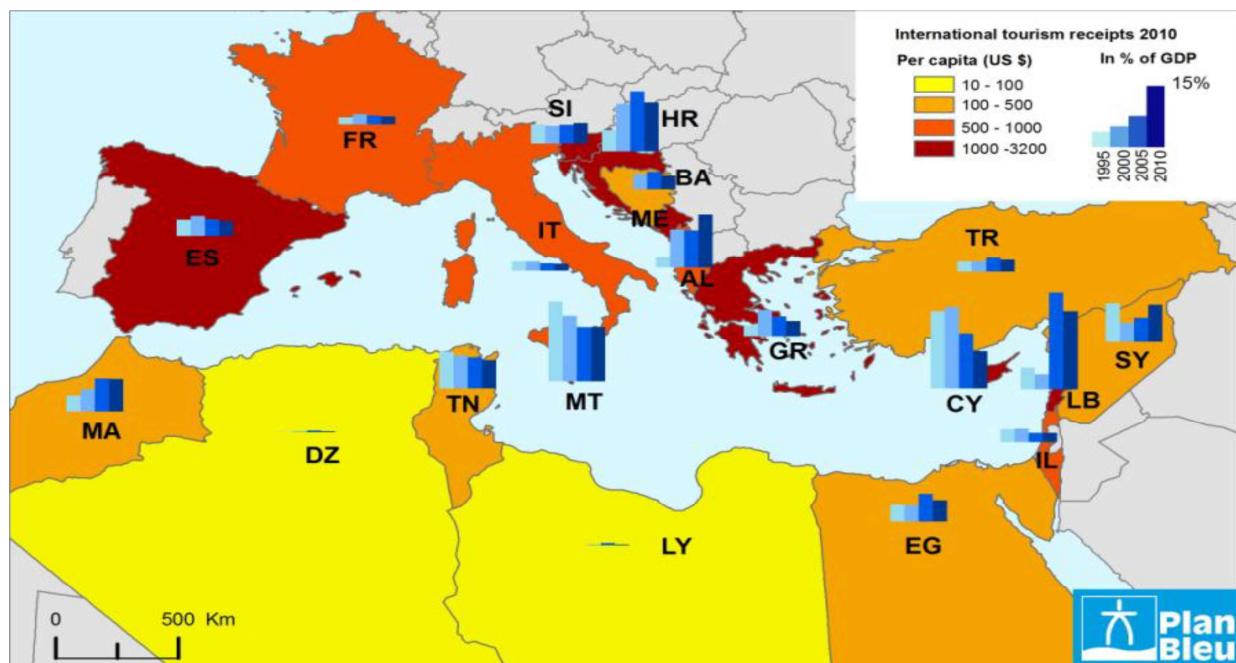
Is (international) tourism profitable enough?

International tourism receipts / Exports of goods and services, 2010 (%)



Between 1995 and 2008, the vast majority of Mediterranean countries saw a rise in total revenues from international tourism. However, these revenues fell in 2009, and continued to fall in 2010. Yet comparing tourism revenues with GDP reveals a mixed picture.

International tourism receipts, 1995-2010 (% of GDP)



Source: WTO, WDI

1.4 The effects of Climate Change

2.4.1. Climate change is happening

In the 20th century, average annual temperatures rose by 2°C in south-western Europe, with a notable acceleration in the pace of change in the last three decades of the century.

Similar long-term temperature increases can be observed along the South coast of the Mediterranean, but a lack of long-term data on this region makes the exact situation harder to quantify to any degree of accuracy.

However, the figures do show a 20% decline in rainfall in some parts of the South.

2.4.2. Global trends

Among the many changes and trends happening in the world today, some of the most important – and rapidly developing – issues stem from climate change and urbanisation.

The water cycle and the climate are closely linked. Water is recognised, on average, as the highest-impact effect of climate change and the sector in which adaptation is most vital. Some countries have made concrete commitments to climate change adaptation (France: Paris Pact on Water and Climate Change Adaptation, 2015).

As extreme events become more frequent, climate change is exacerbating tensions around water resources. Flooding costs Europe €5 billion each year, with the potential to rise to €23 billion each year by 2050 (IIASA, 2014).

Global warming is expected to have varied and significant impacts on the various forms of water.

The main observed and expected effects include:

- changes to rainfall patterns and river flow rates, but not everywhere and in different ways (increase or decrease); forecast models suggest that rainfall will increase in some places and fall in others;
- forecasts are highly uncertain for some countries (notably those located in transitional regions between two zones – one where average rainfall could rise, and another where it could fall); however, the models show that the Mediterranean is highly likely to see a reduction in average rainfall.

In June 2008, the Intergovernmental Panel on Climate Change (IPCC) published a Technical Paper on Climate Change and Water (technical paper VI).

The authors state that, while there is no clear cause behind changing global rainfall levels, the trend is strongly influenced by the magnitude of natural variability. Major uncertainties remain. While rising temperatures tend to intensify the water cycle, it is still difficult to predict what effect this will have. Several authors (see V. Masson Delmotte in The Conversation) argue that we are likely to experience more intense and frequent extreme rainfall events in middle-latitude regions of the world. A 2°C rise in global temperatures would, they claim, see the percentage of intense rainfall events affected by global warming rise from 18% in 2015 to 40%.

Estimates suggest that extreme rainfall events around the Mediterranean basin will become 7% more intense for every 1 degree rise in local temperature.

“A very robust finding is that warming would lead to changes in the seasonality of river flows where much winter precipitation currently falls as snow, with spring flows decreasing because of the



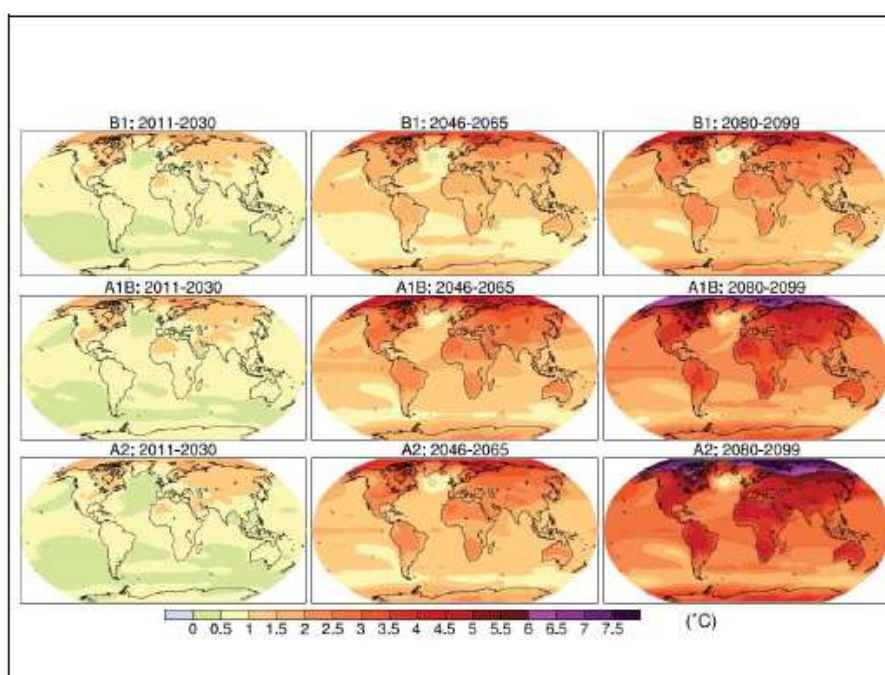
reduced or earlier snowmelt, and winter flows increasing.” IPCC, June 2008, “Technical Paper on Climate Change and Water” (technical paper VI).

“Observed warming over several decades has been linked to changes in the large-scale hydrological cycle such as: increasing atmospheric water vapour content; changing precipitation patterns, intensity and extremes; reduced snow cover and widespread melting of ice; and changes in soil moisture and runoff. Precipitation changes show substantial spatial and inter-decadal variability. The frequency of heavy precipitation events (or proportion of total rainfall from heavy falls) has increased over most areas (likely).”

2.4.3. Converging global models towards 2030

While IPCC forecast models cover climate trends until the end of this century, the system’s inherent inertia means that, whatever measures we take to limit the effects of climate change, we already know what our climate will look like by 2030.

The models all agree that climate change will push up temperatures in the Mediterranean by between 0.5°C and 1°C by 2030.



The forecasts only start to diverge after 2050. The most pessimistic model suggests major heating of between 2.2°C and 5.1°C by the end of the century, with a 50% likelihood of a temperature rise of between 3°C and 4°C by 2100.

At the same time, the number of rainy days is expected to fall, while drought episodes become more frequent.

Water will become scarcer as rainfall declines and becomes concentrated in autumn, droughts become more intense in summer when demand is at its highest, and river flow levels are likely to become less regular as the glaciers retreat.

These conditions raise the prospect of severe concerns for land-based and marine environments, as continental rainfall declines and pollution rises.

Every model indicates that the Mediterranean region, where the CO-EVOLVE Pilot Sites are located, will be a “hot spot” for global climate change – a phenomenon that has already begun¹ and is likely to continue throughout the 21st century. This, in turn, will place pressure on water and increase the likelihood of us reaching crisis point (IPCC, 2013).

1) According to the IPCC, the average surface temperature in the Mediterranean increased by between 0.5°C and 1.5°C in the 20th century, and annual rainfall levels fell by 5-10 mm per decade between 1950 and 2010.



2 Water and tourism in the Mediterranean

2.1 The situation as things stand

The Mediterranean region is one of the world's top mass tourism destinations and tourist inflows to the region rising steadily. Tourism benefits from the quality and richness of the natural and landscape heritage of the region.

But its rapid development, as a result of rising living standards and increased leisure time, is putting significant pressure on water resources.

In its "Pilot Study on Water and Tourism" Medstat II (2009), Eurostat stresses that "While water resources in Mediterranean countries are limited and unequally distributed over space and time, exacerbating the pressures, it can be seen that water consumption by the tourism sector is not well covered by statistics and it is difficult today to assess the impacts of this activity on the water resource, especially as the dispersion of the activity Tourism in the different branches of the economy makes it difficult to develop a global vision. "

The organization, data collection, monitoring and development of detailed statistics on this issue are necessary, especially as the trends are for a rapid development of water consumption, with the growth of 500 million international tourists expected in 2025.

It therefore seems essential to better understand the impact of tourism on the management of water resources, so as to better guide tourism and environmental policies, based on projected scorecards, via trade-offs between sectors (agriculture, industry, household use, hotel facilities, etc.), especially during drought episodes, or through adapted management methods (development of differentiated taxes or tariffs).

This general observation and this orientation apply to the entire CO-EVOLVE Pilot Site study area.

Thus, in a context where environmental issues are becoming more and more important, governments, local authorities and tourism companies should be encouraged to have statistical tools to assess and monitor the impact of tourism on water resources and more generally on the environment and natural resources.

There is therefore a need:

- ♣ For States and local authorities: knowledge of tourism water consumption, knowledge of its seasonal distribution, the daily peak and its distribution in relation to the various water resources as well as in the different sub-regions. - tourism sectors (accommodation, equipment, activities, etc.), in order to define the priorities for water saving, security of supply or demand management programs;
- ♣ At the level of tourism companies: a diffusion of benchmarks to enable companies to compare their consumption compared to similar establishments, to define their priorities for action (consumption of rooms, gardens, accompanying equipment ...), to follow the evolution of their performances and to put in place appropriate management strategies.



Water consumption by the tourism sector is not well covered by statistics and it is difficult today to assess the impacts of this activity on water resources.

There is a need to collect data and develop detailed statistics on this issue.

As things stands, there is a shortage of consistent data and statistics about this issue, about the nature of the data, the level of detail, who produces the figures, and how to make them available.

The statistics "Water & Tourism" therefore remain to be built: organization, collection and development.

2.2 What makes the Mediterranean unique: seasonality and artificialisation

Most of the impacts on the environment are multiplied by seasonality: more accommodation needs to be built than if attendance was spread throughout the year, oversizing public facilities and transport infrastructures (water supply , garbage collection).

In general, hotels and tourist residences are used a few weeks per year, at the same time, as well as rural lodgings and tourist lodgings, campsites and second homes.

Fragile ecosystems are therefore experiencing seasonal stress, especially since they must absorb the pollution flows of treated wastewater. Low season periods are periods of "breathing" for society and ecosystems.

Seasonality also has significant social impacts on employment and disruption of daily life, including transportation.

In a context of economy and opportunity, the occupation of space can lead to the proliferation of more or less illegal constructions, hygiene problems (wild camping), exposure to natural and health risks public (bathing in polluted waters) or the degradation of landscapes by sprawl.

The artificialisation of holiday resorts also impacts by its spatial concentration on the coast (fragmentation and land degradation, loss of biodiversity and alteration of the aesthetic value of landscapes).

Tourism operators are mobilizing to reproduce on the holiday site all the logistics necessary for a stay: accommodations, equipments, shops, transport infrastructures.

In their 2005 report "Tourism and Sustainable Development in the Mediterranean", UNEP and Plan Bleu even referred to the "tropicalisation" of the Côte d'Azur's ornamental vegetation, with the introduction of species such as the palms of the Mediterranean. Canaries, Agaves, Bougainvillea, Mimosas or Eucalyptus. "

Tourism urbanization tends to favor the setting up of its tourist resorts in a diffuse way and preferably in a virgin site.

At the same time, natural attractiveness factors (beach, landscapes) are replaced by artificial factors (leisure facilities, cultural attractions, marinas, golf courses, thalassotherapy, water parks) that consume spaces, resources and have a certain impact on the environment.



2.3 Types of tourism

There are several types of tourism that affect water management:

- internal tourism (which covers both domestic tourism and outbound tourism);
- national tourism (which covers both domestic tourism and inbound tourism);
- international (which covers both inbound and outbound tourism).

International definitions also distinguish between overnight visitors and same-day visitors.

According to these definitions, tourism covers a potentially vast array of different activities, including accommodation, food and catering, transport, leisure activities (excursions, leisure facilities, shows, etc.), shopping (souvenirs and everyday shopping), and services (post, telephone, etc.).

It is difficult to determine what portion of these activities can be attributed to tourism, since they are shared between tourism, leisure and daily household use.

Many of these activities nevertheless have a significant environmental impact.

This is particularly true of transport, which is the number-one source of tourism-related greenhouse gas emissions. Yet those activities of most concern when it comes to water consumption are accommodation and leisure facilities such as golf courses, pools and water parks.

2.4 “Water and tourism”: key issues

Water resource management is becoming a major issue for Mediterranean countries, and for the tourism industry, as more and more tourists are expected to visit the region and demand for water increases (especially in agriculture and domestic use).

Tourism: a major consumer of water

It is recognized that at the Mediterranean basin level, tourism-related water consumption is relatively modest compared with other sectors such as agriculture.

According to Plan Bleu estimates, confirmed by field studies, «The water consumption of hotel nights, which account for a large share of tourist visits, accounts for just 4.5% of total water demand in Malta and Cyprus, and as low as around 2% in popular tourist destinations such as Greece and Tunisia. Water consumption during peak tourist periods is nevertheless a matter of concern for some locations, whereas this is almost a non-issue in countries with a smaller tourism industry, such as Syria (0.1% of total demand) and Israel (0.5%).

Tourism-related water consumption is likely to rise sharply, as tourist numbers grow (500 million expected in 2025), visitors expect greater comfort, and providers built new facilities to diversify their offering (pools, golf courses, etc.).



15: Contribution of tourism (hotels and similar properties) to drinking water demand per country, 2000 (trend for 2017)

	Tourisme international		Tourisme national		Total tourisme			
	Demande en eau potable	Demande en eau potable du tourisme littoral méditerranéen	Demande en eau potable	Demande en eau potable du tourisme littoral méditerranéen	Demande en eau potable du tourisme	Demande en eau du tourisme littoral	Part du tourisme dans la demande en eau potable du pays	Part du tourisme littoral dans la demande en eau potable du pays
	lm3/ an	lm3/ an	lm3/ an	lm3/ an	lm3/ an	lm3/ an	%	%
Espagne	35,94	25,16	12,23	4,89	48,17	30,05	1,03	0,64
France	18,74	3,75	16,95	3,05	35,69	6,80	0,60	0,12
Italie	24,31	15,80	20,46	14,32	44,76	30,12	0,56	0,38
Malte	1,74	1,74	1,74	1,74	4,36	4,36
Grèce	11,45	10,88	2,20	1,98	13,65	12,86	1,57	1,48
Slovénie	0,69	0,17	0,28	0,07	0,97	0,07	0,37	0,03
Croatie	3,78	3,52	0,49	0,35	4,27	0,35	1,12	0,09
Bosnie Herzégovine	0,05	0,01	0,09	0,01	0,14	0,01	0,05	0,005
Serbie Monténégro	0,18	0,03	0,60	0,09	0,78	0,09	0,10	0,01
Albanie	0,02	0,01	/	/	/	/	/	/
Turquie	7,09	4,61	2,51	1,00	9,60	5,61	0,17	0,10
Chypre	3,61	3,61	/	/	3,61	3,61	4,51	4,51
Syrie	0,46	0,05	0,17	0,05	0,63	0,10	0,05	0,01
Liban	/	/	/	/	/	/	/	/
Israël	2,42	1,69	1,45	1,16	3,86	2,85	0,57	0,42
Palestine	0,24	0,01	/	/	/	/	/	/
Egypte	8,19	0,82	0,44	0,15	8,64	0,97	0,19	0,02
Libie	0,08	0,08	/	/	/	/	/	/
Tunisie	8,29	7,88	0,34	0,30	8,63	8,18	2,33	2,21
Algérie	0,04	0,01	0,49	0,25	0,53	0,26	0,04	0,02
Maroc	3,08	0,46	0,61	0,18	3,69	0,65	0,34	0,06
Méditerranée	130,42	80,28	59,29	27,86	189,37	104,32	0,50	0,28

/: données non disponibles

Hypothèses : consommation d'eau d'une nuitée d'un touriste international : 250 litres, d'un touriste national : 150 litres

Source : TEC, d'après OMT/WTTO, 2000 ; contributions nationales ; Plan Bleu

Specific needs in terms of water consumption :

- seasonality, with peak demand coinciding with the dry season (summer);
- spatial concentration along the coast, at locations with scarce local water resources (islands) and often in fragile natural environments;
- a preference among tourists for facilities that consume excessive amounts of water, such as golf courses, pools and water parks;
- all of which requires water to be piped from inland areas, increases reliance on non-conventional water sources (such as desalination in Malta, the Balearics and Djerba, and wastewater reuse in Morocco and Tunisia), and causes water piping and wastewater treatment facilities to be oversized because tourist numbers are unevenly distributed across the seasons.

Tourism can be a major source of funding, allowing authorities to improve water distribution and treatment systems for the benefit of local populations, or even supporting investment in wastewater treatment plants for parks and gardens.

Water as a tourism resource

Tourism and the environment are two issues closely intertwined with water. "Water and tourism" is about more than just the consumption of water by hotels and tourist facilities.



Water is also an important tourism resource, and its availability can be instrumental to a destination's appeal:

- landscapes;
- wellness tourism (balneotherapy, spas, etc.);
- Industrial tourism (spring water, fish farming ...);
- Cultural tourism (caves ...) and scientific (research and valorization center ...);
- seawater or freshwater bathing (rivers, lakes, etc.);
- water sports (canoeing, diving, windsurfing, sailing, etc.).

To promote these objectives, tourism is a strong argument for maintaining a high water quality in order to allow the sustainability of these activities, which have a certain economic potential and the support of an extra-regional influence.

This is particularly the case for the structures in charge of water management and the local public authorities, which have taken into consideration the economic impact that water quality can have on tourism with the obtaining of the Blue Flag.

Coastal tourism: impacts on water, energy, land and waste

In coastal areas, "good land management" actions that are supposed to be implemented in the context of public policies (anticipation, adapted governance, etc.), with tools for territorial planning, are very often non-existent, incomplete, or inappropriate. for a real prospective co-development strategy.

While the environmental impacts are already very important (consumption of water, energy, waste production ...) this lack of articulation between tourism activity and urban management, highlights the infrastructure deficits in terms of public facilities, for water, energy, waste ... but also in terms of road.

The choices made, often in a rush, can lead to poorly adapted solutions, with higher environmental impacts and costs of investment and exploitation of this prohibitive equipments.

Several activities are impacted by poor territorial management, including:

▪ ***Water field***

For the tourist, water consumption is characterized by a double phenomenon:

- a daily drinking water consumption often three to four times higher than a permanent resident; or more, in some international 3S destinations (Sea, Sand and Sun);
- a strong demand for water for leisure facilities (golf courses, swimming pools, water parks ...).

Such a situation can unbalance the territorial management of water (use of non-renewable water resources, disproportionate transfers, etc.), lead to choices on resources of lower quality, and also generate tensions in the area. sharing the resource.

▪ ***Energy field***

Insofar as the technological choices relate to solutions such as desalination plants, the reuse of treated wastewater, the environmental repercussions (brine, greenhouse gas, etc.) should not be underestimated, as well as the overconsumption in energy.



On this last point, it is necessary to take into account the overall electricity consumption to be satisfied, both at the level of urban facilities, and tourism.

Thus, having to satisfy the seasonal peak of a tourist area can generate in terms of energy the extra-territorialisation of the environmental impact: by the creation of poles of energy production, networks, marine pollution of the receiving environment, visual pollution by the infrastructures of the overhead electrical networks.

▪ ***Land field***

The choices made on the coast in terms of construction have shown their limits: land saturation, landscape impacts, cohabitation, management of transport flows ...

This phenomenon, which has already been identified for tourist accommodation and residential housing, has multiplied in the coastal areas that have hosted space-consuming facilities such as golf courses and leisure parks.

The consequence of a balanced non-management, which should have normally faced and anticipated this land pressure, is today translated on the ground by the limited presence of only a few deserted areas ... but which remain subject to strong stakes of appropriation!

▪ ***Household waste field***

In coastal areas, the attractiveness they generate induces an increase in population (often extraterritorial movement and reception function of these territories) which combines in summer with the increase of populations for these tourist destinations.

The overproduction of waste, which should normally be in line with the complete "Collection - Storage - Treatment" sector, is not present in many cases, including the components of an essential recycling.

Thus, for lack of global control - even if often the competences are often shared at the level of a larger territory - it follows public health problems and flow of pollution air, soil, water (drinking water, course of water, sea ...).

CO-EVOLVE will focus on local planning in an effort to improve urban services, mitigate land pressure and reduce impacts on water resources.

The Mediterranean region and climate change: a challenge for tourism

Considerations around water resources worldwide, and in the Mediterranean region in particular, must be placed in the context of efforts to mitigate the impact of climate change.

According to IPCC forecasts, the Mediterranean region is particularly vulnerable to climate change, especially when it comes to water resources, with the region highly likely to see a reduction in rainfall and greater inter-annual variability.

In addition to drinking water supply, the key identified risks stem from a general fall in water availability (more frequent droughts and more violent floods). When taken together, these



manifestations of climate change further exacerbate already scarce freshwater supplies in the region, due to greater evaporation, scarcer resources and salinisation of coastal aquifers.

Several areas across the Mediterranean are likely to have less water available, and this situation could have various impacts on the tourism industry – drinking water access, threats to water-based activities such as lake tourism and river canoeing, alteration of attractive natural and agricultural landscapes, and more frequent forest fires which, in turn, could endanger activities such as camping and hiking.

Moreover, just as tourism impacts the environment, so the degradation of the environment could put the brakes on tourism development. For example, the deterioration of water quality due to increased wastewater discharge in the high season could, in turn, cause a proliferation of algae and hit tourism revenues.

Over-development and environmental degradation are harming the appeal of many tourist destinations, fuelling the decline of the industry itself. If a coastal area becomes less attractive, it could take a severe hit to its main source of income.

The interaction between these myriad factors – physical, ecological and environmental, socio-demographic, and economic-political, is instrumental to a destination's ability to accommodate tourists.

There is the potential for conflict over access to water between local residents and the tourism industry (e.g. golf courses, water parks, etc.). Climate change-induced pressure on attractive ecosystems endangers the activities that rely on these ecosystems (such as diving). For example, rising water temperatures could attract more jellyfish into an area. And finally, the predicted rise in sea levels – stemming from natural or man-made causes – poses a threat to many coastal tourism resources, from infrastructure to beaches.

2.5 Tourism in the context of marine pollution

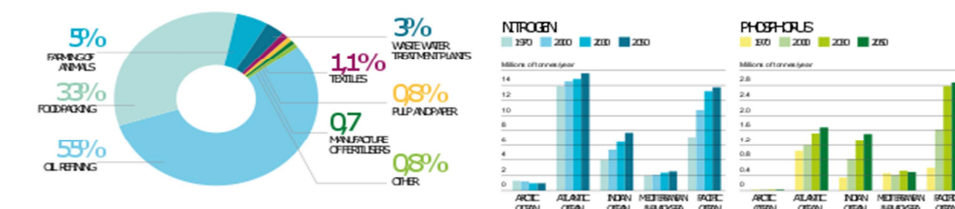
According to WWF, « Land-based human activity is responsible for four-fifths of marine pollution ». In addition, WWF specifies both a trend (2030) towards the further decline in wastewater pollution, but on the other hand an accentuation (2030) of pollution by heavy metals (mercury and lead), but also cause nutrients.

In this context, no one can ignore that the various forms of marine pollution (nutrients, heavy metals, persistent organic pollutants (POPs), marine waste, and others) affect marine and coastal ecosystems and the economic activities that rely on them, such as fishing and tourism.

Because of its activities, man is the source, via rivers and rivers, atmospheric dusts and marine litter, the presence of pollutants in the Mediterranean, whether organic compounds, heavy metals, organic pollutants Persistent (POPs), nutrients and marine litter.



16: Percentage of coastal and transitional waters in EU Mediterranean countries "in poor condition or with limited ecological potential" (2005-2010).



In its 2015 report, WWF states that "80% of marine pollution is derived from land-based human activities, primarily from the northern shores of the Mediterranean. For example, the largest continental discharges are those of the Rhône and the Po, which alone account for 25% of the total".

« The majority of heavy metals found in marine and coastal waters come from fertiliser production, the metalworking industry, oil refineries and wastewater treatment and, to a lesser extent, energy generation and the chemical industry.

These metals are dangerous not just because they can accumulate in coastal regions, but also because they move, through a process of advection, to the deeper waters of the continental margin and the basin (WWF & MEDPOL, 2007).

POPs, meanwhile, have historically been found in extremely high concentrations in the marine environment (especially in large predators and large marine mammals). Yet the biggest sediment pollution concerns relate to the North coast of the Mediterranean – particularly in enclosed coastal areas (ports and lagoons).

Moreover, although eutrophication remains a localised phenomenon in the Mediterranean, the accumulation of nutrients due to human activity along the coast, and throughout watersheds more generally, poses a severe threat to many coastal environments. Most of these nutrients come from wastewater, animal waste, fertiliser and industrial discharge.

Finally, man-made waste can be found in all marine habitats, from beaches to the open seas and oceans, often accumulating in large quantities on the sea bed.

2.6 Tourism in the context of marine ecosystems

The Mediterranean is the world's largest semi-enclosed sea, with a coastline stretching for 46,000 km. Connected to the Atlantic Ocean through the narrow Strait of Gibraltar, to the Red Sea via a man-made canal, and to the Black Sea by way of the Bosphorus, its coastline encompasses no fewer than 21 countries in Europe, Africa and the Middle East.

The Mediterranean features both rare and important habitats, has a high level of endemism, and is home to many severely endangered species.

The Mediterranean is recognised as one of the world's 25 biodiversity hot spots, because: it is home to between 4% and 18% of the world's known marine species, yet accounts for just 1% of the world's oceans by surface area.

Emblematic species of global conservation (reference : WWF) concern:

The Mediterranean is home to 19 different species of large marine mammal.

The region's other emblematic species include the loggerhead sea turtle (*Caretta caretta*), the green sea turtle (*Chelonia mydas*), the leatherback sea turtle (*Dermochelys coriacea*) and the Mediterranean monk seal (*Monachus monachus*), the most endangered of all species found in the Mediterranean. The Atlantic bluefin tuna is without contest the region's most iconic fish species.

The IUCN Red List for the Mediterranean also includes a large number of other marine species, including sharks, which are severely endangered because their population is declining at a much faster pace than elsewhere.

Six species of marine mammal are under threat of extinction (critically endangered, endangered and vulnerable).

Emblematic habitats of global conservation (Ref. : WWF) concern:

Sensitive Mediterranean habitats include seagrasses, coralligenous habitats and maerl beds. Seagrasses are found in shallow waters, forming a unique habitat that provides many ecosystem services.

Yet human coastal activity is causing these habitats to shrink and fragment. Coralligenous beds, maerl beds and the species that depend on them are affected by mechanical disturbances, increasing sedimentation, invasive species, rising temperatures and water quality degradation.

Threats to ecosystems (Ref. WWF) :

In the Mediterranean, marine life is severely threatened by habitat degradation and the erosion of biodiversity.



The primary source of these threats comes from human activities, such as fishing, shipping, water pollution, coastal development and offshore oil and gas drilling.

Yet right now, there are 150 million habitats in 21 countries along the Mediterranean coastline, drawing in several million tourists each year.

Table 11. Pressures on Mediterranean marine ecosystems from different sectors – WWF data.

Activity	Sector	Main pressures
Biological resource extraction	Commercial fishing	Selective species extraction Physical changes (changes to the pace of silting, abrasion) Marine waste
	Recreational fishing	Selective species extraction
	Marine aquaculture	Addition of organic matter Introduction and transfer of non-indigenous species Selected species extraction (juvenile catches)
Non-biological resource extraction	Deep sea mining	Physical changes (abrasion, changes to the pace of silting)
Energy production	Renewable energy	Suffocation, underwater noise
	Oil and gas drilling and extraction	Physical losses (clogging, suffocation) Introduction of other substances (solid, liquid or gas)
Coastal activities	Land-based pollution	Contamination by hazardous substances Nutrient and organic matter enrichment
	Coastal development	Physical alterations (clogging, suffocation) Introduction of microbial pathogens (wastewater effluent)
Transport	Shipping and port activities	Underwater noise Introduction and transfer of non-indigenous species. Introduction of synthetic and non-synthetic compounds. Introduction of microbial pathogens (waste discharged from ships)
Tourism	Tourism (coastal tourism, pleasure boating, cruises)	Physical changes. Introduction of synthetic and non-synthetic compounds Introduction of organic matter Underwater noise Introduction of microbial pathogens (waste discharged from ships)

Conservation efforts (Ref. WWF) :

The **Convention on Biological Diversity** is one of several strategies to address degradation of the world's sea and oceans. The convention includes a target to preserve at least 10% of coastal and marine areas within **Marine Protected Areas** (MPAs) by 2020 (Aichi Target 11). In 2012, Mediterranean MPAs – including the Natura 2000 sites designated under the European Birds and Habitats Directives – covered 1.08% of the sea's surface area.

Moreover, in addition to the General Fisheries Commission for the Mediterranean's (GFCM) 2005 decision to ban bottom trawling below a depth of 1,000 m, four Fisheries Restricted Areas (FRAs) were established in 2006 and 2009 to protect deep-sea sensitive habitats.

The ninth meeting Conference of the Parties to the Convention on Biological Diversity saw the creation of Ecologically or Biologically Significant Marine Areas (EBSAs), located in specific areas of the ocean that play an essential role in the ocean's proper functioning and that provide many important services.

In 2014, the CBD Executive Secretariat identified and approved **15 Mediterranean areas meeting the EBSA criteria**.

Other international organisations have also identified the following areas of conservation concern (Ref. WWF):

- **marine protected areas under the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) and the Pelagos Sanctuary;**
- **high conservation value areas for Mediterranean sea birds, identified by UNEP-MAP-RAC/SPA;**
- **priority conservation areas for demersal and pelagic stocks, also identified by UNEP-MAP-RAC/SPA.**

Figure 17 : Marine Conservation Areas in the Mediterranean.



Figure 18a: Existing conservation areas and priority conservation areas.

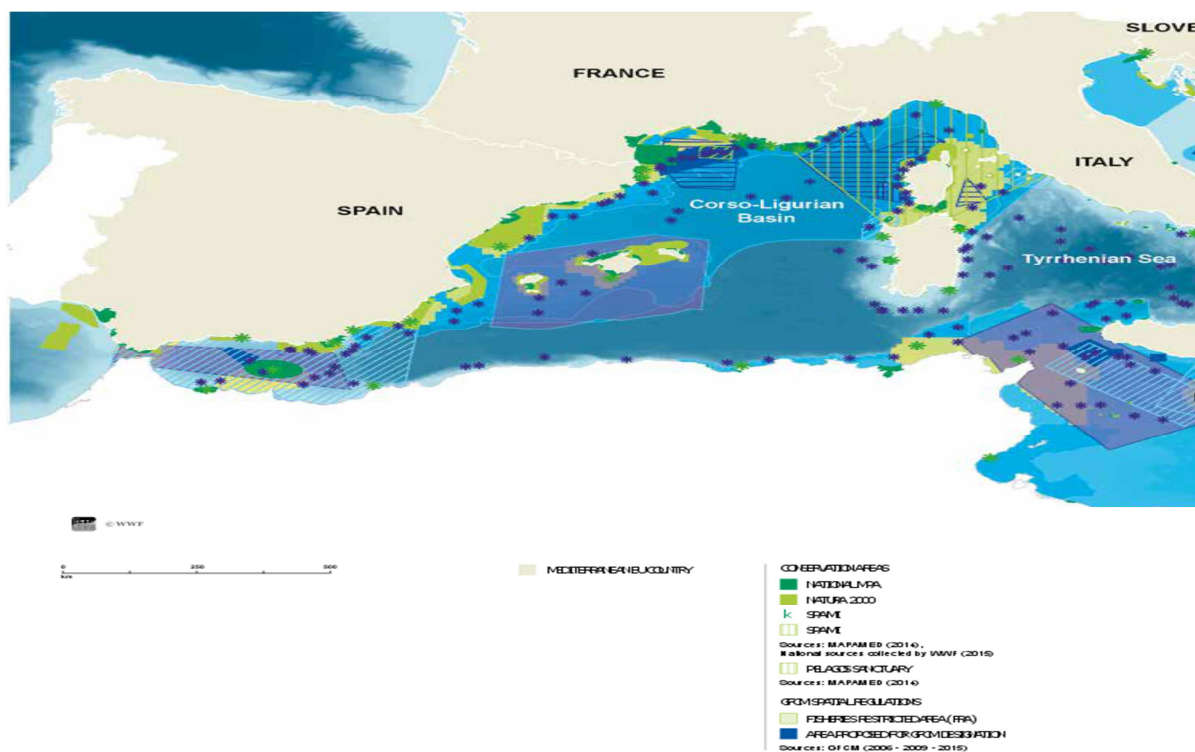
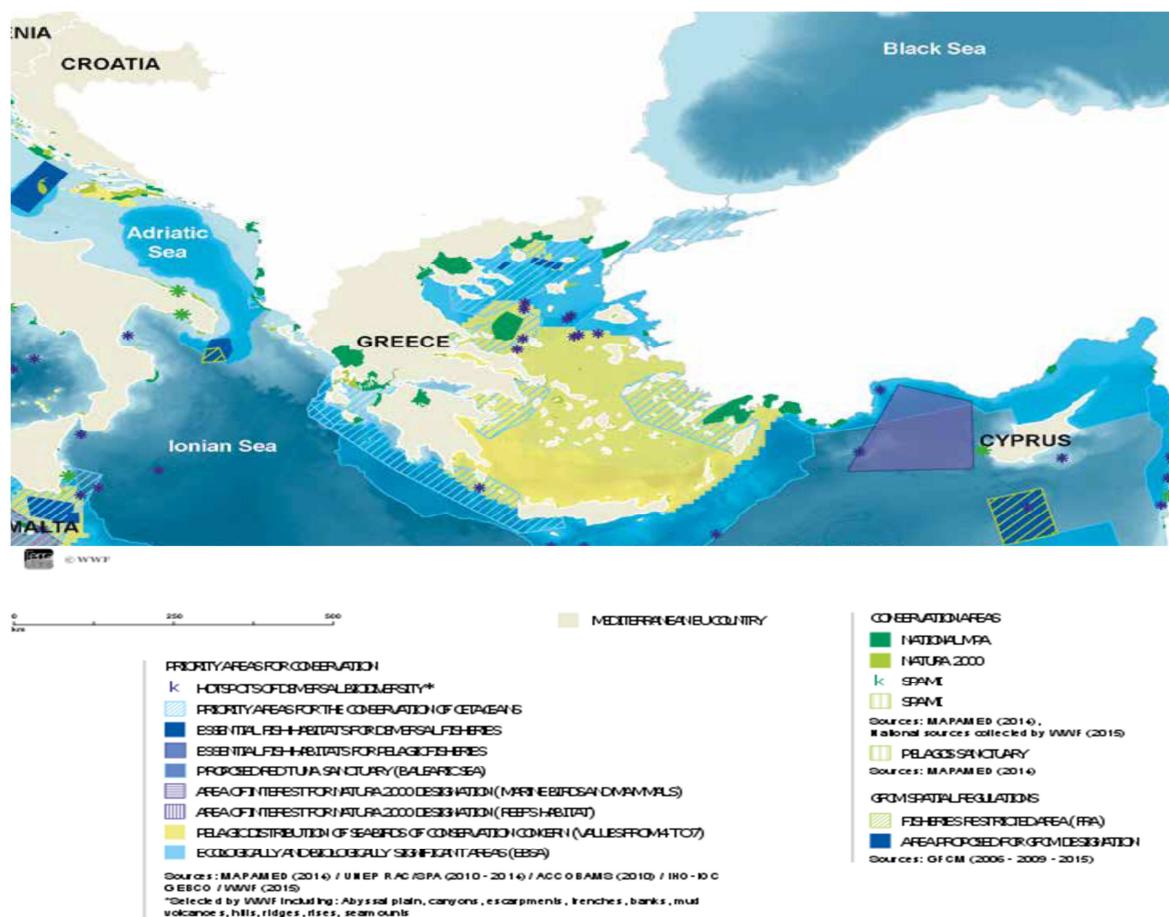


Figure 18b: Existing conservation areas and priority conservation areas.



2.7 Statistical issues

Although tourist activity is flourishing, and unlike the industrial sector, for example, it does not represent the entire tourism phenomenon as a whole, especially from the point of view of statistics.

The known elements boil down to basic data, useful for the immediate activity, such as the figures of international arrivals, nights, as well as those of payments.

Moreover, the current availability of tourism statistics does not allow a fine approach to all tourism activities. Indeed, the entire tourism sector is not cataloged (catering, equipment, leisure activities, etc.).

This diagnosis is to be compared to the absence of a precise and documented identification of tourism activity, a repository shared in some way, organizing the national and international classifications for all equipment.

This general observation applies to the entire Mediterranean basin. Statistics and information are even sparser when it comes to the relationship between the tourism industry and water consumption.

However, in a context where environmental issues are proving increasingly important, public authorities and tourism stakeholders do not have the statistical tools to evaluate (water consumption for the daily peak in particular). and to monitor the impact of tourism on the environment (pollutant discharges and acceptability of the receiving environment during peak periods).

NB: The pilot study "Freshwater and Tourism" Eurostat - MedStat II - to try to qualify the relationship water - tourism had been initiated in 2009, on the countries: Tunisia, Morocco, Israel, Jordan ... It had resulted in formulating recommendations!

There is therefore a need for statistics in the "Water - Tourism" relationship that CO-EVOLVE could usefully suggest.



3 Water and tourism: state of play and outlook

The Mediterranean is one of the most important tourist regions in the world: it accounts for more than a third of total tourist receipts and half of international arrivals.

The Mediterranean is one of the areas of the world in which the dynamics of tourism are the most intense and the most varied. The prospect of climate change and the difficulty to imagine very concretely what will be its consequences on tourist flows raise many questions. This is particularly important in the coastal areas, which are undoubtedly key areas of tourism development in the Mediterranean at the same time as they are places of life increasingly densely populated. They therefore constitute areas of considerable pressure and stakes.

Tourism is the largest economy in the region, its largest contributor to taxation, its main developer and player in the balance of payments balance (ahead of agriculture). He is also the first trainer (the service industry is characterized by a strong workforce whose training is easier than for jobs in other industries) and represents from 6% to 25% of the Gross Domestic Product in 20 of the 28 Mediterranean markets.

In addition to the economic crises in the home markets, the political upheavals underway in North Africa and the Middle East destinations are having a negative impact on the tourism sector. A new course must be defined to strengthen competitiveness.

3.1 Context and current situation

Tourism in the Mediterranean area: a sovereign economic activity!

Mediterranean tourism (spatial and seasonal concentration) increased from 58 million international arrivals in 1970 to 283 million in 2011 (300 million in 2012), an increase of 386% over 40 years (source: **World Tourism Organization**).

The Mediterranean is a major tourist market on a global scale: it represents about 30% of international arrivals for more than 40 years.

In terms of revenues, international tourism generated \$ 5.6 billion in the Mediterranean basin in 1970. In 2011, international tourism generated \$ 224 billion in revenue, an increase of nearly 40 to 1970 (see Plan Bleu - Note 24).

The WWF noted in 2015 that "In 2012, the gross value added (GVA) of coastal tourism in the Mediterranean Sea was estimated at 135 billion euros, equivalent to 7% of the direct contribution to the tourism sector on the planet. Total revenue from tourism and related activities in the Mediterranean countries amounted to € 774.5 billion, or 11.1% of Gross Domestic Product (GDP) in 2011.

At the regional level, tourism employs 18.5 million people, which equates to an average of 15.2% of total employment (2011), up to 25% in Lebanon, Croatia and Malta . "

The Mediterranean Sea also has the particularity of hosting an important activity of cruise passengers (27 million passengers in 2013), which has the occasion of their displacements radiate on the main Mediterranean ports of Italy, Greece, Spain and France.

Cruise tourism contributes to the economic boom through various expenses (cruise lines, purchases), shipbuilding and monitoring and control devices.



On the subject of coastal artificialisation, most Mediterranean countries expect to see their populations rise in the coming years, especially in the east of the region, where population growth will be at its highest (e.g. 59% in Palestine and 44% in Jordan between 2010 and 2030).

Meanwhile, the total population of Mediterranean EU member states is expected to rise by 5% over the same period – a not insignificant increase given that these areas are already highly populated. Coastal population density is also expected to rise.

3.2 Future trends

Coastal tourism has taken off again in the years following the last economic crisis. Between 1995 and 2010, international tourism in the Mediterranean grew by an average of 3.7% per year.

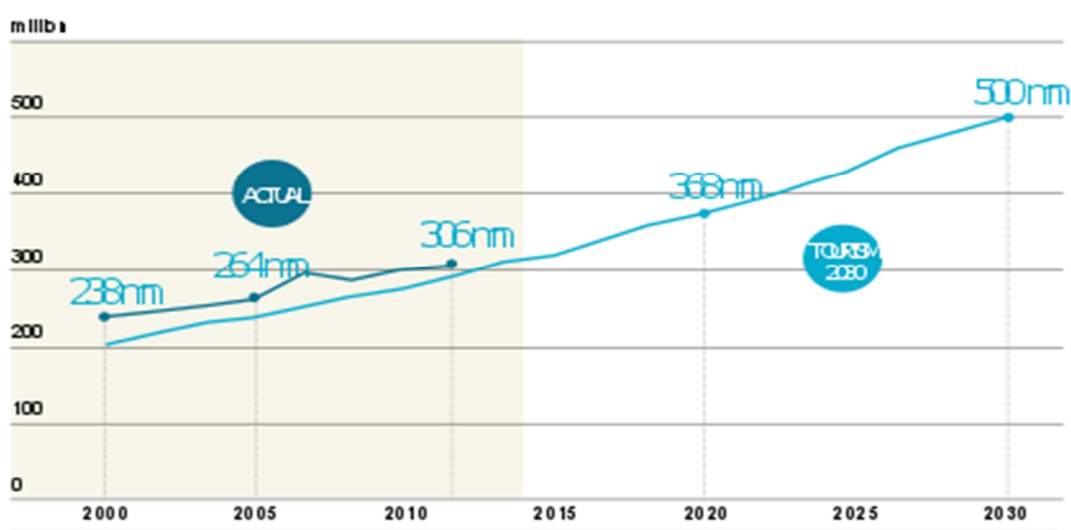
WWF reports in its "Blue Growth 2015" report that "The industry's future will be affected by a series of factors, including declining competitiveness among some Mediterranean destinations, changing tourist needs and preferences, conservation and protection of cultural and environmental heritage, and the growing impacts of climate change ».

In spite of these uncertainties, Plan Bleu forecasts suggest that « coastal tourism will continue to perform strongly in the next 15 years, with international arrivals in the Mediterranean expected to increase by 60% between 2015 and 2030, when they will hit 500 million (figure 20).

France, Italy and Spain will remain the top three destinations. Unlike coastal tourism, cruise tourism continued to grow in the Mediterranean in 2008-2010. The region had a global cruise market share of 17.6% in 2008. By 2011, this had risen to 21.7%.

Although widespread media coverage of the 2012 Costa Concordia disaster had a negative effect, the sector recovered quickly thereafter. Geographically, however, growth remains largely concentrated in the Mediterranean's major cruise ports, where total traffic increased by 10% in 2013 (compared with an average of 4% across all ports in the region).

20. Expected international tourist arrivals in the Mediterranean region (in millions).



Source : UNWTO Tourism highlights 2014



3.3 What are the lessons for CO-EVOLVE?

The success of “**Sustainable Tourism**” development projects depends on “inclusive” approaches that mobilise and empower stakeholders.

There are several possible ways forward, as outlined below:

Creating an enabling national framework

Local approaches can only be successful if there is an enabling national environment, with relevant laws, investment policies, a clearly established legal framework, effective decentralisation and truly inclusive processes.

Central government and local authorities need to act in unison to support and promote the emergence of local projects. The government must facilitate actions at the local level, enabling stakeholders to work together and agree on major themes.

An enabling framework encompasses a series of policy measures – national land use planning policies, investment and decentralisation policies, and incentive policies. It also supposes a system to equalise disparities between territories regions and ensure a balanced development process. All land use planning master plans (urban planning frameworks, land management, transport plans, etc.) must be complementary and joined-up by design.

Here, the notion of public subsidiarity is vital.

Subsidiarity is a principle by which tasks are divided between the government and civil society – wherever a given task can be accomplished by individuals or groups associating freely, this should be preferred to direct government intervention.

Unlike decentralisation, this notion has nothing to do with how power is distributed between institutions. Instead, it is about action – about using available resources to drive improvement and building capacities.

But it raises a number of questions that have to be answered. What resources? How will they be used?

What do we want to improve and why? What stakeholders and sectors will be involved? Subsidiarity is vital to the creation of an enabling national framework.

It is inextricably linked to the idea of networks working in the public interest, and to the creation of charities and non-profits that exist to share and pool knowledge and skills.

Making tourism part and parcel of a territorial project

Local development is about more than sector- and theme-specific approaches, business networks or local marketing. These initiatives are important, of course. But local development is about something bigger – a process involving a complex set of stakeholders.

It can be defined as a process of long-term, local innovation. It has its roots in a given territory, where politicians, businesses, and social and environmental stakeholders come together, organise and develop a common culture around the project. It stems from the interplay between all sectors and themes in play.

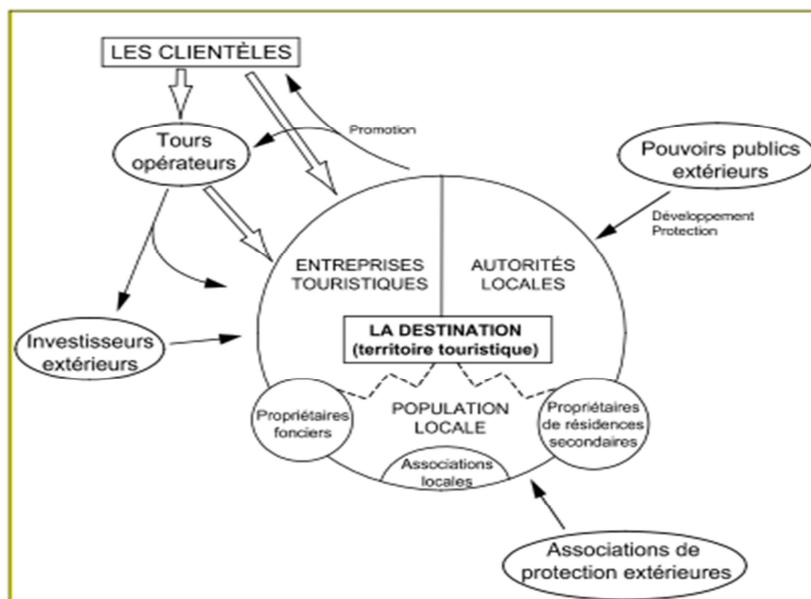
There are four dimensions to local development:



- Stakeholders or sectors: local development requires mutual understanding and respect between the public and private sectors, so that joint initiatives can emerge and sector-specific policies can be addressed in a new light.
- Themes: economy, society, culture and the environment are cross-cutting themes that affect all stakeholders. Local development requires stakeholders to break down sector-specific barriers.
- Time: stakeholders experience time differently – their actions occur at different time scales, and this can sometimes give rise to conflict. For example, tourism operators operate at completely different time scales to politicians or farmers. A territorial project must take account of these differences.
- Territory: local development is a holistic process that harnesses synergies between a given territory's activities, people and natural environments.
- The project and the territory are the frame of reference and the basis on which local development occurs, potentially driven by tourism. This type of approach requires a broader understanding of what development means. It cuts across institutional barriers and encompasses the territory at all its scales. It relies on stakeholder involvement in setting shared objectives that will guide their action for the long term.

As such, it is an interesting way to regulate the tourism system (figure 25).

25: Model showing a territory's tourism system



Source : P. Moisset, Plan Bleu, 1998

In the Mediterranean, there are various initiatives that align wholly or partially with the idea of a “territorial project”, and that take account of broad water-related issues either directly or indirectly:

- ✓ In Italy (Rimini) and Spain (Calvià), tourism is a central feature of the Local Agenda 21 process.
- ✓ In France, Regional Nature Park (PNR) charters include a requirement for a high-quality territorial project in the medium-term (10 years). This approach is beneficial because it

separates the process from the electoral timetable (local and regional elections are held more frequently than every 10 years). PNRs – a prime example of inter-communal cooperation – are managed by a separate body that encompasses both the region and local authorities (joint association) and are underpinned by a coordinated local development project. As well as protecting natural and cultural heritage, PNRs play a vital role in economic and social development and in land use planning.

- ✓ As regards coastal tourism, integrated coastal zone management (ICZM) projects provide a framework for local development, yet progress on these projects is slow because stakeholders have found it difficult to arrive at shared objectives and commit unanimously for the medium term. The main problems with ICZM stem from the fact that there is no clearly defined operational framework in law.
- ✓ “Contract” type programmes (river contract, bay contract, mountain range contract, regional contract, etc.) herald interesting opportunities to incorporate tourism into a local development process that goes beyond the boundaries of local, departmental or regional authorities. France’s “regional contract” model, for example, has its roots in a local process. It involves the establishment of “development councils” with members from the business, social, cultural and charitable sectors. In this case, the “region” encompasses a series of natural or functional “territories” that share similar aims and values. Its role is to drive, lead and coordinate local initiatives and land use planning schemes. Heritage promotion is a key feature of all types of contract – as embodied in the name of the “region” or coast (e.g. “Carthage coast” in Tunisia, or “Costa Smeralda” in Italy), which signifies the territory’s identity.
- ✓ Inter-communal schemes are also an effective way to drive local initiatives, in which tourism could be seen as a cross-cutting activity bringing together a broad panel of stakeholders working on a joint project with benefits that stretch well beyond a given sector.

By viewing tourism as part and parcel of a broader, cross-sector territorial initiative, schemes of this type can help to redefine tourism development strategies.

Tourism could, for example, play a part in sound water demand management, as is the case in Tunisia, where a dedicated pricing policy has been brought in to slash drinking water demand per tourist bed despite rising tourist numbers.

However, policy measures of this type can only be successful if they are backed by an enabling framework at the regional and national levels.

Mediterranean cooperation on tourism

Unlike in other areas such as water management, there is still very little Mediterranean cooperation in the tourism industry. There is no over-arching organisation and discussions generally focus on specific projects and occur over a limited time frame (e.g. in relation to projects funded by the EU or other international organisations).

To date, several factors have hampered such coordination:

- ✓ the paucity of tourism-related public policy;
- ✓ intense competition between destinations and countries offering similar tourism products;
- ✓ the fact that governments cooperate through other frameworks (European Union), which can overwhelm efforts for closer cooperation in the tourism industry;
- ✓ the persistence of geopolitical tensions, especially in the Middle East.



There is nevertheless a genuine need for proper organisation. There are several founding texts that lay the framework for Mediterranean cooperation on tourism.

The MED Agenda 21 of 1994 recommends cooperation on education and vocational training, tourist awareness-raising, and the development of new products and technologies to reduce the impact of tourism on the environment. It calls for the creation of a “Mediterranean Tourism Charter” and the establishment of a Mediterranean Tourism Network.

The Mediterranean Tourism Charter, adopted in Casablanca on 22 September 1995, stresses the need for such a network as a cooperation instrument. The aims of this network would include establishing a Mediterranean authenticity and quality label and holding periodic meetings of Ministers of Tourism.

The Calvià Declaration on Tourism and Sustainable Development in the Mediterranean was adopted on 19 April 1997 in the Balearics. Section VII of the declaration reaffirms the importance of cooperation and appeals to the European Union to develop and support such cooperation.

In October 1999, the **Mediterranean Commission on Sustainable Development (MCSD)** issued a set of recommendations and proposals, including a call for the Mediterranean Action Plan and the Parties to the Barcelona Convention to “stimulate a regional co-operation mechanism” in the field of tourism that works in a network.

The idea for a joint organisation for Mediterranean tourism has therefore been suggested repeatedly since the early 1990s, to cater to growing calls for unity and partnership between governments, tourist destinations, the private sector and NGOs. Notably, the Asia-Pacific region has had a similar cooperation mechanism for more than 50 years.

There are many possible paths to tourism cooperation in the Mediterranean. For sustainable development reasons, the options should not be limited to marketing and economic observation.

The MCSD’s 1999 recommendations included:

- **participating** in international sustainable tourism networks and initiatives;
- **strengthening** awareness activities on a regional scale in tourist destinations as well as in the source countries;
- **organising** experience-sharing between the actors involved in tourist destinations of the various countries;
- **developing** training programmes;
- **promoting the implementation of Mediterranean networks** (between professionals, between certain areas such as islands or certain kinds of tourism such as the cultural variety);
- **promoting the implementation of Mediterranean eco-labels;**
- **promoting economic and financial tools** for protecting and managing sites.

A regional cooperation mechanism of this type could also have other purposes: creation of regional tourist products (cruises, themed trails such as the Al Andalus Trail), experience-sharing in new technologies (electronic distribution systems, internet), joint marketing and sales, development and harmonisation of tourism observation methods, support for research through the creation of university laboratory networks, or flagship initiatives (such as awarding prizes, etc.).

An essential part of its remit would be to monitor destinations’ progress towards more sustainable development and to disseminate the outcomes across the Mediterranean community.



3.4 Prospects of failure... in the medium term?

“Strong possibility that the aim of achieving good ecological status in 2020 may not be met” see WWF

Positive point: the future of the Mediterranean basin is governed by a whole set of laws applicable to the good scales of territory and the marine environment, including the Common Fisheries Policy (CFP); the Integrated Maritime Policy (IMP), which encompasses Maritime Spatial Planning (MSP) and the EU’s Blue Growth strategy; the Marine Strategy Framework Directive (MSFD) and its ecosystem-based approach; the EU Biodiversity Strategy (which is vitally important to coastal areas); and the Water Framework Directive and of course the Barcelona Protocol.

Negative point: The establishment of synergies between these different policies, and even more, the integration of these policies in order to improve their effectiveness, as well as the reinforcement and sharing of actions at local and supra-local level , still remain to be implemented.

The WWF - a player strongly involved in Blue Growth - calls for this challenge to be successfully met so that the inhabitants of the Mediterranean can benefit in the future from the services provided by marine and coastal ecosystems.

Nevertheless, WWF stresses that "It is likely that some of the pressures, and more importantly, the cumulative impacts on marine ecosystems of increasing exploitation of the sea, are worsening more rapidly. the pace of implementation of the imagined solutions to mitigate them.

The EU-funded Options for Delivering Ecosystem-Based Marine Management (ODEMM) project measured the risk, for each European marine region, of not achieving good ecological status (table 12). The study also looked at the species and habitats covered by the Habitats Directive (92/43/EEC).

The study found a strong possibility that good ecological status will not be achieved by 2020 in the Mediterranean for 7 of the 11 MSFD descriptors. (DCSMM).

Table 12: Risks likely to compromise achievement of good ecological status in the Mediterranean by 2020. (Source: ODEMM, adapted by WWF)

Descriptor/issue			Descriptor/issue	
D1 – Biodiversity	1a. Plankton		D7 – Hydrographical conditions	
	1b. Fish		D8 – Concentrations of contaminants	
	1c. Mammals and reptiles		D9 – Contaminants in seafood	
	1d. Sea birds		D10 – Marine litter	
	1e. Key habitats		D11 – Energy (including underwater noise)	
D2 – Non-indigenous specie			Habitats (as defined in the Habitats Directive)	
D3 – Commercial fish species			Species (as defined in the Habitats Directive)	
D4 – Food webs			Marine and coastal landscape	
D5 – Eutrophication				
D6 – Sea floor integrity				

In most countries of the world, the causal link between promoting sustained economic growth in the marine sectors and the blue-performing economy is confirmed.

According to the WWF "Despite the uncertainties surrounding their evolution, all maritime sectors are expected to grow significantly in the next fifteen years, except for fishing (whose place will continue to decline because of the strong pressure suffered by fish stocks) , while spills of pollutants from land-based sources are expected to decrease at the same time. "

CO-EVOLVE in the eye of the storm !

The diagnosis that can be shared on the Mediterranean basin is as follows:

- Emergence and development of maritime sectors: renewable energies at sea and the mining of the seabed;
- Strengthening of the sectors: maritime transport, tourism, oil and gas industry.

What are the consequences for the future: in spite of the strict regulatory framework and the efforts made to mitigate the pressures, the risk is that their simultaneous development will not be accompanied by a deterioration of the ecosystems of the Mediterranean Sea.

The quantitative and qualitative demands of tourism will inevitably be at the heart of interactions, such as those generated by the growing development of maritime sectors:

- Conflicts over the use of space, where one sector excludes some or all other sectors in a given region. Examples of this risk include the growth of coastal activities in already over-populated areas, or a simultaneous increase in shipping traffic and offshore oil and gas drilling.
- Negative effects caused by some activities on others, which are highly dependent on healthy ecosystem services (e.g. fisheries and tourism).
- Competing commercial interests over the same marine resources, such as competition between commercial fishing and rapidly-growing recreational fishing.

In another complementary register, the cross-referencing of spatial data on the maritime sectors allows **WWF (2015 Report - Blue Growth)** to draw the following conclusions:

- **"Conflicts over the use of space will intensify in coastal areas**, fuelled by the growth of marine aquaculture, marine tourism, offshore renewables and recreational fishing.
- The oil and gas industry is now clearly turning its focus to offshore resources, raising the prospect of more frequent conflicts with the shipping industry. In the longer term, deep sea mining is also likely to expand in the Mediterranean.

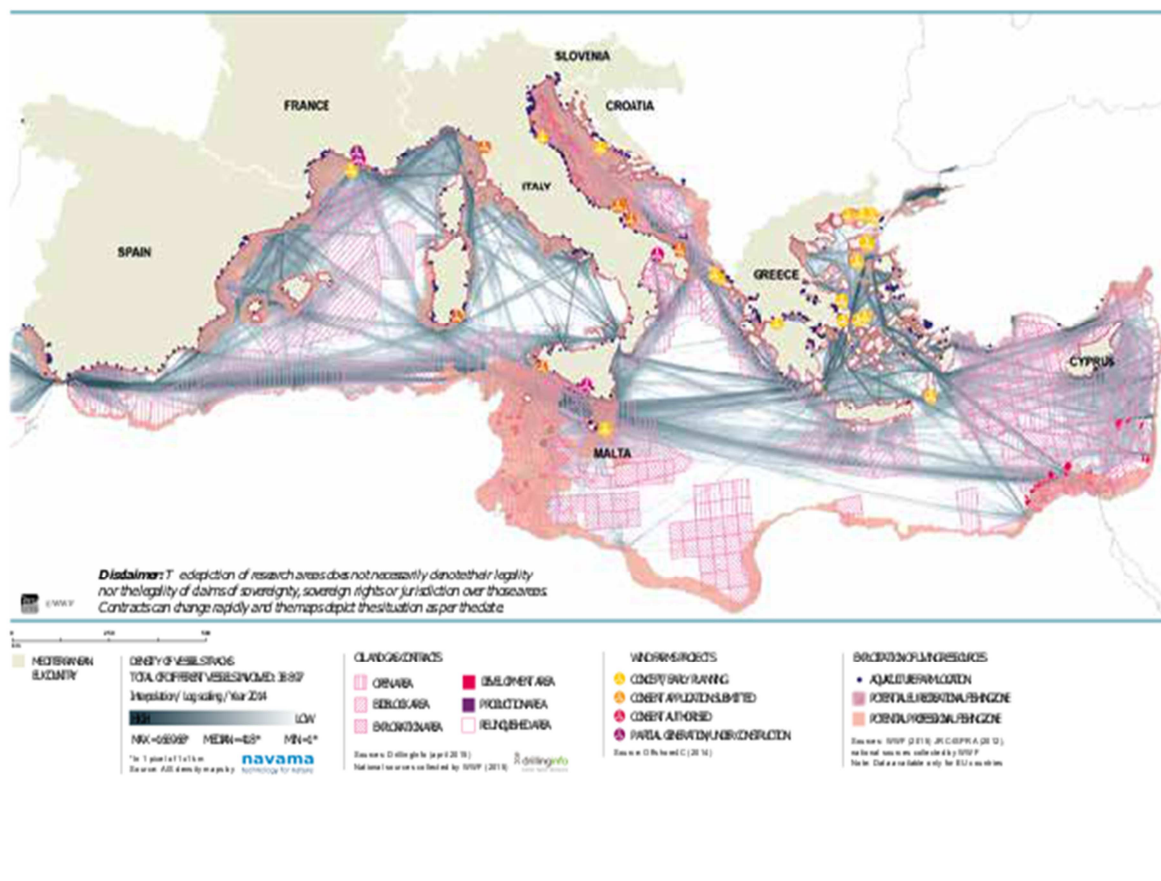
Commercial fishing is the sector under greatest threat from the growth of the maritime economy (reference WWF):

- fisheries areas will become smaller, especially along the coastline, where coastal activities are expanding rapidly (urbanisation and coastal tourism);
- pressure on marine ecosystems from other sectors (e.g. increasing fish catches from recreational fishing, various forms of land-based pollution, underwater noise emitted by ships and oil and gas drilling operations) will continue to rise and is likely to impact fish stocks both directly and indirectly.



Other conflicts could arise between sectors, especially between the oil and gas industry and coastal tourism, both of which are growing rapidly, amid a heightened risk of hydrocarbon spills and damage to natural landscapes ».

21. Potential spatial interactions between different sectors.



So ... What possible co-development of Mediterranean coastal tourism in this fragile and already highly disturbed maritime area?

What are the "Recommendations" for CO-EVOLVE Pilot Sites ?

See WP4 studies.

4 References

- **PNUE - PAM** - Stratégie Méditerranéenne pour le Développement Durable 2016 - 2025
- **PNUE/PAM/PAP** : Protocole Relatif à la Gestion Intégrée des Zones Côtières de la Méditerranée. Split, Programme d'Actions Prioritaires, 2008
- **PNUE/PAM/PAP** - 2001 – Hélène Rey – Valette (économiste UM1)
- **AFD - Plan Bleu** - Atelier régional sur la Gestion Intégrée des Zones Côtières en Méditerranée (Antibes septembre 2015)
- **UNEP / MAP Regional Activity Center - Plan Bleu** - Mediterranean Strategy for sustainable development follow-up – May 2013 – Main Indicators
- **UE - Directive Cadre sur l'Eau (DCE)** - 2000/60/CE – 23 octobre 2000 –
- **UE - Directive 2008/56/CE** - 17 juin 2008 établissant un cadre d'action communautaire dans le domaine de la politique pour le milieu marin - Directive Cadre Stratégie sur le Milieu Marin (DCSMM)
- **UE - Directive 2007/60/CE** - 23 octobre 2007 relative à l'évaluation et à la gestion des risques d'inondation
- **GIEC (2013) - Changements climatiques 2013**. Les éléments scientifiques (contribution du Groupe de Travail au 5^{ème} rapport d'évaluation du GIEC, O.M.M. / PNUE)
- **Projet Européen SPICOSA** - 6^{ème} PCRD 2007 – IFREMER
- **SDAGE 2016 - 2021** - Bassin Rhône-Méditerranée – Agence de l'Eau Rhône Méditerranée
- **PNUE - Plan Bleu (2005)** - Dossier on Tourism and sustainable Development in the Mediterranean
- **PNUE - Plan Bleu** - Towards an observatory and a "quality label" of tourism sustainability in the Mediterranean. Plan Bleu, Valbonne. (2012)
- **Cahier 14 Plan Bleu** (nov.2012) - Vers une meilleure efficience de l'utilisation de l'eau en Méditerranée
- **Cahier 17 Plan Bleu** (mai 2017) - Tourisme durable en Méditerranée : Etat des lieux et orientations stratégiques
- **IRSTEA (2016)** - Etude stratégique Eaux - Préambule -
- **PNUE - PAM - Plan Bleu - Ministère de l'Aménagement du Territoire et de l'Environnement République Algérienne** - Profil de durabilité de la zone côtière de Tipaza - Samir GRIMES Consultant Plan Bleu (31 Janvier 2011)
- **UNEP - MAP - Plan Bleu - CAR** - Profil de durabilité de la destination du littoral de Tétouan au Maroc (2011) - Mohamed Berriane -
- **Centre d'Activités Régionales PNUE/PAM - Plan Bleu - FEMIP** - La destination d'Alanya en Turquie à partir de l'étude de cas réalisée par Cevat TOSUN et Caner ÇALIŞKAN – (Loïc BOURSE Plan Bleu)
- **Département de l'Hérault - Projet Interreg Med « Castwater »** - Etude des facteurs d'incidence et des impacts liés aux économies d'eau du secteur du tourisme en zone cotière méditerranéenne » - juil.17
- **Assemblée Nationale Française / Sénat** - La pollution de la Méditerranée : état et perspectives à l'horizon 2030 - Sénateur Roland Courteau (Juin 2011)
- **Fondation Mohamed VI pour la protection de l'Environnement - AFD - FFEM - IME** - Gestion des lagunes méditerranéennes : cas de la lagune de Nador (Maroc) – Najia Fatine 2010
- **Haut Commissariat aux Eaux et Forêts et de la Lutte contre la Désertification (Maroc)** - Plan d'aménagement et de gestion intégré de la lagune de la Merja Zerga (2015).
- **Note 24 Plan Bleu** (nov.2012) - Tourisme en Méditerranée :un moteur du Développement Durable ?
- **PNUE - Plan Bleu** (sept.2015) - Application of a Multi-Scale Coastal Risk Index at Regional and Local Scale in the Mediterranean



- **ONU Environnement / PAM Athènes** (Grèce 2017) - Programme de surveillance et d'évaluation intégrées de la mer et des côtes méditerranéennes et critères d'évaluation connexes
 - **PNUE - PAM** - Stratégie Méditerranéenne pour le Développement Durable 2016 - 2025
 - **AEE - PNUE/PAM** - Rapport Horizon 2020 sur la Méditerranée
 - **ONU Environnement / PAM Athènes** (Grèce 2017) - Cadre Régional pour l'Adaptation au Changement Climatique pour les Aires Côtières et Marines Méditerranéennes
 - **PNUE** - Convention de Barcelone - Convention pour la protection du milieu marin et du littoral de la méditerranée et ses protocoles
 - **Directive Cadre Stratégie sur le Milieu Marin (DCSMM)**
 - **World Bank - CMI** (dec.2016) - Managing water scarcity in the Mediterranean
 - **GIEC (2013) - Changements climatiques 2013.** Les éléments scientifiques (contribution du Groupe de Travail au 5^{ème} rapport d'évaluation du GIEC, O.M.M. / PNUE).
 - **Conservatoire du Littoral** - Stratégie d'intervention 2015-2050
 - **WWF 2015** - Croissance Bleue : la Méditerranée face au défi du Bon état écologique
 - **PNUE - Plan Bleu (2005)** - Dossier on Tourism and sustainable Development in the Mediterranean
 - **PNUE - Plan Bleu** (août 2015) - Analyse économique et sociale des usages des eaux côtières et marines méditerranéennes
 - **Cahier 15 Plan Bleu, AFD, CMI** (nov. 2014) - Approche économique de la gestion de la demande en eau en Méditerranée Instruments économiques
 - **Plan Bleu** (2011) - Croisières et Plaisance en Méditerranée
 - **Plan Bleu** (juin 2012) - Towards an Observatory and a « Quality label » of Tourism sustainability in the Mediterranean
 - **Cahier 14 Plan Bleu** (nov.2012) - Vers une meilleure efficience de l'utilisation de l'eau en Méditerranée
 - **Cahier 17 Plan Bleu** (mai 2017) - Tourisme durable en Méditerranée : Etat des lieux et orientations stratégiques
 - **Note 24 Plan Bleu** (sept.2016) - Promouvoir un Tourisme durable et inclusif en Méditerranée
 - **Note 27 Plan Bleu** (mai 2015) - Gestion des risques climatiques en Méditerranée - Les services climatiques : un outil d'aide à la décision pour l'adaptation.
-

