1 Diversity and Abundance of Species

Status: 

Trends: 

Reliability: 

Facts

Indicator:
Living Planet Index

MWO Relevant objective:
1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:
1. Biodiversity and ecosystem integrity

Key indicator Partners:
Tour du Valat, World Wide Fund for Nature, Zoological Society of London, Wetlands International

Data available:
60,000 time-series of 464 species of Vertebrates, 1970 onwards

Development status:
Ready for regional use

Rationale

The Mediterranean Basin is a hotspot of biodiversity, one of the 34 world regions where the rich and endemic biodiversity is the most at risk of extinction. Species populations living in Mediterranean wetlands face several threats like natural habitat loss, over-exploitation of natural resources, and pollution. They also face a spread of invasive species and the effects of climate change. However, conservation actions have been undertaken for decades in order to protect wild species and their habitats. The Mediterranean Wetlands Living Planet Index (LPI) became an international composite indicator that measures the result of these factors on vertebrate populations.

Method

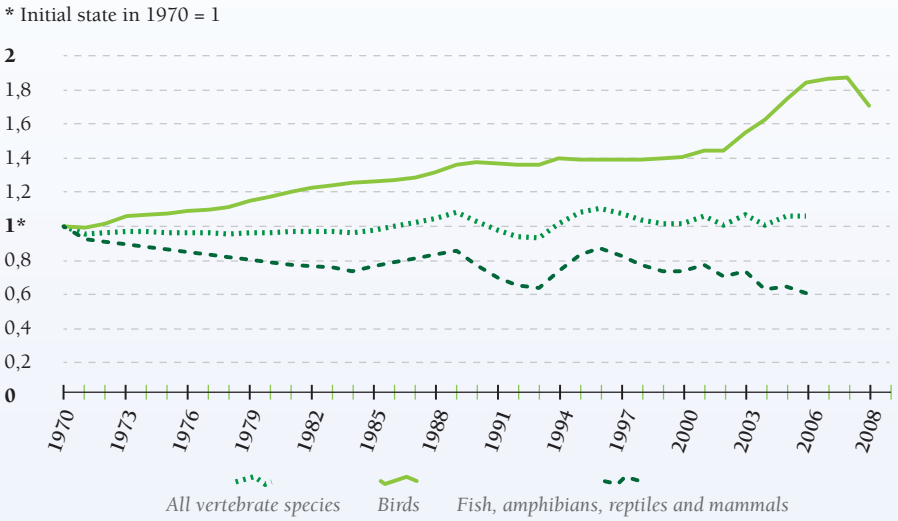
The LPI reflects changes in the health of biodiversity by tracking trends in species populations of mammals, birds, reptiles, amphibians and fishes (Loh et al. 2005). Any standardized set of data recording the abundance of individuals of a species over at least two different years may be used in theory, whatever the parameter measured (n° of individuals, breeding pairs, density, biomass, etc.). The changes in the population of each species are aggregated and shown as an index relative to 1970, which is given a value of 1. The LPI can be thought of as a biological analogue of a stock market index that tracks the value of a set of stocks and shares traded of an exchange.

60,000 population trends for 464 vertebrate species have been collected so far. These are mainly studies implemented by conservation NGOs, scientists, and managers of wetlands. The availability of raw data can differ: some exist in detailed form in published material (paper or online), but others are held by data collectors in private databases. On-going and future partnerships between the MWO and data collectors are progressively facilitating raw data sharing.

Following the methodology of the index, no attempt is made to select species on the basis of geography or taxonomy. Birds are over-represented in our database whereas they only constitute one third of the diversity of vertebrates in the Basin Mediterranean. To counterbalance this bias, the Mediterranean Wetlands LPI is the aggregate of two indices: the bird LPI and the mammal, reptile, amphibian and fish LPI, each of which are given a different weight (respectively 1 and 2).

The Indicator

Living Planet Index



How to interpret the indicator:

An increase / decrease in the LPI means that species populations living in Mediterranean wetlands have increased / fallen on average. This implies that diversity will have increased / decreased, even if none of those species populations has declined to zero (extinction).

Current storyline

"The LPI shows a stable trend overall from 1970 to 2006 meaning that on average, vertebrate populations have not changed in abundance over this 36 year period. This apparent stability is the result of mixed trends for birds and the other groups. The bird index shows that bird populations have increased markedly (about 70 %) since 1970 whereas mammals, amphibians, reptiles and fishes have declined by an average of 40%.

Waterbirds have been the first to benefit from conservation measures through international conventions (e.g. Bonn Convention on Migratory Species of Wild Animals, Ramsar Convention, 1971) and legislative acts (e.g. Birds Directive, 1979). As the other species exhibit less dispersal abilities and more restricted ranges, they are also less resistant to habitat loss and water pollution. The worrying conservation status of freshwater fishes and amphibians in the Mediterranean is confirmed by the high proportion of species threatened with extinction (respectively 56% and 29%) according to the IUCN Red List Criteria (Cox et al. 2006; Smith and Darwall, 2006). Many of these threatened species are endemic to the region, highlighting the responsibility that Mediterranean countries have to prevent their extinction at the global level."

Reliability

The LPI dataset contains more population trends from countries where wildlife is well-monitored like Spain, France and Italy.

There is currently a deficit in data on species populations occurring in East and South Mediterranean where biodiversity faces threats perhaps more severe than in EU countries. This might result in a LPI not representative of the overall trend in the Mediterranean region.

Key references

- *Cox N., Chanson J., Stuart S., 2006. The Status and Distribution of Reptiles and Amphibians of the Mediterranean Basin. IUCN, Gland, Switzerland and Cambridge, UK. V + 42 p.*
- *Loh J., Green R.E., Ricketts T., Lamoreux J., Jenkins M., Kapos V., Randers J., 2005. The Living Planet Index: using species population time series to track trends in biodiversity. Phil. Trans. R. Soc. B, 360, 289-295.*
- *Smith K.G., Darwall W.R.T., 2006. The Status and Distribution of Freshwater Fish Endemic to the Mediterranean Basin. IUCN, Gland, Switzerland and Cambridge, UK. Vii + 34 pp.*

Photo credits

- *Mediterranean Tree Frog © Th. Galewski*
- *Common Pochard © Th. Galewski*
- *European Pond Terrapin © Tour du Valat/L. Chazée*
- *Sea Bream © J. E. Roché*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

1a

Diversity and Abundance of Species: Waterbirds

Status:

Trends:

Reliability:

Facts

Indicator: Living Planet Index

MWO Relevant objective:
1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:
1. Biodiversity and Ecosystem integrity

Key indicator Partners:
Tour du Valat, Wetlands International

Data available:
56,000 time-series of 172 species of waterbirds, 1970 onwards

Development status:
Ready for Mediterranean and national use

Rationale

At the crossroads of Europe, Asia, and Africa, Mediterranean lakes and marshes are not only breeding sites for tens of thousands of birds, they also play a role as migratory stop-over and wintering places for a much larger number of birds that escape rigorous winter conditions in Eurasia. Waterbirds are numerous and easy to monitor: a great deal of high quality data already exists and new data are relatively inexpensive to collect. As they are obvious and often much-appreciated, birds also represent an excellent way to improve awareness of the general public on the fate of wetlands.

Our hypothesis is that waterbirds in the Mediterranean Basin are under pressure through habitat loss, pollution, climate change, over-exploitation of natural resources and hunting. In return, they have benefited - more than any other animal group - from the attention of conservationists for the past decades. Bird species differ also in their tolerance to human disturbance, some being able to cope well or be favoured by man-induced changes in their habitat. The Waterbirds Living Planet Index (WB LPI) is a measure of the fate of the most charismatic component of wetland biodiversity.

Method

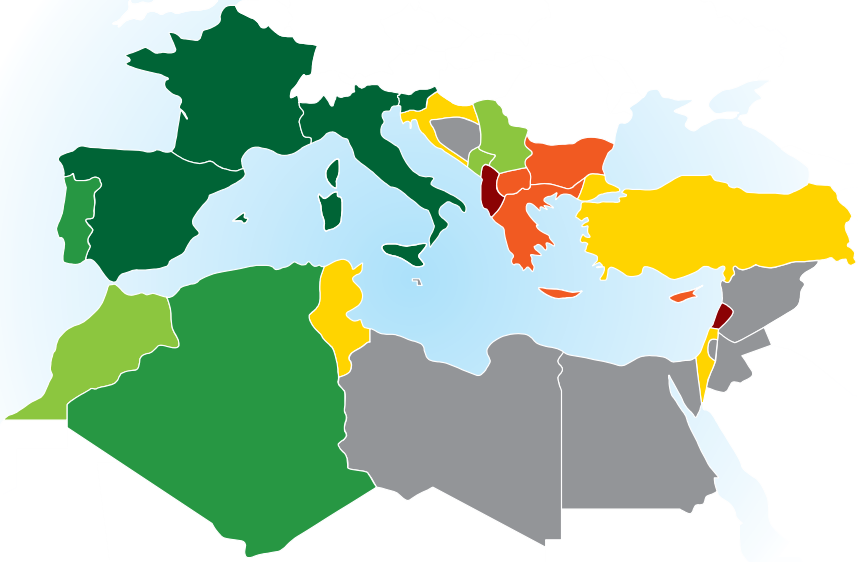
The WB LPI is calculated using only waterbirds time-series data (see Factsheet 1). More than 56,000 populations of 172 species of waterbirds and wetland-dependent bird species were used: swans, ducks, geese, herons, ibises, storks, waders, terns, gulls, and few species of passerines or raptors specialist of wetlands. Most data are issued from monitoring schemes of breeding colonial waterbirds and from the International Waterbird Census (mid-January counts) piloted by Wetlands International.

The WB LPI is the aggregate of two-equally-weighted indices of waterbird populations - the breeding and the overwintering WB LPIs - calculated as the geometric mean of the two. Distinct forces may drive breeding and wintering waterbird populations as pressures might differ across space and time (e.g. disturbance due to tourism is higher in summer whereas hunting pressure is stronger on wintering populations).

The Indicator

Waterbird Living Planet Index since 1970 in Mediterranean countries.

- Increase in LPI > 100% since 1970
- Increase in LPI comprised between 50 and 100%
- Increase comprised between 20 and 50 %
- LPI stable or fluctuating between -20 and 20%
- LPI decreasing by 20 to 50 %
- LPI decreasing by more than 50%
- No sufficient data



How to interpret the indicator:

An increasing / decreasing WB LPI means that waterbird populations have increased / fallen on average in the country. For instance, waterbird species have increased by more than 100% on average in Italy since 1970 but have decreased by more than 50% in Albania.

Current storyline

"LPIs calculated by country show that the conservation status of waterbirds breeding or migrating through West and East Mediterranean regions differ. Waterbird populations are globally increasing in the West, and at a higher rate in Spain, France, Italy, and Slovenia. The situation is less favourable in the East, with clear declines in FYR of Macedonia, Bulgaria, Cyprus, and especially Albania and Lebanon.

In the European Union, the effective protection of the last important wetlands, together with the end of persecution campaigns against fish-eating birds, allowed the recovery of waterbird populations that were at their minimal level in 1970. Paradoxically, water pollution and open-sky dumps also benefited some generalist species (e.g. gulls, storks) as food resources increased all-year round. Declines observed in the East Mediterranean are much worrying as the strongholds of many species of waterfowl are confined to this region. Uncontrolled hunting pressure in some Balkans and Middle East countries (MWO, 2011) and deteriorating conditions met by birds breeding in the former U.S.S.R. countries - but overwintering in the East Mediterranean - are possible explanations behind this decreasing trend (Young et al. 2007)."

Reliability

Data on waterbirds are generally robust and such an indicator could be calculated routinely at the national level for most Mediterranean countries. Data are still too scarce to provide a confident trend for Malta, Libya, Egypt, Jordan, Syria, Bosnia-Herzegovina and Palestinian Territories. There is also comparatively less information on breeding populations in North Africa, the Middle East and Turkey compared to Europe.

References

- *MWO, 2011. Mediterranean wetlands monitoring situation and needs assessment. Tour du Valat/ Mediterranean Wetlands Observatory internal report, 60 p.*
- *Young, J., Richards, C., Fischer, A., Halada, L., Kull, T., Kuzniar, A., Tartes, U., Uzunov, Y., Watt, A., 2007. Conflicts between biodiversity conservation and human activities in the Central and Eastern European Countries. Ambio 36: 545-550.*

Photo credits

- *Sandwich Tern, Gediz Delta, Turkey © Hellio - Van Ingen*
- *Little Egret © Tour du Valat / J. Peridont*
- *Northern Shoveler, Camargue, France © Tour du Valat / Th. Galewski*
- *Flamingos © Hellio - Van Ingen*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

2 Wetland birds and Climate Change

Status:

Trends:

Reliability:

Facts

Indicator: Community Temperature Index

MWO Relevant objective:
1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:
1. Biodiversity and Ecosystem integrity

Key indicator Partners:
Tour du Valat, Institut des Sciences de l'Evolution (CNRS / Université Montpellier 2, France), Wetlands International.

Data available:
58,000 time-series on birds, 1970 onwards, Species Temperature Indices for birds

Development status:
Ready for Mediterranean use with birds as study model.

Rationale

The increase in the average Earth's temperature may result in important changes in the abundance and distribution of species, which could lead to the extinction of some species and reduce the diversity of ecosystems. In the Mediterranean Basin, climate change may further increase the stress over fragile ecosystems such as desert and steppe, and the pressure on water resources. Wetland-dependent species may therefore be particularly under threat.

In general, composite biodiversity indexes such as the Living Planet Index (see Factsheet 1) typically provide trends that depict the state of biodiversity. However, these trends cannot be directly interpreted as immediate results of specific threats, pressures or drivers. The Community Temperature Index (CTI) belongs to a new generation of indicators, which intimately combines biodiversity data with potential explanatory factors. In this case, it evaluates if change in biodiversity is directly linked to climate change. Birds, the most studied component of biodiversity, are used as models.

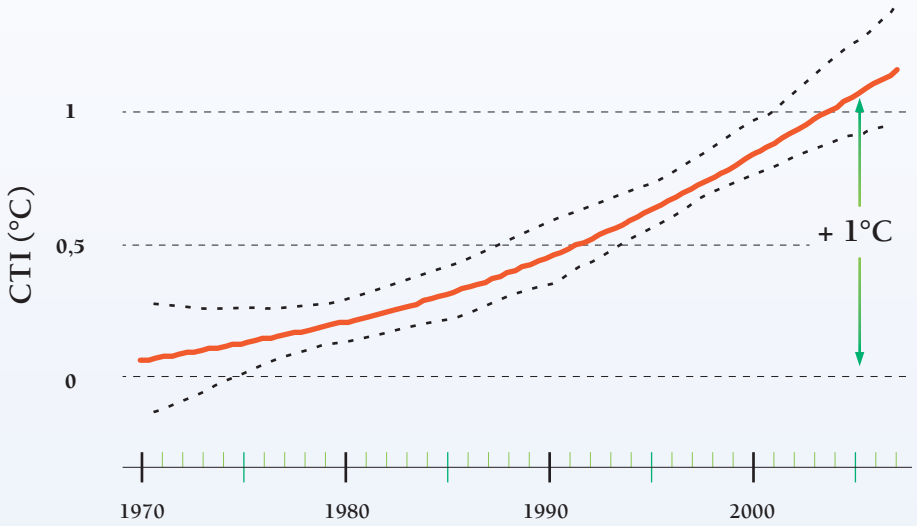
Method

The CTI is described in Devictor et al. (2008). To calculate the value of this indicator at the bird community level, it requires starting first with the measurement of each species. Each species is given a Species Temperature Index (STI), which is the mean temperature of its distribution area: "southern" species will have a higher STI than the "northern" ones. STIs are currently available for bird species only but the methodology might be extended to other taxonomic groups in the future. Once each species in the community has been attributed its own temperature index, the CTI can be calculated for the whole community, as the average of this index for all species included in the analysis. The CTI is weighted according to the relative abundance of each species within the community.

The CTI currently uses abundance data issued from time-series of 58,000 populations of 350 bird species. It must be highlighted that data could even be qualitative (e.g. presence/absence), which allows to retrace the evolution of the CTI on a longer time period, locally from the 19th century.

The Indicator

Evolution of the Mediterranean Waterbirds Community Temperature Index over time



How to interpret the indicator:

An increase in the CTI means that the bird community of Mediterranean wetlands has changed over time. Populations of species tolerant to warm climates have increased more than populations of species preferring cooler climates.

Current storyline

"With a CTI increasing by 1°C between 1970 and 2007, the bird community of Mediterranean wetlands has been clearly impacted by global warming in the past decades. Warm-dwelling bird species had an advantage on cool-dwelling species during this period. There was a general northward shift in the breeding distribution area of waterbirds, with some species extending their range (e.g. Cattle Egret) and others progressively disappearing from the Mediterranean (e.g. Common Snipe). The migration pattern of long-distance migrants is also changing with an increasing number of birds overwintering in the region instead of Sub-Saharan Africa. Components of the biodiversity showing lower dispersal abilities and smaller ranges (e.g. amphibians, molluscs) are susceptible to be even more severely impacted by climate change than birds.

Reliability

As two-thirds of the data that were used come from bird populations monitored in Spain, France, and Italy, it is possible that overall, the pan-Mediterranean result calculated by the MWO conceals differences in CTI between countries. Some parts of the Mediterranean might experience a stronger increase in temperatures (Middle East) which could more seriously impact wetland biodiversity.

Key references

- *Devictor, V., Julliard, R., Jiguet, F., Couvet, D., 2008. Birds are tracking climate warming, but not fast enough. Proceedings of the Royal Society of London B 275: 2743–2748.*

Photo credits

- *Common Snipe © Tour du Valat / Th. Galewski*
- *European Bee-eater © Th. Galewski*
- *Caspian Tern © Tour du Valat*
- *Dry soil in the Gediz delta, Turkey © Hellio - Van Ingen*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

3

Birds and Land-Use Change in Wetlands

Status:

Trends:

Reliability:

Facts

Indicator: Community Specialisation Index

MWO Relevant objective:
1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:
1. Biodiversity and Ecosystem integrity

Key indicator Partners:
Tour du Valat, Institut des Sciences de l'Evolution (CNRS / University Montpellier 2), Muséum National d'Histoire Naturelle (Paris), Wetlands International

Data available:
58,000 time-series on bird populations, 1970 onwards, Specialisation Indices for bird species

Rationale

One of the main challenges to biodiversity is habitat loss, a modification and degradation due to human-induced changes in land-use. Wetland-dependent species have to deal with the loss of their habitat but also with the progressive replacement of their natural functioning by an artificial management. Land-use change acts as a non-random filter, selecting species best able to survive within modified ecosystems. It is predicted that generalist species (using a large range of habitats) will resist better than specialist species (using more species-specific habitats) to anthropogenic pressures on their habitats.

In general, composite biodiversity indices such as the Living Planet Index (see Factsheets 1 and 1.a) provide very useful, descriptive trends for the species or groups they encompass. However their interpretative value is usually limited. Indeed, diverse causes may be at the origin of the increase / decrease in abundance, making the interpretation of those indicators difficult. Therefore, the Community Specialisation Index (CSI) evaluates if change in biodiversity is directly linked to land-use change. Birds, the best studied component of biodiversity, are used as models.

Method

The CSI is described in Julliard et al. (2006). Each species is given a Specialization index (SSI), based upon a greater or lesser specialization in habitat choice. On one extreme, species which are quite eclectic in their choice (e.g. among wetland birds: Grey Heron, *Ardea cinerea*) will have a low SSI, whereas those that are restricted to fewer wetland types (e.g. Great Bittern, *Botaurus stellaris*) will have a high index. SSIs are currently available for bird species only but this methodology may be extended to other taxonomic groups in the future. The CSI is the mean of the SSIs of all the bird species monitored in Mediterranean wetlands, weighted by their abundance.

The CSI is currently based on time-series recording the trends in abundance of 58,000 populations of 350 bird species. It must be highlighted that data could even be qualitative (e.g. presence/ absence), which allows to retrace the evolution of the CSI on a longer time period.

The Indicator

Trend in the Community Specialization Index of birds in Mediterranean Wetlands over time

How to interpret the indicator:

A decrease in the CSI means that the bird community of Mediterranean wetlands has changed over time with specialists representing now a smaller proportion of the community than in 1970. Conversely, generalists are now better represented than in the past.

Current storyline

"The significant negative trend in the CSI reveals that land-use changes in the last decades have reduced the diversity of bird species in Mediterranean wetlands.

Human-induced changes have favoured generalists to the detriment of specialists. Some species underwent a large decline as the habitat they are specialised in was largely converted. This is the case e.g. for species living exclusively in reedbeds or seasonal wetlands. On the opposite, some generalists have adapted very well to the large-scale changes happening in wetlands by taking advantage of new and abundant food resources (e.g. intensive crop farming, wetland eutrophication) or of the multiplication of artificial wetlands flooded all year-round (e.g. reservoirs, fish ponds).

These changes are worrying as it means that bird assemblages are decreasingly diverse and original over time, with few banal species (generalists) replacing many other species (specialists), rarer and which make the specificity of Mediterranean waterbird community. These land-use changes include the loss, modification and degradation of natural wetlands due to pollution, fragmentation, but also an artificial management that does not reproduce the original functioning of Mediterranean wetlands (characterized by a high ecological variability)."

Reliability

A potential bias is the under-representation of bird data from the South and East Mediterranean. Some countries have experienced drastic changes in land-use in the past decades (European Union), while others have just started to face rapid modifications (e.g. Balkans, Turkey). The impact on bird communities is thus likely to be correlated with the economic development pattern and intensity of each country.

References

- *Julliard, R. Clavel, J. Devictor, V. Jiguet, F. Couvet, D. 2006. Spatial segregation of specialists and generalists in bird communities. Ecology Letters 9: 1237-1244.*

Photo credits

- *Birds in waste land © L. Chazée*
- *Land fragmentation, Camargue, France © Tour du Valat / M. Gauthier-Clerc*
- *Eurasian Penduline Tit © Tour du Valat*
- *Ricefield © Tour du Valat / N. Beck*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

4

River Flow

Status:

Trends:

Reliability:

Facts

Indicator:
Mediterranean river flows

MWO Relevant objective:
1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:
1. Biodiversity and Ecosystem integrity

Key indicator Partners:
Plan Bleu, Tour du Valat

Data available:
A lot of data available but dispersed (centralization efforts in the early 2000's not sustained).

Development status:
Ready for use

Rationale

Rivers are wetlands by Ramsar definition. With the water scarcity prevailing in most of the Mediterranean, rivers are critically important for human societies. They also have a very high biological importance, as they host a diversity of species: freshwater fish, molluscs, odonata… – many of them endemic. They play important functional roles e.g. by allowing biological connexions between other wetlands, providing them with water and delivering sediments to coastal wetlands.

River flow is therefore a key ecological factor to monitor. More generally, surface water flows can be viewed as a proxy of the water actually available for the ecosystem, and of the naturalness of water processes (i.e. untamed vs. regulated rivers). Flows are also affected by dams, modification of river course and mineral extraction, which results in natural wetland loss and severe changes in habitat quality. This affects fish migration and population connectivity, with significant economic impact on fisheries activity.

Method

This quantitative indicator measures how river flows change over times. It is made-up of 3 sub-indicators:

- the proportion of rivers with increasing/ stable/ decreasing discharges;
- the total freshwater discharge to the Mediterranean sea;
- the storage capacity of dams, which partly reflects the level to which rivers have been artificialized.

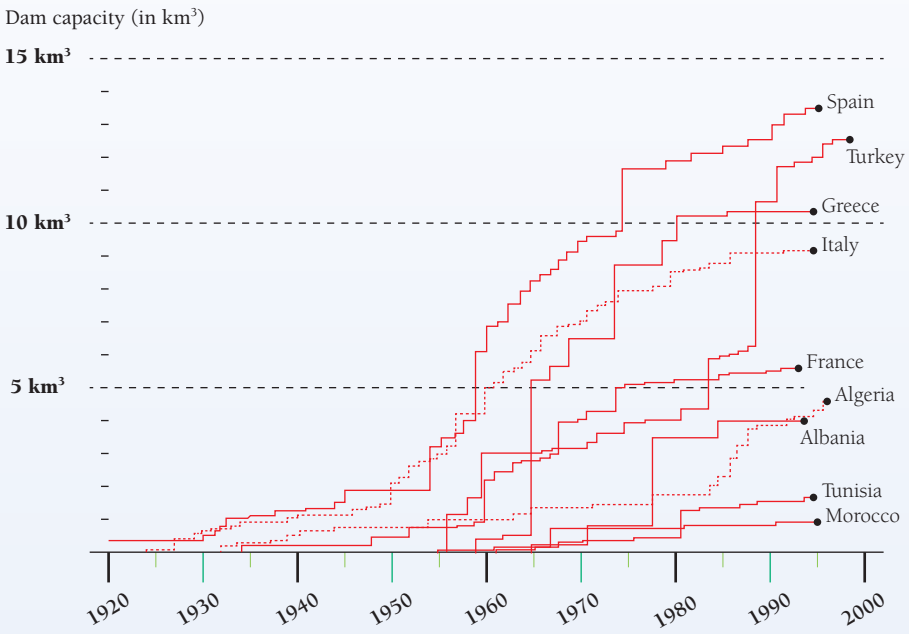
River discharges are from various projects and the Global River Discharge database RivDIS, all analysed in 2003 by Ludwig et al. (2003). They provided trends of discharges for 29 Mediterranean rivers since 1960, and for 11 rivers since the beginning of the 20th century. The MWO synthesises this information as the proportion of rivers showing increasing, stable or declining trends of various intensity. The total discharge to the Mediterranean Sea results from the same sources, plus climate-based modelling for areas without discharge data.

The sub-indicator on dam capacity was synthesised from various national sources by the Plan Bleu. By construction, this sub-indicator is comprehensive: all significant dams are included.

The Indicator

Cumulated Water storing capacities of reservoirs (in km³) in of the Mediterranean basin in the 20th century.

Source: Margat & Treyer 2004



How to interpret the indicator:

The total capacity of dams in e.g. Spain slowly grew to c. 2 km³ in 1955, and more steadily afterwards (to 13 km³ by 1995).

Current storyline

"The total freshwater brought yearly by all rivers flowing to the Mediterranean has declined by c. 45% in the 20th century, as a result of the decreasing discharge of most rivers. The Nile is an emblematic case (-93%) as a result of the Aswan dam. The water resource available for wetlands is therefore diminishing throughout the region. Reduced river flows imply that wetlands downstream are less regularly flooded - or no longer at all - leading to wetland loss and/or degradation. Human uptake and climate change are the key causes.

The number of dams built has tremendously increased in the Mediterranean region - especially after the 1950's. Their cumulated storage capacity was estimated in 2004 at 420 km³, higher than the estimated 330 km³ of freshwater flowing each year to the Mediterranean. Impacts of dams are numerous: fragmentation of rivers and therefore of fish populations; deprivation of wetlands from water and sediments; coastal erosion downstream, etc. "

Reliability

River discharges are fairly well monitored, and data quite reliable and representative. Data on dams – at least the major ones – such as number, capacity etc. - are well monitored too. The Plan Bleu regularly updates them.

Key references

- *Ludwig, W., Meybeck, M. and F. Abousamra 2003. Riverine transport of water, sediments and pollutants to the Mediterranean Sea. MAP Technical Report Series No.141. UNEP/MAP, Athens, 111 pages.*
- *Margat, J. and S.Treyer, 2004. L'eau des méditerranéens: situation et perspectives. MAP Technical Report Series No.158. UNEP/MAP, Athens, 366 p.*

Photo credits

- *Banded Damselfly*
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  © Wetlands International
- *Mujib river, Jordan*
  © Wetlands International
- *Northern landscape, Rabat, Morocco*
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For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

5 Water Quality

Status: unknown

Trends: unknown

Reliability:



Facts

Indicator: Water quality of Mediterranean wetlands

MWO Relevant objectives:

1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:

1. Biodiversity and Ecosystem integrity

Potential Key Partners:

European Environment Agency (EEA); UNEP-GEMS Water Programme

Data available:

Good set of data for EuroMed countries, less data in North Africa and Middle- East

Development status:

Single-parameter data ready for use; synthetic indexes require more development

Rationale

The quality of water is important for the wetland ecosystem functioning, for biodiversity and for human uses. It is influenced by many chemical components, which largely result from human activities (agriculture, industry…). Among them, nutrients - which can cause wetland eutrophication - are the most commonly monitored parameters, together with BOD and heavy metals. But many other elements influence water quality too: PCBs, PAHs, nano-pollutants…

In the European Union and candidate countries, the Water Framework Directive provides a strong incentive to improve water quality. It has set up explicit targets for all water bodies and obligations for monitoring water quality.

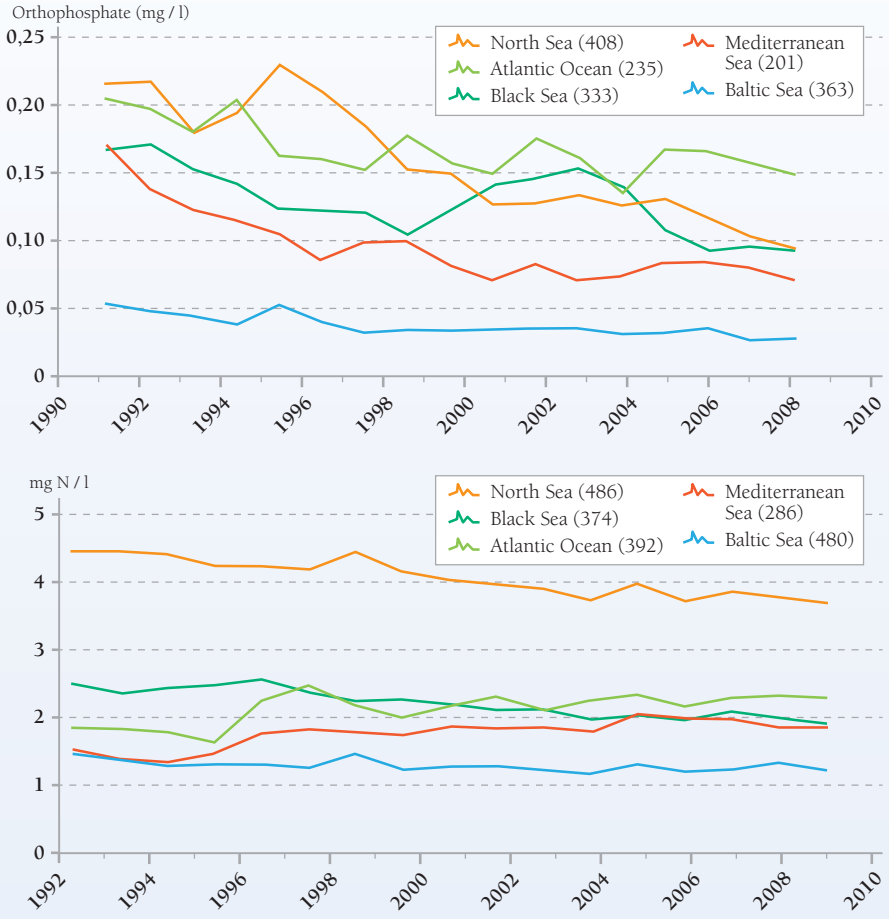
This MWO indicator measures how the water quality evolves in Mediterranean wetlands. In this first phase, only nutrients are covered.

Method

The indicator is not fully defined and developed yet, but it will likely include (or integrate in a composite index) at least the concentrations of nitrates and phosphorous in wetlands. We used the European Environment Agency (EEA)'s Mediterranean-relevant results on these parameters (EEA 2005, 2009, 2010), for Euro-Mediterranean countries, without performing new data analysis. No similar trans-boundary source of data/ results was found for the southern and eastern Mediterranean. Water quality is assessed separately for each main type of waterbody (rivers, lakes…) and for each key parameter. Online databases provide data, e.g. http://www.eea.europa.eu/data-and-maps/data/waterbase-lakes-6. Some large gaps in data exist. We report results for the selected parameters, both as the proportion of stations falling within various ranges of the parameter value, and as trends in average concentrations.

The Indicator

Annual mean Nitrate (bottom) and Phosphorus (orthophosphate; top) concentrations between 1992 and 2008 in rivers of various european sea basins.



Reproduced courtesy of EEA 2010. Within (…): n° of monitored stations. For the Mediterranean, only Slovenia, Spain, Albania, Bulgaria, and France provided data.

How to interpret the indicator:

e.g. in rivers draining to the Mediterranean, for 286 stations monitored, annual mean concentrations of nitrates showed no sign of decline.

Current storyline

"An overview of water quality in Mediterranean wetlands is still impossible, mainly because too few data are available outside Europe, and even within it, pollutants other than nutrients are badly covered.

In Europe, water quality is heterogeneous, and is making progress at a very variable pace, depending on wetland types and countries. For nitrates, the water quality of rivers is higher in the Balkans than in SW Europe, likely because of a lower use of fertilisers. Conversely, the rapid increase in fertiliser use in Turkey, Egypt, Morocco and Syria suggests that, although monitoring is limited, water quality is likely degrading in wetlands of the South and East Mediterranean. In recent decades there has been a gradual reduction in phosphorus concentrations (but not of nitrates) in European rivers flowing to the Mediterranean. Better waste water treatment is the likely main reason.

For most other pollutants, e.g. herbicides, PAHs etc., and despite the absence of coordinated monitoring, converging evidence suggest that the load in aquatic ecosystems is increasing."

Reliability

The indicator relies on EEA results, which only uses data deemed comparable between countries. But monitoring focuses mainly on some wetland types (rivers, lakes, lagoons) and some elements only (mainly nutrients).

Key references

- *EEA 2005. The European environment - State and outlook 2005–EEA 2005 (http://www.eea.europa.eu/publications/state_of_environment_report_2005_1/SOER2005_Part_A.pdf and Part_B.pdf)*
- *EEA 2010. Nutrients in freshwater (CSI 020) - Assessment published Dec 2010. (http://www.eea.europa.eu/data-and-maps/indicators/nutrients-in-freshwater/nutrients-in-freshwater-assessment-published-4)*

Photo credits

- *Waste water treatment station, France © SIEL / Mireva*
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- *Gediz Delta, Turkey © Hellio et Van Ingen*
- *Southern Peloponnese, Greece L.Chazée*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

6

Wetland Surface Area

Status:

Trends:

Reliability:

Facts

Indicator: Surface area of Mediterranean wetlands

MWO Relevant objective:
1. Provide timely and quality information on Mediterranean wetlands status and trends

MWO Relevant theme:
1. Biodiversity and Ecosystem integrity

Key indicator Partners:
MedWet, Ramsar Bureau, Tour du Valat, Wetlands International.

Data available:
National and Regional wetland inventories; local and national studies

Development status:
Ready for Mediterranean use (coarse estimate of current situation)

Rationale

Mediterranean wetlands have been under pressure for centuries, and lost large extents to various human uses. Despite their apparent simplicity, their surface area and trends have never been quantified precisely. Therefore, this indicator aims at measuring the surface area of existing Mediterranean wetlands, its variations, and assess their condition. It integrates the end-result of diverging public policies, that may lead to either net wetland loss, gain or stability. The indicator is made of 2 variables: (1) the surface area of wetlands in the Mediterranean region and (2) the rates of change over time.

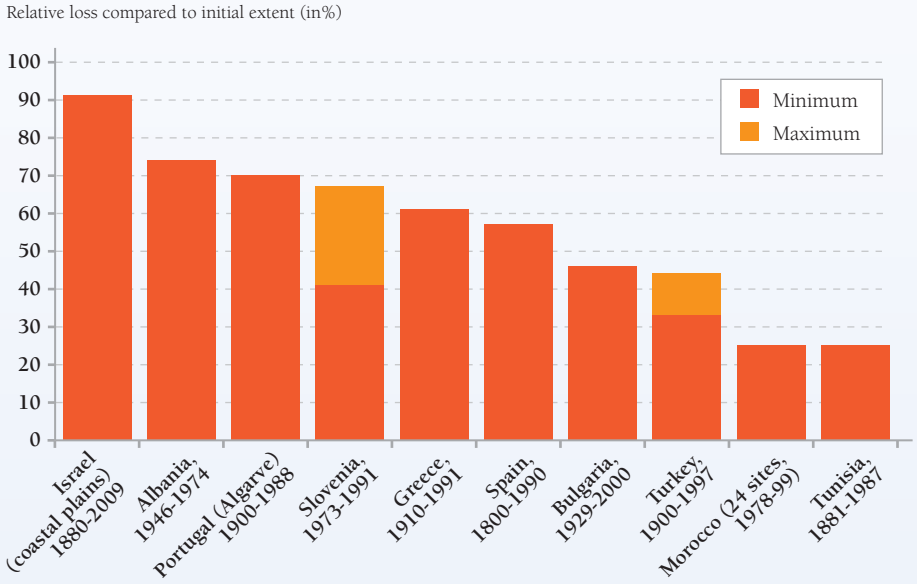
Method

Approaches for estimating wetland surfaces and trends in the Mediterranean are still very crude. Inventories use different methodologies, and do not cover yet the full region. Thus, the indicator cannot be calculated in a rigorous, comparable way. For this 1st analysis, we gathered comprehensive but fairly heterogeneous data from all countries, through a literature review. National and international wetland inventories and specific reviews (on e.g. oases, ricefields, reservoirs…) were used. Data were collected on current (i.e. 1990-2010) wetland areas, losses over recent decades (back to the 1880's when available), and relative % of natural vs. artificial wetlands. Ranges rather than figures were produced, e.g. when several conflicting figures existed.

The Indicator

Estimated natural wetland loss in (parts of) Mediterranean countries in (mainly) the 20th century

Sources: MWO, EKBY etc. & various national sources.



How to interpret the indicator:

Albania and Greece both lost c. 250,000 ha. of wetlands over (part of) the XXth century, i.e. 60-70% of their initial wetlands. When comparing countries, one should take into account (1) that for some countries only regional statistics are available: (2) the relative size of the countries (larger countries had more wetlands, and higher absolute losses are expected), and (3) the different time-scales over which data are available.

Current storyline

"The Mediterranean had, at the turn of the XXIst century, an estimated surface area of 15-22 million ha of wetlands (1.7 to 2.4% of the total land area of the 27 MedWet countries) - or c. 1.5% of the world's wetlands. Because of incomplete data and diverging methods, it is not possible to calculate a reliable % of loss over the whole region. But all examples (graph above) suggest a likely wetland loss in the order of 50% in the XXth century. Major losses occurred mainly between the 1950's and 1970's. However, they continue unabated in some countries, as recent data for a sample of 24 wetlands in Morocco show: -25% in 21 years at the end of XXth century. Similarly, Turkey is still losing important wetlands, including Ramsar sites.

Over the same period (XXth century), the creation of artificial wetlands took place. Out of the Mediterranean total wetland area, c. 23% are artificial: ricefields, large dam reservoirs, saltpans, oases… Some are of high ecological value, especially for waterbirds, but others have destroyed irreplaceable natural marshes, floodplains, pools etc… "

Reliability

Available data are very coarse, due to wetland inventories using different methods and definitions. Despite this, figures/ ranges are deemed reliable for providing orders of magnitude.

Key references

- *Caessteker P. 2007. Synthèse du statut des inventaires de zones humides dans la région méditerranéenne. Tour du Valat/ Université de Provence-Marseille/ MedWet Report, 245 p.*
- *Gramond, D. 2002. Dynamique de l'occupation du sol et variation des usages de l'eau en Anatolie centrale (Turquie) au cous du XXe siècle. Ph.D. Thesis, Paris IV – La Sorbonne University, Paris, 359 p. + Annexes.*
- *Nivet, C. & S. Frazier. 2004. A Review of European Wetland Inventory Information. Wetlands International, Wageningen, NL, 262 p.*

Photo credits

- *Gediz Delta, Turkey © Hellio et Van Ingen*
- *Saltpans, Salin-de-Giraud, France © Tour du Valat*
- *Qarun Wetlands, Egypt © Tour du Valat / L.Chazée*
- *Ricefields, Camargue, France © Tour du Valat / L. Chazée*
- *Wadi, Israel © Tour du Valat / Th. Galewski*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

7

Renewable Water Resources

Status:

Trends:

Reliability:

Facts

Indicator: Exploitation Index of Freshwater Renewable Resources

MWO Relevant objective:
2. Track threats to Mediterranean wetlands and identify actions to promote their protection and wise use and restoration.

MWO Relevant theme:
2. Drivers and pressures

Key indicator Partners:
Plan Bleu

Data available:
Routine data for 22 of 27 Mediterranean countries (Plan Bleu)

Development status:
Ready for Mediterranean use

Rationale

Water is an essential component of Mediterranean wetlands, whose amount, quality and temporality are key ecological determinants. However, freshwater is increasingly captured by human populations upstream of wetlands, for their ever-increasing needs: irrigation, industry, drinking water… This puts stress on all water resources, including wetlands. This indicator measures how sustainable is the use of freshwater in the Mediterranean, comparing the water intake for human use to renewable natural resources.

Method

This indicator is one of the 34 priority indicators of the Mediterranean Strategy for Sustainable Development (Indicator WAT_P03);

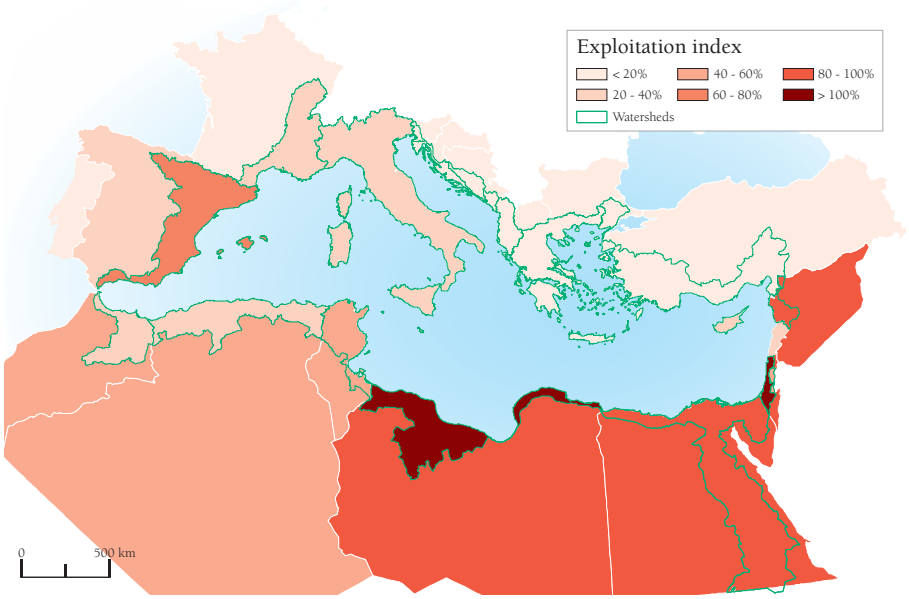
http://www.planbleu.org/actualite/uk/MediterraneanStrategySustainableDevelopment.html.

It is calculated as the ratio (%) between the amount of renewable freshwater withdrawn, and the amount available in the country or at the watershed level. They are computed as follows:

- the amount of renewable freshwater withdrawn is the total of the water extracted annually by humans from these renewable sources. Depending on uses, a variable proportion of the water taken is given back to the natural environment, although usually in a different state and different location. This component of the ratio is more variable from year to year than the other one;
- the annual amount of renewable freshwater available in a given country or river basin is estimated as a long term average (e.g. over 20-30 years). It takes into account the overall water flows that annually feed the country/ basin, i.e. mainly the rainfall, discharge from upstream, and underground flows.

The Indicator

Exploitation index of renewable natural water resources



Source: Plan Bleu 2011 from national sources

How to interpret the indicator:

In Spain, the Mediterranean catchments have 60 to 80% of their renewable freshwater exploited annually, against 20-40% for the rest of the country.

Indices above 80% indicate high tensions on water resources; 60 to 80% signals high risk of structural tensions; 20 to 60% points to local/ conjectural tension. An index of over 100% implies that the same water is being used more than once in succession (reuse or recycling).

Current storyline

"The Mediterranean (in the Plan Bleu sense) consumes annually c. 290 km^3 of freshwater, i.e. about 24% of its renewable resources. These are heavily used in NE Africa, the Middle East and Mediterranean Spain, less so in most of southern Europe, where resources are more abundant. This clearly identifies the areas in the Mediterranean basin where wetlands are already suffering from a shortage of water. A high or growing index is usually not a favourable sign for Mediterranean wetlands.

National trends have various causes. An increasing index can be due either to mounting pressure on the resource, or conversely to more recycling/ reuse of the same water. A decrease may be due either to less water withdrawals (i.e. more efficient use of water), or to an increasing use of desalination or non-renewable fossil aquifers - easing up the pressure on renewable resources. Additional information on specific water uses is required for interpreting data.

Overexploitation of underground water in desert areas is less well documented and monitored. However, it is already impacting several oases - a special wetland type - in Algeria, Egypt, Libya and Morocco".

Reliability

This indicator is deemed reliable as the water resources are fairly well estimated at national and Mediterranean level. However, the Plan Bleu data used cover only 22 of the 27 Mediterranean countries.

Key references

- *Margat, J. 2008. L'eau des Méditerranéens: situation et perspectives. Paris. L'Harmattan, collection Prospective.*
- *Plan Bleu, 2009. State of the Environment and Development in the Mediterranean. UNEP/MAP Plan Bleu, Athens, 200 p.*

Photo credits

- *Mechta Besbes*
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- *Water source in a rural locality in the Ichkeul watershed*
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- *Industrialization and marshes, Camargue, France*
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For more information about this indicator, please visit the Mediterranean Strategy for Sustainable Development pages of the Blue Plan website:

www.planbleu.org/actualite/uk

or the MWO website:

www.medwetlands-obs.org

8

Water Demand per Sector

Status: unknown

Trends: unknown

Reliability:

Facts

Indicator:
Water demand per sector

MWO Relevant objectives:
2. Track threats to Mediterranean wetlands and identify actions to promote their protection and wise use and restoration.

MWO Relevant theme:
2. Drivers and pressures

Key indicator Partners:
Plan Bleu

Data available:
Regular calculations for 22 of 27 Mediterranean countries, since the 1950's at least (Plan Bleu)

Development status:
Ready for Mediterranean use

Rationale

Water is one of the most sensitive natural resources in the Mediterranean Basin - from the environmental, political, social and economical points of view. The total water demand has doubled over the last 50 years. In several development sectors, it is often the bottleneck for further development, extension and intensification. This development often translates into over-abstraction of water from ecosystems, especially from rivers, wetlands and groundwater sources.

In complement to the MWO Priority Indicator "Exploitation Index of Freshwater Renewable Resources" (Factsheet 7), this complementary indicator assesses more precisely the demand for freshwater from different socio-economic sectors, as a way to identify and quantify the key driving forces that (potentially) affect wetlands.

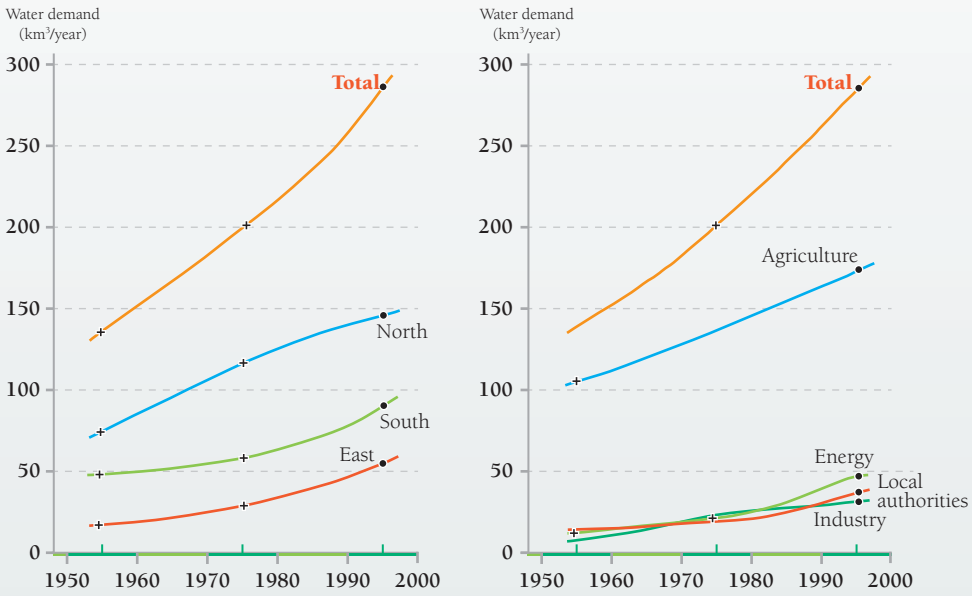
Method

Because water is such a sensitive national issue, all Mediterranean countries keep statistics on the water demand by the key socio-economic sectors, namely agriculture, industry, energy production and domestic use. However methods differ between countries, and careful cross-checking is required if compatible data are to be pooled together. The Plan Bleu has been checking, correcting and compiling this data for a long time, and regularly updates these statistics. Consequently, the Plan Bleu data are used in this report; they cover only 22 of the 27 MedWet countries.

The Indicator

Data can be presented in 2 ways: either as trends or as "snapshots" at given dates. Trends can be shown country by country or for the whole Mediterranean basin, e.g.:

Water demand by sector in the Mediterranean countries overall in the 20th century. *Source: Margat & Treyer 2004*



How to interpret the indicator:

The total amount of water used by agriculture in the Mediterranean has increased from c. 100 km³ of water per year in the 1950's, to c. 180 km³ in recent years (2005).

Current storyline

"Over the last fifty years, water demand for all sectors of activity together doubled to reach 290 km3/year in 2007. Irrigated agriculture is the major consumer with 64%, followed by industry (22%, including the energy sector) and the domestic sector with 14%. In relative terms, the share of agriculture has slightly declined (c. 75% in the 1950's) whereas that of domestic supply and energy production increased. The total irrigated area has doubled between 1965 and 2005. This can be viewed in parallel with the decline in area of many wetlands at about the same time, largely due to water abstraction upstream (e.g. in Turkey).

Irrigation accounts for over 50% of national water consumption in all countries apart from the eastern Adriatic and France. Its share reaches often up to 75-90% (Morocco, Egypt, Syria, Spain…). Water demand for irrigation varies from 5000 m3/hectare/year in the North to almost twice (9600 m3/hectare/year) in the South and East, depending on irrigation techniques and climate conditions (Plan Bleu, 2009). All these pressures are likely to increase in the coming decades, as the Plan Bleu's prospective studies show.

It should be highlighted however that not all the water taken is consumed. Usually, a fraction returns to the environment: a high one for the energy sector (e.g. cooling power stations), a smaller one in the case of agriculture or domestic use."

Reliability

This indicator is deemed reliable as the distribution of water resources between main sectors is fairly well estimated at national and Mediterranean level. However, the Plan Bleu data used cover only 22 of the 27 Mediterranean countries.

Key references

- *Margat, J. and S.Treyer, 2004. L'eau des méditerranéens: situation et perspectives. MAP Technical Report Series No.158. UNEP/MAP, Athens, 366 p.*
- *Plan Bleu, 2009. State of the Environment and Development in the Mediterranean. UNEP/MAP Plan Bleu, Athens, 200 p.*

Photo credits

- *Port area in Fos-sur-Mer, France © Tour du Valat / M. Gauthier-Clerc*
- *Vegetable crops in the Neretva valley, Croatia © Tour du Valat / L. Chazée*
- *Greenhouse in Jijel, Algeria © L. Chazée*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

9

Human Demography

Status:

Trends:

Reliability:

Facts

Indicator: Human population trends in/near Mediterranean wetlands

MWO Relevant objective:
2. Track threats to Mediterranean wetlands and identify actions to promote their protection and wise use and restoration

MWO Relevant theme:
2. Drivers and pressures

Key indicator Partners:
Plan Bleu; Wetland site managers, National Statistics Offices

Data available:
Plan Bleu data for 22 of 27 mediterranean countries

Development status:
Ready for use at Mediterranean scale

Rationale

Human population is a key factor of pressure on Mediterranean wetlands, and it can be taken as a good measurement of the overall pressure on nearby wetlands. Demography, combined with other parameters such as the development model chosen, can reflect the main specific pressures affecting wetlands: urbanisation, public infrastructures, agriculture, industry, pollution, disturbance, etc. Seasonal variation due to tourism and migration is also an important component of the question.

Seasonal variation of population density due to tourism and migration is also impacting wetlands, especially in coastal areas.

Method

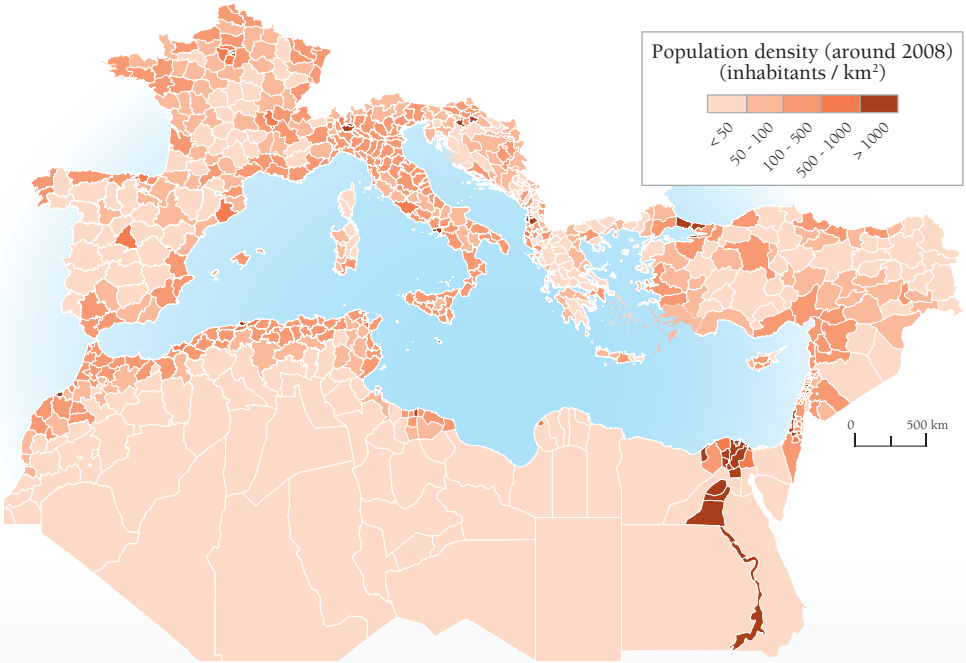
Census data are usually reported at the administrative levels of village, districts, wilayas, departments, etc. Official, national demographic data are then centralized - for its 22 countries - by the Plan Bleu at the scale of administrative districts or for major watersheds (www.planbleu.org and http://simedd.planbleu.org/simedd). Sources of potential errors are corrected or accounted for, e.g. changes with time in the limits and number of administrative divisions, mainly in the South and East Mediterranean countries.

A test was made in 2010 to collect data closer to the field reality, i.e. at the scale of wetland sites, so as to build an aggregated indicator from many such wetlands. This approach was not pursued as too few data sets are easily available.

For the pan-Mediterranean scale, the MWO relies on the Plan Bleu data.

The Indicator

Population density in administrative units around the Mediterranean in 2008 *Source: Plan Bleu from national sources*



How to interpret the indicator:

In most of the countries, the population density is usually higher along the Mediterranean coast than inland. A notable exception is Egypt, where the Nile instead is the lifeline.

Current storyline

"In 2010, the total population of the 27 Mediterranean countries was estimated at 505 millions inhabitants for 8.8 million km²: 225 million in the North, 113 million in the East (incl. Turkey) and 167 in the South. The average population density was 57inhabitants/km². The regional population is increasing quite fast: almost +50% between 1970 and 2000. Although this is now slowing down, it will likely still grow by another 100 million between 2000 and 2025. Large sub-regional differences exist: between 1970 and 2000, the population grew by 14% in the North but doubled in the South and East.

In most Mediterranean countries, population densities are higher along the coastline than inland (see Map), and in some of them (e.g. France, Turkey…), their coastal population is growing more rapidly than inland. Since many Mediterranean wetlands occur near the coastline (large deltas, lagoons, brackish marshes...), this undoubtedly impacts coastal wetlands, with a likely increasing, overall pressure upon most of them - although exceptions may occur.

In a few areas, the demographic increase can be quantified at wetland site level. In such cases it can prove to be very high, e.g. in and near the Gediz Delta (Turkey), the population shot up from c. 0.7 to 2.3 million between the 1970's and the early 2000's."

Reliability

This indicator is deemed reliable as the human demography is usually well monitored by countries, at national and sub-national scales. However, the Plan Bleu data we used cover only 22 countries and would deserve completing for the other 5 mediterranean countries.

Key references

- *Plan Bleu 2006. A sustainable future for the Mediterranean. The Blue Plan's Environment and Development Outlook. Executive summary. UNEP/MAP PlanBleu, Sophia Antipolis, France, 22 p.*
- *Plan Bleu, 2009. State of the Environment and Development in the Mediterranean. UNEP/MAP Plan Bleu, Athens, 200 p.*

Photo credits

- *Pilgrimage, Saintes Maries, France*
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- *Northern landscape, Rabat, Morocco*
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- *Prespa lake, Greece*
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- *Camargue, France*
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For more information about this indicator, please visit the Plan Bleu website:

www.planbleu.org

and database:

http://simedd.planbleu.org/simedd

or the MWO website:

www.medwetlands-obs.org

10

> Land Conversion

Status:

Trends:

Reliability:

Facts

Indicator: Land conversion to agriculture and urbanization around the main wetlands

MWO Relevant objective:
2. Track threats to Mediterranean wetlands and identify actions to promote their protection and wise use

MWO Relevant theme:
2. Drivers and pressures

Key indicator Partners:
European Thematic Centre for Land Use and Spatial Information, BirdLife International, Wetlands International, European Space Agency

Data available:
Corine Land Cover database, Important Bird Areas database, Ramsar sites database.

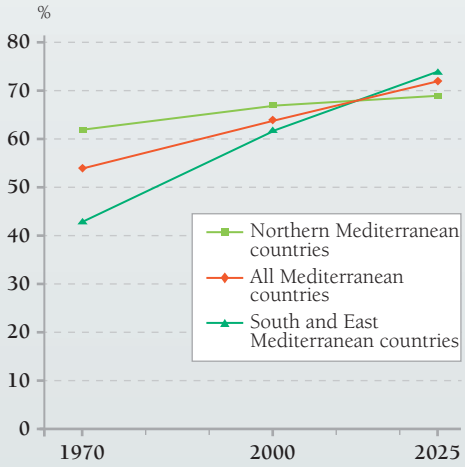
Development status:
Tested in the Northern coast; under development for the Southern and Eastern coasts

Rationale

The conversion of natural or semi-natural habitats into urban or agricultural land is a key pressure impacting wetlands. It leads both to the destruction of natural habitat and species, and the disturbance of neighbouring habitats.

In the Mediterranean, urbanisation has been increasing over the last decades. This process is more rapid in the Southern and Eastern Mediterranean countries and in coastal areas.

Agriculture is an important economic and employment sector in the Mediterranean. As a whole, the surface area under cultivation did not change in the Mediterranean countries between 1961 and 2005. However this apparent stability results from both a constant overtaking of agricultural land by urbanisation close to cities, and the use of natural or semi-natural land by agriculture elsewhere.



Method

This quantitative indicator measures the conversion in absolute and relative terms (% of change compared to the whole studied surface area) of land to urban or agricultural areas in the Mediterranean wetland sites of international importance (sensu Ramsar, that are wetlands included in Important Bird Areas, IBAs, and Ramsar sites) as well as in a buffer area of 1 km-radius around them.

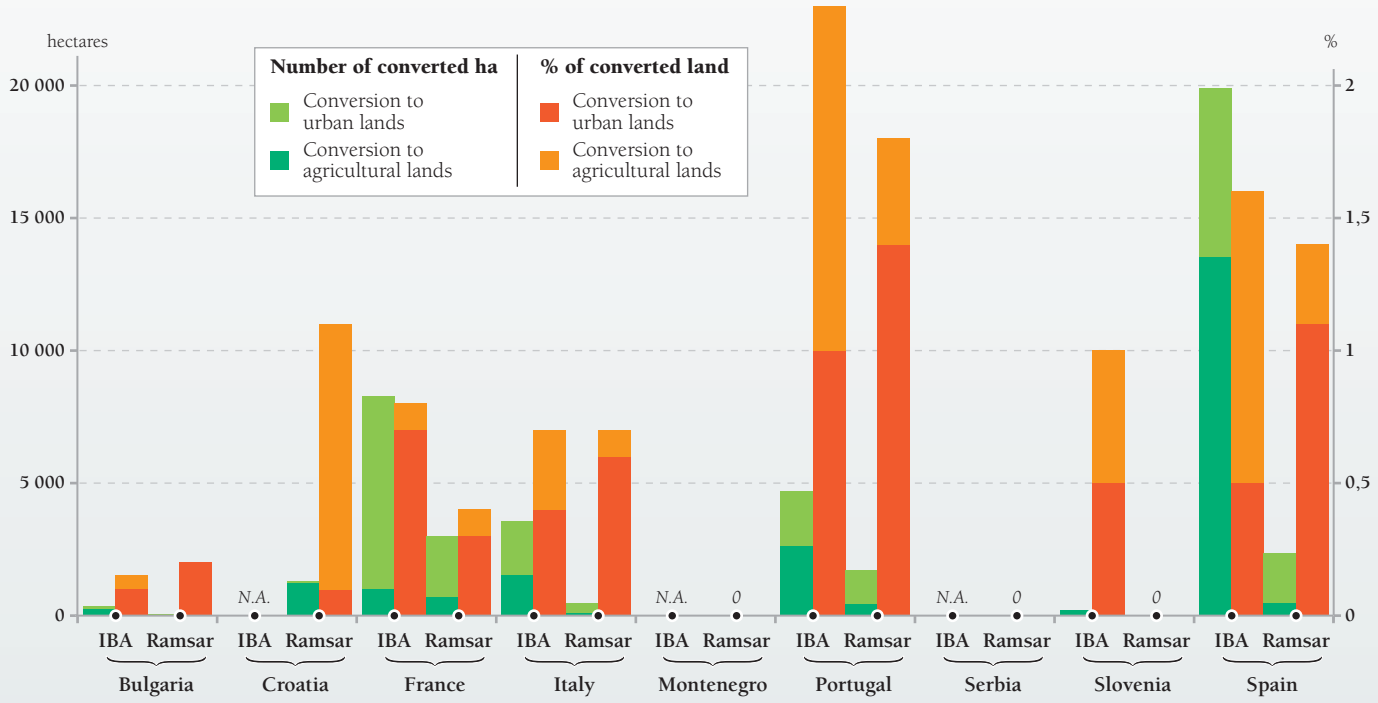
This indicator was implemented only for the European shore because of land use and land cover data availability (Corine Land Cover (CLC) database in 1990 and 2006). There was no data for Albania, Bosnia and Herzegovina, Cyprus, Greece and Macedonia.

Data on IBAs' location and on Ramsar sites were available through GIS databases managed respectively by Birdlife International and Wetlands International.

The Indicator

Between 1990 and 2006, 36.743 ha were converted in and around the IBAs (1%), of which 17.813 ha to urban lands and 18.930 ha to agricultural lands. In and around the Ramsar sites, 8.726 ha (0.6%) were converted, of which 5.941 ha to urban areas and 2.785 ha to agricultural areas.

Land conversion (in total area and in %) in wetlands of international importance in the Euro-Mediterranean countries between 1990 and 2006.



No data available for IBAs in Bosnia & Herzegovina, Croatia, Malta, FYR of Macedonia, Montenegro and Serbia. No CLC data on change in land use/land cover between 1990 and 2006 for Albania, Bosnia & Herzegovina, Cyprus, Greece and FYR of Macedonia.

How to interpret the indicator:

In Portugal, 4.646 ha were converted to agricultural or urban lands in the IBA wetland area (= wetland itself + a buffer of 1km-radius) between 1990 and 2006. This corresponds to 2.3% of the total IBA wetland area of this country. Of this, 2.069 ha were converted to urban lands (1%) and 2.577 ha to agricultural lands (1.3%).

Current storyline

"Between 1990 and 2006, land conversion to urban and agricultural areas has been going on in and around the main European Mediterranean wetlands.

Spain underwent the most important changes, followed by France, Portugal and Italy. Both urbanisation and agricultural development operated.

For both types of conversion, higher rates were observed in EU countries than in the Balkans (when data available), both in % and in surface areas. Generally, the national averages are driven by changes in a few severely impacted sites.

In the Southern and Eastern countries, no quantitative data is available yet on land use change. Nevertheless, the growth of urban population is even more rapid in the South and the East where urban sprawl impacts natural and semi-natural habitats."

Reliability

The results obtained are minimal estimates because of technical restrictions. These restrictions are due to limits both in characteristics of the CLC database (minimum mapping / change detection unit), and in the spatial delineation of wetlands (Ramsar and IBAs databases). As a result, our sample does not encompass all of the Mediterranean wetlands of major importance, and land changes that affect surfaces of less than 5 ha are not detected.

Key references

- *European Environment Agency, 2006. Land accounts for Europe 1990-2000. Towards integrated land and ecosystem accounting. EEA Report, n°11/2006.*
- *Mediterra, 2009. Repenser le développement rural en Méditerranée. Centre International des Hautes Etudes Agronomiques méditerranéennes. Presses de Sciences Po Paris, 387 p*
- *Plan Bleu, 2005. Méditerranée. Les perspectives du plan Bleu sur l'environnement et le développement*

Photo credits

- *Neretva Delta, Croatia*
  © Tour du Valat / L. Chazée
- *Montpellier surroundings, France*
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- *Filling of a wetland, Camargue, France*
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For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

11

Role of Wetlands in Water Supply

Status: unknown

Trends:

Reliability:

Facts

Indicator:

Role of wetlands in water supply

MWO Relevant objective:

3. Assess the level of consideration of wetlands in the Mediterranean context of sustainable development

MWO Relevant theme:

3. Ecosystem services

Key indicator Partners:

Tour du Valat

Data available:

No strong data yet to calculate the value of this indicator

Development status:

No indicator currently developed

Rationale

Wetlands are important sources of renewable fresh water for human basic needs. Renewable water resources can be found at the surface or underground. Indeed, water supply comes from an array of inland wetlands, including lakes, rivers, swamps (surface water), and groundwater aquifers (renewable and fossil groundwater).

There are strong links between groundwater and surface water. On one hand, numerous wetlands are groundwater-dependent and fed largely or wholly by groundwater, e.g. springs, oases and many marshes. On the other hand, groundwater levels are replenished through the flooding of surface watercourses or wetlands, both mostly temporary. But knowledge of both groundwater resources and interaction with rivers and other wetlands is still limited, even if developing. There is increasing evidence that it is not possible to generalize for all hydrological contexts or wetland types as they have very diverse hydrological functioning.

In the Mediterranean, water resources are limited and unequally distributed. Pressure on water is increasing in the Mediterranean, especially in summer and in coastal areas, where population, tourism and other activities concentrate. These pressures are expected to increase along with demographic growth, economic and social changes and climate change. Especially, the water-poorest territories may be the most heavily affected: by 2100, precipitations are foreseen to diminish by 20 to 30% in the Southern countries and by 10% in Northern countries.

Overuse of surface water provokes surface wetlands disappearance and decrease water tables recharge. The combined effect of this and of groundwater overexploitation speeds up the drying of groundwater tables. This impacts not only the quantity of available resources but also its quality (intrusion of seawater in coastal aquifers for instance). General water quality deterioration occurs in many parts of the Mediterranean region, due mainly to contamination (waste, fertilisers), mismanagement during irrigation practices and overexploitation of coastal aquifers.

Because of their key role in the hydrological cycle, wise management of wetlands would be useful to secure the hydrological cycle's functioning and preserve water resources in the long-term.

Perspective

The purpose of measuring the indicator "Supply of water" is to assess the role of wetlands in providing water for human consumption.

For the time being, the above-mentioned analysis is only based on a bibliographic study and the MWO indicator has yet to be developed.

Global datasets are available for various facets relating to ground and surface water, river flows and water use. Especially the impact of land cover on ground water quality has been studied and modelled to a certain extent. However, determining the precise role of wetlands in water provision is challenging. Indeed each wetland has a specific hydrological functioning due to a multiplicity of factors which are, as well as their interactions, not always well understood. If monitoring this indicator is not feasible or too complicated, another possibility is for the MWO to use a proxy indicator.

Key references

- *Gordon, L.J., C. M. Finlayson, M. Falkenmark . 2010. Managing water in agriculture for food production and other ecosystem services. Agricultural Water Management: 97, 512-519*
- *Med-EUWI working group on groundwater. 2007. Mediterranean groundwater report. Technical report on groundwater management in the Mediterranean and the Water Framework Directive, 125 pages.*
- *Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: wetlands and water. Synthesis. 68 pages.*

Photo credits

- *Skadar Lake Ramsar Site, Montenegro © Tobias Salathé*
- *Mechta Besbes, Algeria © Laurent Chazée*
- *Sidi Fredj, Algeria © Laurent Chazée*
- *Collection of water for domestic use, Tunisia © Wetlands International*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

12

Role of Wetlands in Water Purification

Status: unknown

Trends:

Reliability:

Facts

Indicator: Role of wetlands in water purification

MWO Relevant objective: 3. Assess the level of consideration of wetlands in the Mediterranean context of sustainable development

MWO Relevant theme: 3. Ecosystem services

Key indicator Partners: Tour du Valat

Data available: No strong data yet to calculate the value of this indicator

Development status: No indicator has been developed yet

Rationale

Wetlands, and in particular marshes and riparian vegetation, contribute notably to the regular natural filtration of water and to the improvement of its quality when polluted. Water charged with sediments, nutrients, pollutants and pathogens, flowing through a wetland area, may be considerably cleaner at its exit downstream. Some wetlands have been found to reduce the concentration of nitrates by more than 80%. Microbial communities (bacteria and fungi) are the main processors of organic sewage and regulate water purification in rivers. The relatively slow passage and shallow depth of water through wetlands is also a key factor explaining the role of wetlands in water purification. Indeed it provides time for sediments to deposit (trapping metals and organic compounds with them), for pollutants and nutrients to be processed, and for pathogens to lose their viability or be consumed by other organisms in the ecosystem (Millennium Ecosystem Assessment, 2005). Thus, the riparian vegetation at the transition between the river and its floodplain is a key factor in buffering sediments, pollutants and nutrients as it slows water and enhances the development of microbial communities.

This service is especially important for human societies whose economic, social and domestic activities inevitably lead to a substantial level of waste. Water pollution remains a key issue in the Mediterranean. As far as Mediterranean wetlands are concerned, the main sources of water pollution are from agriculture (crops and livestock), sewage wastewater (industry and settlements), run-off from urban areas and illegal dumping of solid and liquid waste. Eutrophication due to high levels of phosphorus and nitrogen in water is a major environmental problem in the Mediterranean basin. Agriculture, in the current context of intensification, contributes to eutrophication by increasing the amounts of nutrients in water runoff throughout the landscape. Water pollution and eutrophication negatively impact both the economy (aquaculture, water supply and tourism along polluted coasts) and the environment.

The ability of ecosystems to deliver this service has decreased. Water abstraction, physical modification of river courses, drainage, urbanisation of floodplains and eutrophication have often provoked the degradation of key purification services that wetlands used to deliver. The capacity of wetlands to clean water is not infinite: over a certain threshold, pollutants may seriously and persistently damage wetlands. The cost of reversing damaged ecosystems is usually high; in some cases rehabilitation is no longer a feasible option.

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Of course, solutions exist for mitigating, preventing and avoiding water pollution. Several actions are already implemented: awareness raising, Mediterranean initiatives to reduce pollution (Barcelona Convention, Horizon 2020 Initiative), strengthening the legal context of water quality, waste management and pollution reduction (national legislations and European directives, especially the Water Framework Directive) and incentives to change lifestyle practices (use of biodegradable and organic products, less water consuming and less polluting domestic and industrial devices,...).

Within certain limits ensuring their ecological functioning, wetlands in a good ecological state could help decision-makers reach the requirements of the new legal framework. It is obviously more vital than ever to reduce the release of contaminants in water and increase the use of technological equipment such as sewage plants and treatment centres.

The natural ability of wetlands to filter and clean water is even reproduced to treat wastewater, in treatment plants using aquatic plants.

Perspective

The purpose of measuring the value of this indicator. "Water purification" is to assess the role of wetlands in water quality improvement. As mentioned earlier, the analysis presented here is based on a bibliographic study and the MWO indicator has to be developed.

Global datasets are available for various facets relating to water quality and river flows. Scientific literature exists on models to explain the surface and underground water quality in relation to land cover and human activities in the watershed. However, extrapolating such information to reflect how water purification 'directly depends' on wetlands is challenging. If monitoring this indicator is not feasible or too complicated, another possibility is for the MWO to identify and use a more relevant proxy indicator.

Key references

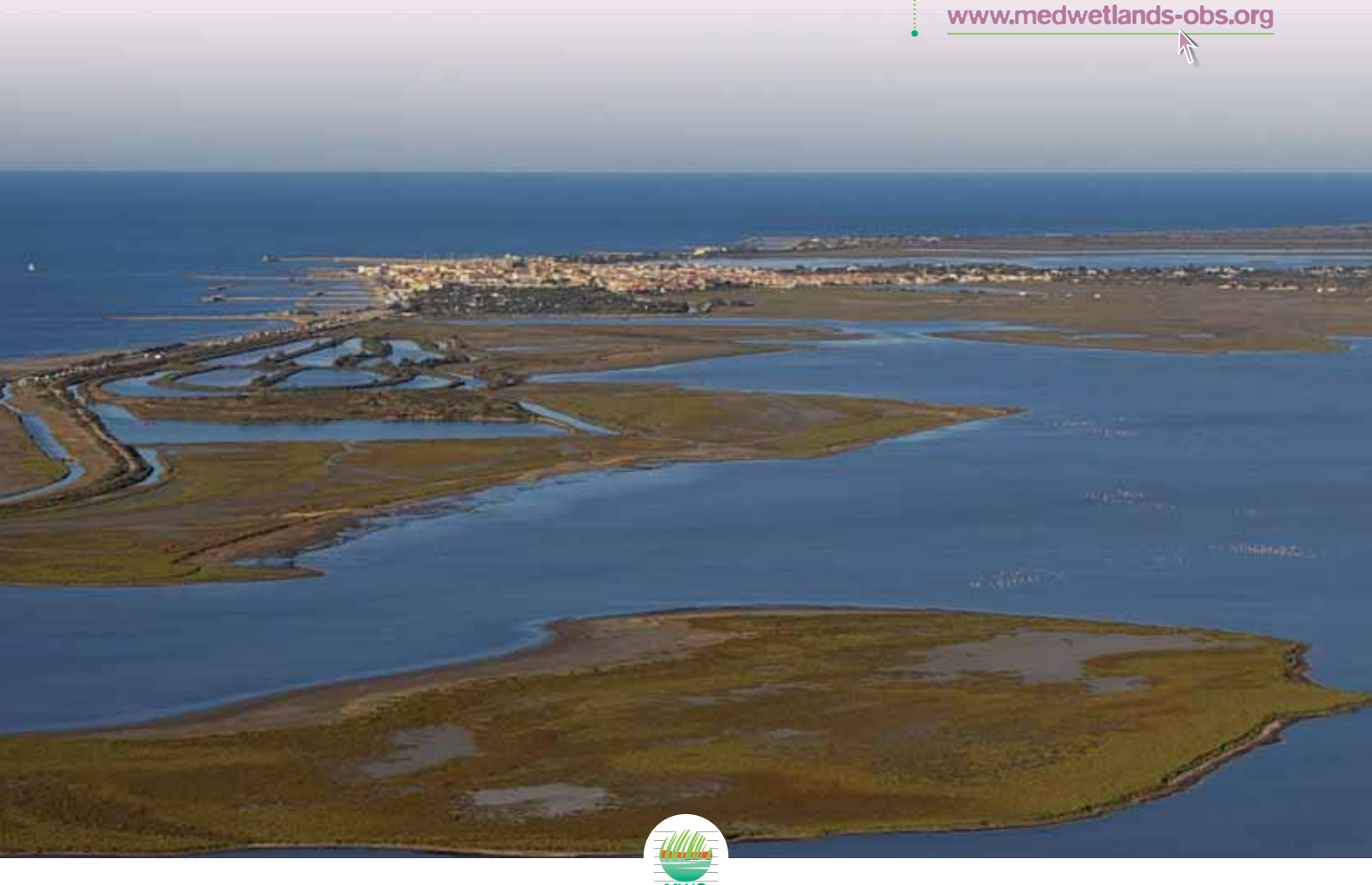
- *Harrison, P.A., M. Vandewalle, M. T. Sykes, P. M. Berry, R. Bugter, F. de Bello, C.K. Feld, U. Grandin, R. Harrington, J. R. Haslett, R. H. G. Jongman, G. W. Luck, P. M. da Silva, M. Moora, J. Settele, J. P. Sousa, M. Zobel. 2010. Identifying and prioritising services in European terrestrial and freshwater ecosystems. Biodiversity and Conservation, 19: 2791-2821*
- *Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: wetlands and water. Synthesis. 68 pages.*

Photo credits

- *Water polution in the Gediz delta, Turkey © Hellio - Van Ingen*
- *Reed beds, Camargue, France © Tour du Valat / M. Gauthier-Clerc*
- *Open settling ponds receiving industrial products, Gediz delta, Turkey © Hellio - Van Ingen*
- *Mireval waste water treatment plant, South of France © SIEL*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org



13

Role of Wetlands in Flood and Drought Attenuation

Status: unknown

Trends:

Reliability:

Facts

Indicator:
Role of wetlands in flood and drought attenuation

MWO Relevant objective:
3. Assess the level of consideration of wetlands in the Mediterranean context of sustainable development

MWO Relevant theme:
3. Ecosystem services

Key indicator Partners:
Tour du Valat

Data available:
No strong data yet to calculate the value of this indicator

Development status:
No indicator has been developed yet

Rationale

Wetlands play a major role in the regulation of water flow, attenuating both the number and the intensity (peak) of extreme events like floods and droughts. This is especially the case for wetlands located in floodplains as they provide ideal areas for retaining floods and for balancing the water regime, e.g. during low-flow conditions or during summer droughts. Indeed most of the wetlands act like sponges: they store water during wet periods and often provide a reserve of water during dry periods. The storage role of wetlands is mainly due to their low topographic location (floodplains, depressions, etc.). Their vegetation serves as a buffer to decrease wave energy and allows the redistribution of water. Wetlands also help prevent water logging in agricultural, industrial and urban lands. Finally, this regulatory service has proven efficient to limit the human and physical damages during flooding periods, and to be an inexpensive natural means of water regulation, compared to artificial protection and reconstruction structures that usually involve high costs.

There is increasing evidences that generalizations about the role of wetlands in flood and drought control are not applicable in all hydrological contexts. A specific, case-by-case approach is therefore required for understanding the local hydrological and ecological systems.

Floods and droughts are common in the Mediterranean basin due to highly variable rainfall regimes. They lead to important human and economic damage each year. For instance, between 2000 and 2009, more than 2 million people were affected by drought in the Mediterranean countries and more than 1.1 million by floods, of which, more than 2,000 lost their lives. Meanwhile, the cost of these damages were evaluated at nearly 3 billion USD for drought and more than 16 billion for floods. The economic, social and psychological impacts of flood damage can be disastrous.

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There is an increasing demand by societies for natural hazard and water regulation, and especially for flood protection. Two factors may explain this demand: (1) the increase of urbanisation in the valleys, especially with the concentration of cities and human activities close to rivers, and (2) the reinforcement of the legislation on risk management (EU Flood Directive, 2007). Moreover, climate change is expected to exacerbate the risk of droughts and floods in the Mediterranean region.

Meanwhile, river regulation, urbanisation and floodplain destruction have resulted in reduced flood retention capacity of wetlands and higher level of run-off. Hence, the risk and severity of floods has increased. This negative trend has continued since 1950.

The sustainable management of flooding risks thus involves combining several activities such as flood control works, appropriate urban planning and the protection of natural wetlands' regulatory functions. Using the natural capacity of wetlands to attenuate floods is another complementary, cost-effective way to reduce flooding risks. It involves the conservation and restoration of crucial ecosystems like wetlands and floodplains.

Perspective

The indicator "Attenuation of flood and drought" aims at measuring the specific role of wetlands in the regulation of the river flow variability as well as disaster mitigation. For the time being, this above mentioned analysis is based on a bibliographic study and the MWO indicator has to be yet developed.

Global datasets are available for various facets relating to river flows as well as drought and flood damages. Scientific literature exists on models to explain the occurrence of floods in relation to land cover in the watershed. Flood attenuation potential can also be estimated by the "residence time" of water in rivers, lakes, reservoirs and soils. Residence time is defined as the time taken for water falling as precipitation to pass through a system: the longer the residence time, the larger the buffering capacity to attenuate peak flood events (Millenium Ecocystem Assessment, 2005). However, extrapolating such information to reflect how flood or drought attenuation "directly depends" on wetlands is challenging. Another possibility of measuring flood and drought attenuation is to use a proxy, if deemed more relevant.

Key references

- *EASAC. 2009. Ecosystem services and biodiversity in Europe. European Academics Science Advisory Council, The Royal Society, London*
- *EM-DAT: The OFDA/CRED International Disaster Database for the 27 MedWet countries*
- *Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: wetlands and water. Synthesis. 68 pages.*

Photo credits

- *Flood water in 2002, Rhône river, France © Tour du Valat / P. Chauvelon*
- *Salines in Camargue, France © Tour du Valat / L. Ernoul*
- *Flooding coastal lagoons in the Ebro Delta (Ramsar Site) to maintain their biodiversity, Spain, © T. Salathé*
- *Damage due to the flood in Arles city, South of France © Tour du Valat / P. Chauvelon*
- *Drought in the Gediz delta, Turkey © Hellio - Van Ingen*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

14

Educational and Touristic Role of Wetlands

Status: unknown

Trends:

Reliability:

Facts

Indicator: Educational & touristic role of wetlands

MWO Relevant objective:
3. Assess the level of consideration of wetlands in the Mediterranean context of sustainable development

MWO Relevant theme:
3. Ecosystem services

Key indicator Partners:
Tour du Valat, Med-INA (Greece)

Data available:
No strong data yet to calculate the value of this indicator

Development status:
Under development

Rationale

Wetlands still suffer from negative perceptions transmitted from the past. It should be recognised that during the past centuries, malaria and other water-borne diseases impacted negatively human health. This has been one of the main initial drivers for wetland drainage in the Mediterranean, especially in North African countries. However, the situation changed several decades ago. Wetlands, their surroundings and human settlements near wetlands constitute aesthetically attractive ecosystems as well as specific cultural and livelihood features. Several local communities are strongly connected with their environment, which has become part of their history, inherited livelihood and educational references. These areas have become for many a source of contemplation, peacefulness, evoke a variety of emotions and are places for discovery during leisure time. Families visit wetlands and take advantage of the natural environment to educate children in respecting wildlife, observing natural beauty, and as a place where they can find a balance that is lost during their fast and materialistic life in urban environments.

Some wetlands, when organized with tourist-oriented services, are important tourist destinations because of their aesthetic value and the high diversity of animal and plant life they often harbour, concentrated on much smaller surfaces than in other ecosystems. In some locations, eco-tourism plays a major role to sustain rural economies, although there are great disparities between access to and involvement in such activities. Some wetlands have a comparative advantage in delivering touristic and educational services. They are also valued by visitors, attracted by easily observed waterbirds such as emblematic flamingos and pelicans, and by the beauty of the landscape. Visitors are also attracted by the cultural heritage and specific lifestyles such as traditional wetland livestock husbandry, bull festivals, local gastronomy, specific hunting and fishing practices, etc. Wetlands are also places where environmental awareness can be enhanced and educational activities can be developed, especially through visitor centres. Finally, wetland services may be valued by scientists and naturalists.

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The sustainable eco-tourism value chain can generate significant employment and income opportunities that can benefit local communities. It may enhance local communities' interest in becoming the best defenders of their own territory and biodiversity, promoting at the same time the sustainable management of the concerned wetlands. This eco-tourism development and its benefits sharing have to be well managed as the negative effects of recreation and tourism are particularly noticeable when they can also not support local economies and introduce inequities. This is especially the case where the ecosystems that support recreation and tourism are degraded.

Since 1950, the demand for recreation and tourism in natural areas has increased, especially in Europe. Similarly, besides wetlands, there is an increasing interest of people in cultural values of nearby wetlands that motivated local management adaptation for this purpose. While ecosystem and man-made services have been developed in some attractive wetlands, the degradation of other natural wetland habitats and natural services may limit today the touristic potential.

Perspective

The analysis presented here is based on a bibliographic study. The MWO indicator has to be developed, following guidelines presented below:

- The measurement of the indicator "Tourism and education" intends to assess through data available from wetland-related visitor centres, the change, between two dates, in the frequency of visits, for education and tourism purposes. This twofold indicator will be both quantitative in tracking numbers, and qualitative by identifying the reasons of the visit, the visitor's place of origin, and the degree of satisfaction / dissatisfaction about wetland services provided. Both quantitative and qualitative information is needed in order to prepare an accurate valuation of this service.
- As far as data collection is concerned, there is no dataset available at the Mediterranean or national scale for this topic. But the number of visitors in these centres is usually recorded. These figures (at least quantitative) can be used retroactively for the purpose of the MWO. Med-INA, an NGO based in Greece and working on cultural relationships between men and Nature in the Mediterranean, is a MWO partner, and will be in charge of collecting data. Questionnaires will be sent to the centres.
- It should be mentioned that the indicator will not capture all kinds of visitors coming to wetland as many of them (e.g. anglers, fishermen, hunters, birdwatchers, etc.), may not frequent visitor centres. However, it may give a relatively good proxy for the trend of visitors interested in wetland education services.

Key references

- *Harrison, P.A., M. Vandewalle, M. T. Sykes, P. M. Berry, R. Bugter, F. de Bello, C.K. Feld, U. Grandin, R. Harrington, J. R. Haslett, R. H. G. Jongman, G. W. Luck, P. M. da Silva, M. Moora, J. Settele, J. P. Sousa, M. Zobel. 2010. Identifying and prioritising services in European terrestrial and freshwater ecosystems. Biodiversity and Conservation, 19: 2791-2821*
- *Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: wetlands and water. Synthesis. 68 pages.*
- *Papayannis, T. 2008. Action for Culture in Mediterranean Wetlands, Med-INA, Athens, Greece, 260 pages.*

Photo credits

- *Public awareness in Marjal de Gandia, Valencia, Spain © CEHUM*
- *Hula Park, Israel © E. Sacham-Cohen*
- *The bleak (Alburnus belvica) endemic to the Prespa lakes © Tour du Valat / L. Chazée*
- *Open day education with schools in Jordan © Wetlands International*
- *Hula Park, Israel © E. Cohen-Shacham*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

15.1

> Surface of Ramsar Wetlands

Status:

Trends:

Reliability:

Facts

Indicator: Surface of protected wetlands. 1. Ramsar designations

MWO Relevant objectives:
2. Track threats to Mediterranean wetlands and identify actions to promote their protection and wise use and restoration

MWO Relevant theme:
4. Integration of environment in development decisions

Key indicator Partners:
Ramsar Secretariat, Tour du Valat

Data available:
Ramsar site list

Development status:
Ready for Mediterranean use

Rationale

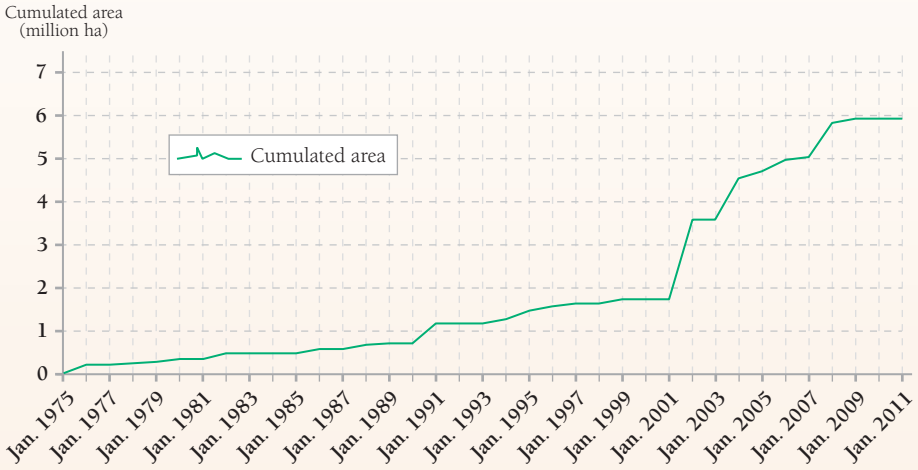
A key mechanism to protect Mediterranean wetlands, maintain their biodiversity and prevent further losses is to designate protected areas. Their surface area is now an indicator of most international conventions. Some countries have defined targets in terms of % of national territory to be protected – although not for wetlands specifically. Beyond the various levels of national, legal protection, international "site quality labels" such as the World Heritage, Biosphere Reserves or Ramsar sites also exist. The latter one is wetland-specific and most relevant to the MWO.

Method

The MWO takes into account 2 sub-indicators: the surface of Ramsar sites and of nationally protected wetlands (Factsheet 15.2). The 1st one is the cumulated surface area of Ramsar sites taken from the Ramsar list (www.ramsar.org), which is constantly updated. Its evolution was reconstructed for the whole metropolitan territory of the MedWet countries (including their non-Mediterranean parts), but excluding overseas territories.

The Indicator

Surface of designated Ramsar sites in Mediterranean countries (in million ha)



Source: after www.ramsar.org
(Note that some Ramsar sites may include large non-wetland areas)

How to interpret the indicator:

From 1975 to 2000 the surface of designated Ramsar sites grew regularly from nil to reach c. 1.7 million ha. From 2001 onwards, 4 main waves of designations (in 2001, 2003, 2005 and 2007) enabled a much more rapid but jerky growth.

Current storyline

"The surface area of Mediterranean wetlands designated under Ramsar is increasing in most countries. This sustained trend is encouraging, and probably played a role in the positive trends of the Waterbirds LPI during the same period (see Factsheet 1[a]). This has also possibly limited attempts at expanding urbanization and agriculture into large Ramsar sites (see MWO Factsheet 10 "Land conversion"). Since its signature in 1971, the Ramsar convention has prompted the designation of 344 Ramsar sites in the Mediterranean (MedWet) countries, now totalling 6 million ha. This can be compared to the c. 15-22 million ha. of extant wetlands in the basin - keeping in mind that some Ramsar sites include large non-wetland areas. In the Mediterranean, the surface designated first grew regularly until 2000. Then Algeria designated numerous very large Ramsar sites in two waves, soon followed by Morocco and Tunisia. In the meantime, most other countries continued their designations as well, participating in this emulation.

Site designation is a mean, not an end, and its effectiveness should be assessed too in the future. For instance, not all Ramsar sites are effectively protected, as the demise of the Sultansazligi wetlands in Turkey illustrates (e.g. Dadaser-Celik et al. 2008). Also, many Ramsar sites in the Mediterranean are not yet included into territorial planning (e.g. local development plans), which limits their integrated management."

Reliability

The monitoring of site designation by the Ramsar Secretariat is very detailed, and updated regularly on its website (www.ramsar.org). Care must simply be taken, when interpreting figures, not to confuse "Ramsar sites area" with "Wetland area", which are sometimes quite different.

Key references

- *Ramsar site list: www.ramsar.org*
- *Dadaser-Celik F., Bauer M.E., Brezonik P.L and H.G. Stefan, 2008. Changes in the Sultan Marshes Ecosystem (Turkey) in Satellite Images 1980-2003. Wetlands 28(3):852-865.*

Photo credits

- *Etang d'Urbino, Corse*
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- *Hutovo Blato, Bosnia and Herzegovina*
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- *Doñana Park © Hector Garrido*
- *Birds lake, Algeria*
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- *Mellah lake, Ramsar site, Algeria*
  © Tour du Valat / C. Hermeloup

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

15.2

Surface of Nationally Protected Wetlands

Status: unknown

Trends: unknown

Reliability:

Facts

Indicator: Surface of protected wetlands / National protection levels

MWO Relevant objectives:
2. Track threats to Mediterranean wetlands and identify actions to promote their protection and wise use and restoration

MWO Relevant theme:
4. Integration of environment in development decisions

Key indicator Partners:
Greek Biotope-Wetland Centre (EKBY), UNEP-WCMC, Tour du Valat

Data available:
National and Regional wetland inventories; international, European or national databases on protected areas (e.g. World Database on Protected Areas)

Development status:
Under development on test countries

Rationale

A key mechanism to protect Mediterranean wetlands, maintain their biodiversity and prevent further losses is to designate protected areas. Their surface area is now an indicator adopted by most international conservation and development conventions. Some countries have defined targets in terms of % of national territory to be protected - although not for wetlands specifically. Protected areas encompass very variable levels of international and national protection, from very strict to "soft". Being country-specific, these levels are made comparable through 6 standard IUCN categories.

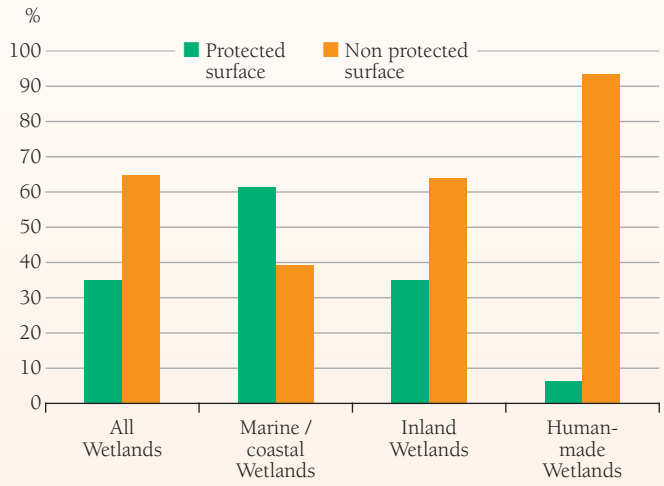
Method

The MWO takes into account 2 sub-indicators: surface area of Ramsar sites (see Factsheet 15.1), and of nationally protected wetlands. The latter one was derived by overlaying information on (1) existing wetlands and (2) nationally protected areas: protected wetlands represent their intersection, i.e. the surface of wetlands that lay inside nationally designated areas. A GIS analysis provided the surface of protected Mediterranean wetlands at different dates.

Precise data (location, extent) on existing wetlands was retrieved from the MedWet Web Information System, maintained by the MedWet Initiative (www.wetlandwis.net). It stores descriptive and geospatial information on Mediterranean wetlands. By 2010, only 3 countries (Albania, Cyprus and Serbia) had proper GIS data, and were used for the analysis. Data on protected areas was obtained from the World Database on Protected Areas (WDPA) (www.wdpa.org). Only sites with boundary data ("polygon sites") were used, i.e. some underestimation is possible. In order to harmonize the various terminologies of "Parks", "Reserves" etc. the IUCN protected area categories (Dudley 2008), which reflect the primary management goal of an area, were used.

The Indicator

Percentage (%) of the surface area of marine, inland and man-made wetlands that is protected vs. unprotected.



Source: MedWet/WIS, and WDPA 2010
(Note: data cover a sample of 1263 wetlands in Albania, Cyprus and Serbia.)

How to interpret the indicator:

In the three countries, 35% of the wetland surface is currently protected. This varies from 61% in marine/coastal wetlands, to less than 7% in man-made wetlands.

Current storyline

"Based on a sample of Mediterranean wetlands (in 3 out of 27 MedWet countries, all in SE Europe), approximately 1/3 of the wetland surface falls inside protected areas in 2010, i.e. benefits from a national protection status. Half of the surface of protected wetlands primarily aims at maintaining species or habitats (i.e. falls under IUCN Cat. IV), whereas for about 1/3, the emphasis instead lies on the sustainable use of environmental products and services (IUCN Cat. V).

Marine/coastal wetlands are much more protected, overall, than inland wetlands. Stronger conservation strategies apply to coastal and marine zones, presumably due to their higher economic interest and vulnerability (e.g. to climate change). Conversely, inland wetlands did not benefit from the same strategic approach, e.g. many are still used as wastelands. Finally, functions and values of human-made wetlands are not appreciated, and they are therefore seldom targeted for protection".

Reliability

Results are quite reliable, but remain restricted to few countries, since this indicator requires overlaying 2 sources of GIS data, if possible updated at the same pace: wetland surface and protected areas. Extension to the whole Mediterranean is not foreseeable for the short/ medium-term.

Key references

- *Dudley, N. (Editor), 2008. Guidelines for Applying Protected Area Management Categories. IUCN, Gland, Switzerland: 86 p*
- *CDDA: http://biodiversity.eionet.europa.eu/announcements/ann1287497900*

Photo credits

- *Ohrid lake, Albania*
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- *Waterfalls, Kravice, Bosnia*
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- *M'Chouneche oasis, Algeria*
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For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

16

Strategic Efforts in Wetland Protection

Status:

Trends:

Reliability:

Facts

Indicator: National Wetland Policy and Committee

MWO Relevant objective:
3. Assess the level of consideration of wetlands in the Mediterranean context of sustainable development

MWO Relevant theme:
4. Integration of environment in development decisions

Key indicator Partners:
Ramsar Bureau

Data available:
Ramsar National reports to the Conference of the Parties (2008), Wetlandmonitoring assessment in MedWet countries (2009-2011)

Development status:
Ready for use

Rationale

In several MedWet countries, the insufficient enforcement of environmental law, the inefficient coordination with other sectors and the weak environmental policy framework specifically addressing wetlands are identified as important causes of poor wetland protection. Without appropriate wetland policy and legal framework, it is usually difficult to classify sites and to maintain sustainable protection and management of wetlands in protected areas. In non protected areas, appropriate protection and management of wetlands is even harder in front of powerful sector policy and legal frameworks such as agriculture, rural development and urbanization sectors. The government response to protect wetlands through appropriate policy and legal framework and the national capacity to enforce environmental laws are then key determinants for operational wetland protection down the line.

Out of the 27 members of MedWet, all except the Palestinian Authority have signed the Ramsar Convention. To facilitate the implementation of the Convention, Ramsar recommends different instruments, among them: a national wetland policy and a Ramsar or cross-sectoral committee. These two sub-indicators - national wetland policies and national wetland cross-sectoral committee - are regularly monitored by Ramsar and has been used, at the Mediterranean level, to calculte a twofold MWO wetland policy indicator.

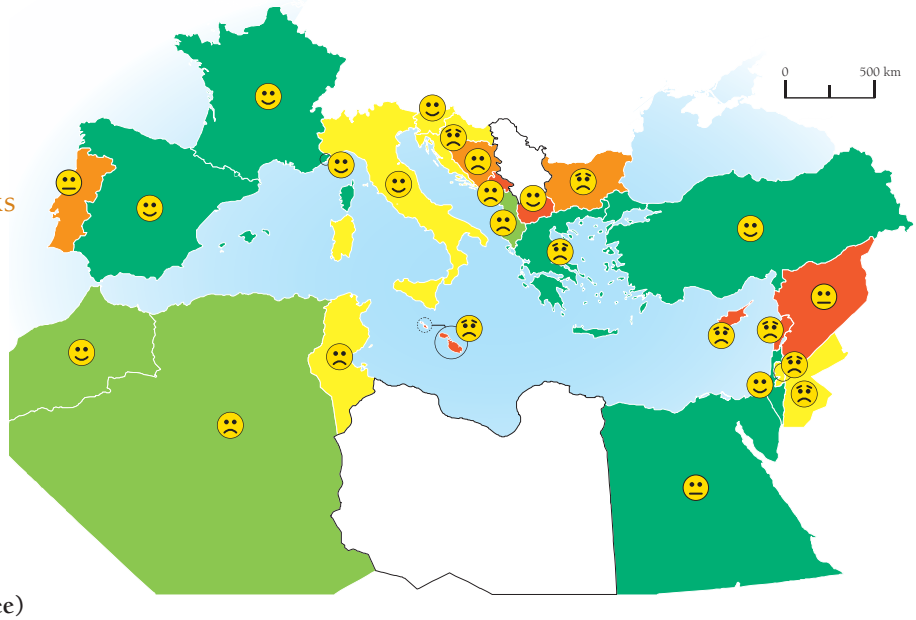
Method

The measurement of this twofold MWO indicator (Mediterranean wetlands policy response index and Mediterranean wetland cross-sector strategy index) come from the percentage of countries having a wetland policy/strategic framework and a wetland cross-sector committee. The measurement is based on 25 MedWet countries (93%) for which information was available in the national reports of Ramsar or through monitoring studies conducted by the MWO coordination unit between 2009 and 2011.

The initial data used for this indicator was collected from national reports prepared for the last Ramsar Conference of the Parties (COP 10). Questions related to national wetland policy indicator were under the Section 3/Goal 1 “The wise use of wetlands” of the Ramsar national report template. Questions related to wetland cross-sector committee indicator were under the section 3/Goal 4 “Implementation capacity”. Additional information was collected in the course of the participation of the MWO coordination unit in STRP meetings in 2010 and 2011, using updated information (2011) from electronic questionnaires to national Ramsar focal persons and through MWO wetland monitoring and evaluation study (MWO, 2011).

The Indicator

Status of wetland policy frame-works and cross-sector instruments in mediterranean countries:



Country color (wetland policy)

- National Wetland Strategy in place
- National Wetland Strategy in preparation
- Wetlands specifically included in broader national strategies on biodiversity and protected areas
- National Wetland Strategy planned
- No National Wetland Policy
- No data

Smileys (Ramsar or inter-sectoral wetland comittee)

- Operational National Ramsar / Wetlands cross-sectoral Comittee
- Partly operational National Ramsar / Wetlands cross-sectoral Comittee
- No National Ramsar / Wetlands cross-sectoral Comittee but planned or in preparation
- No National National Ramsar / Wetlands cross-sectoral Comittee planned

How to interpret the indicator:

Countries such as Spain and Slovenia have both policy/strategic and cross-sectoral institutional wetland mechanisms.

Current storyline

"Based on the results, the Mediterranean policy response index is 0.64 and the Mediterranean wetland cross-sector strategy index is 0.37. Overall, among the 25 considered countries, 16 of them (64%) have established a specific wetlands policy and strategic documents. As for the wetland cross-sector committee, 9 countries (37%) have established an operational wetland committee while in 3 other countries (12%), the committee established is partly operational.

There are eight countries (32%) which have both a wetland policy framework and a wetland committee, eight countries (32%) having established a wetland policy framework without wetland cross-sector committee, three countries (12%) having established a wetland cross-sector committee without wetland policy framework and six countries (24%) that have not, or not yet developed a wetland policy and strategic framework and an operational wetland cross-sector committee.

Effort in developing wetland policy framework is noticeable in most MedWet countries, but the wetland committees to influence policy implementation across sectors are established in less than 50% of them. The countries having developed a specific wetland policy/strategy implement between 30% and 70% of planned activities and results due to insufficiency of budget and human resources mainly. One of the main bottlenecks in mainstreaming wetlands in development agenda is the poor integration of protected areas (including wetlands) in national and local territorial planning processes. Another reason is the weak involvement of the conservation community in promoting the environmental values and importance beyond protected areas."

Reliability

For the 25 countries considered, the reliability of the indicator values and their interpretation are considered strong due to the combination of three sources of information (official Ramsar national reports, recent MWO surveys in 16 Medwet countries, and responses to a recent had-hoc MWO questionnaire through national Ramsar focal points).

In the future, the quality of the results could be improved by 1) maintaining these different sources of information, 2) encouraging, with Ramsar and MedWet, other Mediterranean countries to produce their national reports, and 3) focusing on the implementation dimension. The trends of these national policy and committee indexes could also be tracked using Ramsar COP time series since 1971. Another index could also be developed with the proportion of Ramsar sites benefiting from an operational management plan.

Key references

- *National reports submitted for Ramsar COP 10, MWO wetlands monitoring and evaluation survey (2009-2011), MWO missions reports (2009-2011), Update survey on wetland policy and committees (2010-2011).*

Photo credits

- *COP10 Ramsar © Secretariat Ramsar*
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- *Laguna Cañizar, Spain © CEHUM*

For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org

17

Wetlands and Millennium Development Goals

Status:

Trends:

Reliability:

Facts

Indicator: Rate of achievement of water-related environmental targets under the Objective 7 of Millennium Development Goals (MDGs, 2005-2010)

MWO Relevant objective:

3. Assess the level of consideration of wetlands in the Mediterranean context of sustainable development

MWO Relevant theme:

4. Integration of environment in development decisions.

Key indicator data providers:

United Nations Development Programme, Convention of Biological Diversity, Ramsar, European Union, Organization for Economic Co-operation and Development, European Environment Agency, National MDG bodies, Plan Bleu.

Data available:

National MDG reports (2005-2010), International MDG 2010 and 2011 reports and UN (MDG Track Monitor and Statistic division) data base

Development status:

Ready for Mediterranean use at national level with baseline reference back to 1990s for some indicators.

Rationale

The link between socio-economic development, poverty and natural assets has been recognized by the CBD and the Ramsar Convention and evidenced in several studies. The MDGs provide, since 1990, a harmonized and institutionalized monitoring system covering almost all countries. This international agreement lies at the interface between conservation and development, to which all the 27 Medwet entities are committed. Under the MDGs, there are 8 goals with associated targets, whose degree of achievement is measured trough a set of indicators. Under Goal 7 "Ensuring environmental sustainability", none of the indicators are wetland-specific. Nevertheless, 4 indicators under this Goal 7 have a potential link with wetlands, whether direct or indirect. Therefore, it was decided to have a MWO indicator extracted from selected wetland-relevant indicators under the Objective 7 of the MDGs, and to test its potential for assessing general environmental progress in 17 developing countries, including implications for wetlands.

Method

Periodical monitoring and assessment of the MDG targets started in the early 1990s, using relatively standardized data collection and assessment methods developed by the specialised UN agencies. Data on the achievement of the MDGs are available for 61% of MedWet entities. Data proceed from official national sources (statistics, censuses, national surveys, etc.), and are collected and aggregated at national - sometimes sub-national - level by specialized international agencies. These agencies are in charge of elaborating methodologies for collecting and analyzing data. Under the Goal 7 of the MDGs, only the indicators most relevant to wetlands with sufficient data were considered for the 2010 test: Indicator 7.1. "Proportion of land area covered by forest" (FAO); 7.8 "Proportion of population using an improved drinking water source" (WHO, UNICEF); 7.9 "Proportion of population using an improved sanitation facility" (WHO, UNICEF), and 7.10. "Proportion of urban population living in slums" (UN-Habitat).

For the assessment of the values of these four indicators into a single MWO indicator, we have calculated the average rate of achievement of these four indicators per country. The results are assessed using the official MDG assessment categories and terminologies: countries that have achieved or are likely to achieve by 2015 the 4 selected (wetland-related) environmental targets; countries that could potentially achieve the targets, if they enhanced their efforts, and countries that are very probably not going to achieve the targets.

The Indicator

MDG Objective 7	Albania	Algeria	Bosnia & Herzegovina	Bulgaria	Croatia	Egypt	FYR Macedonia	Jordan	Lebanon	Libya	Montenegro	Morocco	Palestinian Authority	Serbia	Syria	Tunisia	Turkey
Rate of achievement																	

How to interpret the indicator:

5 countries (in green) have achieved or are likely to achieve by 2015 the 4 selected (wetland related) environmental targets. Seven countries (in yellow) could potentially achieve the targets, if they enhance their efforts. Four countries (in red) are very probably not going to achieve the targets. Data for Turkey is not sufficient for an evaluation.

Current storyline

"The majority of the developing countries (75%) have achieved significant results towards these four targets even though seven of them (44%) need to strengthen their efforts. Overall, given the strong commitment of North African, Middle-Eastern and Balkan countries towards better water supply, sanitation, lodging and forest protection, the wetlands-related environmental MDG objectives appear to be on the right track. In the four countries that may not achieve their targets by 2015, there is a high correlation with the level of poverty since they all face a poverty rate over 10 %.

On the negative side, the increased efforts in drinking water supply in countries that have a deficit of access to water has creating further water abstraction, especially in the coastal zone and in river valleys where most of the population lives: Morocco, Algeria, Egypt, Libya, Tunisia. Important national programmes are destroying natural or semi-natural habitats, especially along the coasts for housing Algeria, Egypt, Libya and Morocco.

On the positive side, the important efforts in providing proper sanitation facilities to households and communities reduce soil and water pollution. Stabilizing or even increasing the forest cover in some countries is likely to have, already or in the future, positive impacts on watershed protection and water retention."

Reliability

For the 16 countries with sufficient data, the reliability of the indicator values and the general interpretation are considered as good, as they rely on strategic reviews and special studies from specialized international organizations. The reliability of data remains limited in countries that do not conduct regular surveys and studies, or with deficient statistical systems.

However, since the MDGs are no longer prominent enough in the agenda of most MedWet countries for significantly influencing environmental and wetland issues (Gully and MWO survey, 2010), they will not feature as a MWO indicator in subsequent reports.

Key references

- *International MDG reports 2010 and 2011, MDG country reports.*

Photo credits

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For more information about this indicator, please visit the MWO website:

www.medwetlands-obs.org