SUSTAINABILITY REFERENCE VALUES (SRVs) AND TARGETS FOR WETLANDS AND BIODIVERSITY

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1. INTRODUCTION

Many definitions for **wetlands** are found in current bibliography. The Ramsar Convention, or Convention on Wetlands of International Importance especially as Waterfowl Habitat defines wetlands as *"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres"*. In addition, Article 2 states that wetlands may incorporate "*riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands*". The Ramsar definition was stated 35 years ago, and stood the test of time. Since definitions have to be comprehensive the examples of wetland types stated are few. Therefore, a full list of types was prepared in 1990 (Table 1).

In the United States the definition of the term wetland was a subject of extensive discussion for many years. The most widely accepted definition today has as follows: "*wetlands are defined as areas that have a predominance of hydric soils and that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions*" (Environmental Law Institute 1991). On the basis of this definition, the federal agencies of that country which are involved in wetland conservation have developed three wetland identification criteria: hydrology, soil, and vegetation (Federal Interagency Committee for Wetland Identification 1989).

Finally it must be understood that the definition of the term "wetland" is not solely of scientific interest; it also has political implications, since very often wetlands are under legal protection status, which commit the State, the competent authorities, users and managers.

The term **biodiversity** or biological diversity refers to the variety of life forms in a certain area or on earth in general. It can be divided into genetic diversity, species diversity and ecological diversity (Hoyt 1988, McNeely *et al.* 1990). Genetic

diversity is the variation between individuals in a species. Species diversity is the number of animal, plant, and microorganism species. Lastly, ecological diversity refers to distinct units in which life is organised above the level of the population (e.g. plant communities) in a particular area. In conservation literature the term biodiversity, when not further elaborated, usually refers to species diversity.

The International Convention on Biological Diversity, signed in Rio de Janeiro on 5 June 1992, defines it as *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part ; this includes diversity within species, between species and of ecosystems"*.

Some 1.5 million species of all kinds have so far been identified, from bacteria and algae to higher mammals. Earlier writers estimated the total number of species on earth at 5 million. More recently, May (1988) has put the figure at 50 million, which shows how little we have advanced in our study of certain fundamentals concerning the natural environment. Europe's species diversity is shown in table 2.

Wetland biodiversity is a significant part of the earth's total biodiversity. Many plant and animal species living in wetlands are of direct value to man (Maltby 1986). The best known example is rice, the staple cereal for over half the world's people. Several species of trees in wooded wetlands provide timber and raw materials for use in tanning, textile making and distilling. Agar, used in the food industry and as a substrate for bacterial cultures, comes from seaweed of the genus *Gracillaria.* Certain aquatic ferns (e.g. *Salvinia sp.*) can be used to produce methane gas. The nitrogen-fixing aquatic plant *Azolla* can be used to grow rice without applying nitrogenous chemical fertilizers. Aquaculture of Sea bream and Sea bass and of other commercial fish owe their success to the small crustacean *Artemia salina.* The fry of these fish cannot be given manufactured feed, but flourish on young *Artemia,* which although is not their natural food, have the right size, colour and mobility.

A wetland's species diversity is influenced by various abiotic factors and especially by the hydrological regime, as well as by the physical and chemical properties of the water and the substrate. These factors affect the flora and through this the fauna, since the species diversity of the latter depends on the quantity of vegetation, its distribution and its structure or architecture. Above all, the biodiversity of a wetland is like that of any ecosystem, the outcome of a maze of interactions between its component elements. These interactions change with the seasons and over the years, and the better they are understood the more effectively the wetland will be managed. Attempts to intervene based on individual factors in isolation, on the other hand, are almost certain to lead to mismanagement of the ecosystem. One factor that increases wetland fauna diversity is the migration of waterfowl and waders.

The tendency to give special treatment to wetlands (study, conservation and management) began only a few decades ago, mainly after the early 70s, when science showed that while wetlands have much in common with dry land and deep water systems, they also have their own special characteristics, due to their "transitional" nature (Zalidis & Mantzavelas 1994). Therefore, they have special requirements in relation to their management and conservation. These requirements may well go beyond national borders, as in the case of wetland biodiversity, particularly with regard to their avifauna.

Wetlands' functions include: recharge of underground aquifers, flood water trapping, trapping of sediments and other substances, absorption of carbon dioxide, storage and release of heat, absorption of carbon dioxide, harnessing the solar energy to support food webs. The consumptive and non-consumptive values that emerge from these functions are the following: biological (biodiversity), supply of drinking and irrigation water, support of agriculture, fisheries, animal farming and game, supply of salt and sand, wood supply, educational, scientific, cultural, recreational, protection against erosion control of sediments and flood, maintenance and improvement of underground and surface water quality, contribution to climatic stability. It is evident that wetlands play a very substantial role in supporting human economic activities and civilizations.

In this century, wetlands have suffered severe loss and degradation all over the world, since water has been the natural resource mostly used for different types of development. This loss and degradation have become more obvious in geographic regions where wetlands resources are more scarce, due to a warmer and drier climate, e.g. in the Mediterranean. Drainage of extensive wetland areas for hygienic purposes and for agriculture, projects of larger and smaller scale for flood control and drinking and irrigation water supply, the unwise use of irrigation water, loss of wetland area for transport, touristic and housing development, point and non-point source pollution of wetland waters and soils due to agro-chemical run-off and improper disposal of domestic and industrial wastes and wastewaters, illegal removal of natural vegetation and hunting, all contribute to the current conservation status of wetlands.

The **objective** of this paper is to discuss SRVs and targets for wetlands, mainly in association with biodiversity. Issues such as existing and proposed SRVs and targets for wetlands, missing categories of SRVs and background information, environmental sustainability indicators and spin-offs among wetland SRVs and SRVs for other themes will be examined.

Table 1: Ramsar classification of wetland types as approved by the Fourth Conference of the Contracting Parties, (Montreux 1990).

Marine and Coastal Wetlands

1. Marine waters - permanent shallow waters less than six metres deep at low tide; includes sea bays, straits.
2. Subtidal aquatic beds; includes kelp beds, sea-grasses, tropical marine meadows.
3. Coral reefs.
4. Rocky marine shores; includes rocky offshore islands, sea cliffs.
5. Sand, shingle or pebble beaches; includes sand bars, spits, sandy islets.
6. Estuarine waters; permanent waters of estuaries and estuarine systems of deltas.
7. Intertidal mud, sand or salt flats.
8. Intertidal marshes; includes saltmarshes, salt meadows, saltings, raised saltmarshes, tidal brackish and freshwater marshes.
9. Intertidal forested wetlands; includes mangrove swamps, nipa swamps, tidal freshwater swamp forests.
10. Brackish to saline lagoons with one or more relatively narrow connections with the sea.
11. Freshwater lagoons and marshes in the coastal zone; includes delta lagoon and marsh systems.

Inland Wetlands

1. Permanent rivers and streams; includes waterfalls.
2. Seasonal and irregular rivers and streams.
3. Inland deltas (permanent).
4. Riverine floodplains; includes river flats, flooded river basins, seasonally flooded grassland, savanna and palm savanna.
5. Permanent freshwater lakes (over 8 ha.); includes large oxbow lakes.
6. Seasonal freshwater lakes (over 8 ha.), floodplain lakes.
7. Permanent and seasonal, brackish, saline or alkaline lakes, flats and marshes.
8. Permanent freshwater ponds (below 8 ha.), marshes and swamps on inorganic soils; with emergent vegetation waterlogged for at least most of the growing season.
9. Seasonal freshwater ponds and marshes on inorganic soil; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.
10. Shrub swamps; shrub-dominated freshwater marsh, shrub carr, alder thicket; on inorganic soils.
11. Freshwater swamp forest; seasonally flooded forest, wooded swamps; on inorganic soils.
12. Peatlands; shrub or open bogs, fens.
13. Forested peatlands; peat swamp forest.
14. Alpine and tundra wetlands; includes alpine meadows, tundra pools, temporary waters from snowmelt.
15. Freshwater springs, oases.
16. Geothermal wetlands.

Man-made Wetlands

1. Water storage areas; reservoirs, barrages, hydro-electric dams, impoundments (generally over 8 ha.).
2. Ponds, including farm ponds, stock ponds, small tanks (generally below 8 ha.).
3. Aquaculture ponds; fish ponds, shrimp ponds.
4. Salt exploitation; salt pans, salines.
5. Excavations; gravel pits, borrow pits, mining pools.
6. Wastewater treatment; sewage farms, settling ponds, oxidation basins.
7. Irrigated land and irrigation channels; rice fields, canals, ditches.
8. Seasonally flooded arable land, farm land.

Table 2: Europe's species diversity (European Centre for Nature Conservation, 1996):

Taxonomic category	Number of species
Mammals	250
Birds	520
Amphibians	70
Reptiles	200
Fish	230
Invertebrates	200.000
Higher plants	12.500

2. EXISTING AND PROPOSED SRVs AND TARGETS FOR WETLANDS

Deeper reasons for all the threats described here above, have been the policies regulating the corresponding human activities. These policies, for many decades have been short-sighted, non-integrated, and disregarded all environmental impacts, considering environmental goods and services as free of charge. This has only recently started to change, but the integration of nature conservation (including wetland conservation) into the policies governing all economic sectors (especially agriculture), is proceeding at a low pace.

According to the World Commission on Environment and Development (1987), **sustainable** is the development process which can meet the needs of the present with out compromising the ability of future generations to meet their own needs.

The **5th Action Plan of the European Union** (1993), for the first time placed sustainability as the basic principle for all policies. The Communication from the Commission to the Council and the European Parliament for the "Wise use and conservation of wetlands" (1995), furthermore acknowledges that "throughout the European Union, appropriate policy and environmental standards need to be implemented ...Thus, the conservation and sustainable use of wetlands and their resources, must also be an integrated part of all Union policies" Moreover the European Council Directive 92/43 (Habitats directive), includes a range of wetland ecosystems, in the list of priority habitats, which have to be protected from detrimental activities within their limits, or indirectly, from activities outside their boundaries which have adverse impacts on them. Its objective is *"to contribute to the protection of biological diversity, through the conservation of natural habitats, as well as of the wild fauna and flora ... "*.

The **Pressure-State-Response (PSR) framework** was first developed in Canada and adopted in the environmental indicator work of the OECD, the World Bank, and the World Resources Institute (WRI). The PSR framework seeks to develop indicators which highlight the causal links between human activities the exert negative pressures on the environment, subsequent changes in the state of the environment arising from these pressures and societal corrective responses to these changes.

The PSR framework distinguishes three broad types of indicators:

- **indicators of environmental pressure:** these describe pressures (sometimes referred to as 'stress') from human activities exerted on the environment.
- **indicators of environmental conditions ('state'):** these are designed to give an overview of the situation of the environment and its development over time, and not of the pressures on it.
- **indicators of societal responses:** these show the extent to which society is responding to environmental change and concerns.

The European Commission in response to the priority of the 5th Environmental Action Programme on combining economic and environmental approaches in a balanced way developed_an environmental indicator system that will allow the integration of economic and environmental information within a common 'Greeen' accounting framework. This was the subject of a Communication from the Commission to the European Parliament on **'Directions for the EU on Environmental Indicators and Green National Accounting'** (COM(94) 670 final).

The attempt to define the term sustainability scientifically, practically and politically is gaining the interest of experts. A very useful step is to identify what is necessary in order to achieve sustainability as well as what is feasible in the sort term. Towards this direction Sustainability Reference Values (SRV) and Targets have been established. According to the ERM a **Sustainability Reference Value** is any value for an environmental pressure, state or impact variable which is established and broadly agreed, mainly on a scientific basis, to be either safe or acceptable or tolelable for human health and welfare, ecosysems or other natural resources.
On the other hand **targets** are values for environmental driving force, pressure, state or impact variables which are the mainly politicall determined feasible steps along the way to achieving SRVs.

Apparently, wetland ecosystems and the associated biodiversity are by definition very complex issues to treat and to apply numerical values to. This is probably a serious reason for which, until now, there are no specific quantitative SRVs for wetland biodiversity at international level, which are widely accepted by the scientific community. Many international, supra-national and national documents (declarations, documents of legislative or strategic nature), set long term goals in relation to the conservation of wetlands and their components. Such goals are expressed in broad, non-quantitative terms, on the basis of the precautionary principle, e.g. "to stop and reverse the loss and degradation of Mediterranean wetlands ...." (the Mediterranean Wetlands Strategy). There is a small number of strategic documents which are specific to wetlands, at a supranational or international level, i.e. :
a) Ramsar Convention (Ramsar, 1971)
b) Ramsar Strategic Plan 1997-2002 (Brisbane, 1996)
c) Communication from the Commission to the Council and the European Parliament: wise use and conservation of wetlands (Brussels, 1995), and
d) Mediterranean Wetlands Strategy (Venice, 1996)
Targets and SRVs emerging from (a) and (c) above, have already been introduced in the STAR database. Entries emerging from (b) and (d) are suggested in the Appendix A.

The **Ramsar Strategic Plan** 1997-2002, forwarded during the 6th meeting of the Conference of the Contracting Parties, in Brisbane, Australia, in May 1996,

foresees that the management of water -the key component of wetlands- will be a most critical issue in the coming century, affecting the lives of millions of people and stresses their value as "cradles of biodiversity". Within the overall mission of the Convention, that is "the conservation and wise use of wetlands by national action and international cooperation as a means to achieving sustainable development throughout the world", the meeting agreed on 8 general objectives:

- To progress towards universal membership of the Convention.
- To achieve the wise use of wetlands by implementing and further developing the Ramsar Wise Use Guidelines.
- To raise awareness of wetland values and functions throughout the world and at all levels.
- To reinforce the capacity of institutions in each Contracting Party to achieve conservation and wise use of wetlands.
- To ensure the conservation of all sites included in the List of Wetlands of International Importance (Ramsar List).
- To designate for the Ramsar List those wetlands which meet the Convention's criteria, especially wetland types still under-represented in the list and transfrontier wetlands.
- To mobilize international cooperation and financial assistance for wetland conservation and wise use in collaboration with other conventions and agencies, both governmental and non-governmental.
- To provide the Convention with the required institutional mechanisms and resources.

Each of those general objectives is then analysed into a number of operational objectives, and for each objective, the required actions are specified. All objectives and actions are described in general qualitative terms. The above objectives could constitute SRVs (see Appendix A1), although there is no easy and straightforward way for us to periodically assess the degree of their fulfillment.

The **Mediterranean Wetlands Strategy** was elaborated and approved at the Venice conference in June 1996 (by 250 participants from 21 Mediterranean States, the European Commission, intergovernmental organizations, international and national NGOs and individual wetland experts). Within the overall goal "to stop and reverse the loss and degradation of Mediterranean wetlands as a contribution to the conservation of biodiversity", the strategy sets the following general objectives:

- To endeavour to obtain the widest possible acceptance and commitment to the implementation of the Mediterranean Wetland Strategy.
- To achieve the wise use of Mediterranean wetlands, including restoration or rehabilitation of lost and degraded wetlands.
- To increase knowledge and raise awareness of wetland values and functions throughout the Mediterranean.
- To reinforce the capacity of institutions and organizations in the Mediterranean to achieve conservation and wise use of wetlands.

- To ensure that all wetlands in the Mediterranean are effectively managed, particularly those under legal protection.
- To confer legal protection on the major Mediterranean wetlands and strengthen relevant legal frameworks.
- To strengthen international cooperation and mobilise international technical and financial assistance for wetlands in the Mediterranean.
- To strengthen collaboration among governmental and non-governmental organizations at all levels, as well as the private sector, for wetland conservation and wise use in the Mediterranean.

Again, all the above objectives, as well as the emerging operational objectives and actions are entirely qualitative (see proposed SRVs in the Appendix A2)

A supra-national SRV for biodiversity (in general) in the driving force category, is suggested to be added in the STAR database. This SRV emerges from article 1 (paragraphs a, b and c) of the **European Council Regulation 2078/92** about environmentally-friendly agriculture. This SRV could be stated as follows:
Community funding regime, with the objective to i. favour less polluting crop production methods, ii. favour extensive methods of crop production and animal farming as well as set-aside, and iii. to favour exploitation of agricultural land in agreement to the requirements for protection and improvement of the natural environment, landscape, natural resources, soils and genetic polymorphy.

Additional supra-national targets for the theme nature and biodiversity, may be derived from articles 6 (paragraphs 2, 3 and 4), 10, 11, and 18 of **the Habitats Directive (92/43/EEC),** which are not covered by the current version of the STAR database.

Examples of national SRVs and targets from Greece are given in the Appendix C.

3. MISSING CATEGORIES OF SRVs AND BACKGROUND INFORMATION

Strategic documents such as the Ramsar Strategic Plan or the Mediterranean Wetlands Strategy, normally commit the contracting/affected states to prepare more specific action plans at national levels, in order to conform with the arising obligations. Ideally, in national action plans, there could be set certain quantitative SRVs, with corresponding targets. Considering biodiversity in general, national plans for species conservation, are the ones which could most easily set quantitative SRVs and targets (e.g. a SRV of a monk seal population of X individuals by the year 200X, and the corresponding intermediate targets/legislative regulations). In this case, the background information would come from adequate studies on the population dynamics and other ecological parametres related to the species and its habitats (e.g. degree of threat to the species and its habitats, geographical distribution, minimum viable population, antagonism with other species, degree of

habitat fragmentation, position in the food web, etc.), current conservation status, vulnerability to genetic degradation, past, current and future threats, economic valuation of its conservation (if possible), relation of the species to human activities, interaction with other national conservation objectives, etc. It is evident, that even in this "simple" case, the parametres that have to be estimated are rather complex.

Background information for animals is generally easier for larger conspicuous species, e.g. waders and waterfowl and large mammals. Even in this case, nevertheless, laborious and costly methods and long-term studies are required in order to minimise scientific uncertainty (radio-tracking e.g. for birds, brown bears, wolves, otters, ringing for birds, tagging for birds and fish, etc.). Difficulties may be related to basic gaps in species ecology and distribution, habitat fragmentation, great colour and pattern variability, small animal size, cryptic behaviour, high mobility, inadequately known migration routes, accessibility to their territories, harsh whether conditions, need for numerous simplistic assumptions, shortage of trained field staff, different degree of interest and knowledge in different countries where the species is found, considerable personal error, etc.

Most of the above difficulties are also met in plant studies, except the ones arising from mobility. Additional difficulties with plant demographic and other ecological studies arise from their seasonality and their even greater polymorphism. Phytosociological mapping may require aerial photography and photo-interpretation, which is expensive and requires skilled staff. Moreover, public pressure for plant conservation is usually lower, and therefore does not exert strong pressure to the decision-makers.

Species are strongly dependent on their habitat and their conservation objectives should be ruled by this idea. The conservation of biodiversity, including wetland biodiversity, is not effectively promoted at a level lower to that of the ecosystem. The attempts for the conservation of a single or a group of species must be part of an integrated approach, which includes the whole ecosystem, in order to have more chances to succeed. Nevertheless, integrated studies at the ecosystem level are very complex and its functions very difficult to model, due to the enormous number of parametres involved (biodiversity is a "sink" theme).

It is not advisable to extrapolate the use of nationally or locally set quantitative SRVs and targets for resident or less mobile species, at a wider scale, since populations are affected by a large number of abiotic factors and interaction with other biotic elements. Moreover, parametres such as the minimum viable population of a single species, e.g. a fish species, may vary even between two freshwater lakes of the same country.

Particularly concerning wetland animal species, quantitative or semi-quantitative SRVs could possibly be applied at international level or at wide biogeographical

areas for widespread species, e.g. pursued populations of threatened wild migratory birds, or a pursued restored total surface area of degraded/destroyed habitats of world threatened species, etc. The level of uncertainty in such calculations, would though be high, unless there is a sound scientific background.

Therefore we believe that scientific uncertainty in setting SRVs and targets for biodiversity remains high. Even if we all agree that this is the case, it still must be stressed that difficulty in setting quantitative SRVs and targets, should not be used as an excuse by decision makers and politicians to disregard the value of biodiversity. Even if scientists do not agree e.g. which is the minimum viable population of a world-threatened animal species, the states which host this species in their territory, should still make every possible effort to protect it, preserve its habitats and enhance its surviving populations.

The conspicuous lack of wetlands and biodiversity SRVs and shortage of targets in the driving force type, indicates the very low pace at which the requirement for the conservation of biodiversity are integrated into sectoral policies, at supra-national and national level. Since the driving force level is where the whole "vicious circle" begins, it is worth the labour for scientists to work upon and for politicians to endorse, relevant driving force SRVs and targets. A few well documented, adequately enforced and regularly assessed driving force SRVs and targets of the driving force type, may be much more effective than a great number of SRVs and targets of the other types.

Impact and response SRVs and targets for biodiversity, if they are established, they may be useful to some degree, but their use is meaningful only if placed in the whole causality chain of the DPSIR framework. This is because they will only provide a late warning for ecological emergencies, since very often, by the time impacts on biodiversity are obvious and measurable, damage may already be advanced, too expensive to reverse, or even irreversible. Therefore, the use of impact and even more of response SRVs, makes sense only if the causes of the "response" or "impact" can be traced backwards through the chain of the DPSIR framework, in order to address the very initial causes. This is not often the case, though, with biodiversity issues. For example, if the number of species within a certain region or the population of an endangered species declines, we may have suspicions of what the possible causes, but it would be over-simplistic to say that the precise causes could be identified through the DPSIR framework.

An example of successful **impact SRVs** for wetlands are the ones used by the British National Rivers Authority (NRA), for freshwater quality control. In addition to the physicochemical parametres NRA is measuring in water quality monitoring, it also uses two bioindicators: a) the Trent Biotic Index (TBI) and b). the Biological Monitoring Working Party (BMWP) score. These biological indicators are associated with alterations to freshwater macroinvertebrate communities as a result of organic pollution. Waters are classified according to their score in the two

indicators. Different range of indicator scores correspond to respective levels of organic pollution. NRA sets SRVs for the future, i.e. pursued range of scores for specific waterbodies and for wider areas, within a certain period of time. These indicators are scientifically established and they are used with satisfactory credibility and effectiveness. Such indicators have also been developed in other countries, but, due to the varying zoogeography, they are not transferable without previous studies. These SRVs could also be considered as impact SRVs for biodiversity, since the impact of organic pollution to the diversity of these organisms is a basic aspect of the way these bioindicators operate. In this particular case, the linear approach of the DPSIR framework works (assuming that the same water bodies are not affected by undetermined factors, e.g. acidification, toxic chemicals, etc.) because i. organic pollution control in the UK is operating rather efficiently, and therefore the causes of the identified indicator scores can relatively easily be determined and ii. the response of the macroivertebrates to organic pollution is quite exhaustively studied and established. Nevertheless, this example constitutes the exception rather than the rule.

4. ENVIRONMENTAL SUSTAINABILITY INDICATORS

There are a few environmental sustainability indicators (United Nations Commission on Sustainable Development 1997), which emerge from the **Agenda 21**, that may indirectly help wetland conservation. In the theme "water", useful indicators are, in chapter 18, "protection of the quality and supply of freshwater resources", the indicators:
i. annual withdrawals of ground and surface water as a percent of available water, ii. domestic consumption of water per capita, iii. groundwater reserves, iv. concentration of fecal coliforms in freshwater, v. Biochemical Oxygen Demand in water bodies, vi. wastewater treatment coverage, vii. density of hydrological networks. In the theme "land", indicators useful for wetlands are found in chapters 10 "integrated approach to the planning and management of land resources" and 14 "promoting sustainable agriculture and rural development".

In the theme "other natural resources", chapter 15 "conservation of biological diversity", the proposed indicators are applicable to wetland biodiversity: a. threatened species as a percent of total native species, and b. protected area as a percent of total area.

All the above indicators are now in an experimental stage, and the conclusions for their applicability and effectiveness is still to be assessed. Again, in this case it is very hard to put quantitative SRVs, because for example, in a species-poor nation/region, a small improvement in the conservation status of a very small number of species, may result to a misleadingly high value of the indicator a. hereabove.

Other indicators (IUCN, UNEP, WWF 1991) of ecological sustainability are:
For the progress in restoring and maintaining the integrity of ecosystems:

- Percentages of land area that are natural, modified, cultivated, built, degraded.
- A subset of the above would be percentage of land under forest, and percentages of forest land that are natural (old growth), modified, planted, degraded.
- Percent of modified and natural ecosystems or vegetation types in fragments greater than 10,000 hectares.

Progress in developing a comprehensive system of protected areas:

- Percentage of each ecological region that is covered by protected areas.

Progress in restoring and maintaining species and genetic stocks (among others):

- Number of species, and percent threatened with extinction, percent threatened with extirpation, percent with stable or increasing populations, and percent with significantly declining populations.
- Number of endemic species, and percent threatened with extinction, and percent in protected areas.
- Percent of threatened species with viable populations in ex situ facilities.

Where the knowledge background is strong, SRVs and targets may be set at national and international level, with the use of these indicators. Particularly for wetlands, indicators for sustainability could include e.g. the percent of total wetland area against the total surface area of the country or wider geographic region, percent of protected wetland area against the total wetland area, percent of degraded wetland area against total wetland area.

We believe that the day where there will be satisfactory SRVs and targets for biodiversity (in the sense that progress towards their achievement can be assessed with credibility) is still rather distant for most of the countries. National strategies for wetlands and other aspects of nature and biodiversity currently being prepared by several nations do attempt to establish SRVs, but only where the scientific background is strong, such attempts are fruitful. It is often said that, while numerous studies have been done, degradation of habitats and declining of species still continues. However, this is not due to the studies, even if some of them may have not been done in the most appropriate way, but mainly to the policies of the States which do not utilise the research results in order to impose measures to stop and reverse this degradation. Moreover, when these measures are taken, the enforcement of their implementation is poor.

5. SPIN-OFFS AMONG WETLAND SRVs AND SRVs FOR OTHER THEMES

Wetlands are complex ecosystems with multiple functions and values. It is not correct to isolate one or two of a wetland' s values e.g. supply of irrigation water or support of fisheries, disregarding the rest of the values, except perhaps very few cases, e.g. of some artificial wetlands which have been constructed solely to address

urgent and crucial human needs. Even in this case, though, such systems, due to their dynamic nature, may well evolve into ecosystems with considerable biodiversity and other values, than the ones originally planned. Therefore it is very sensible and meaningful for wetland conservation to be served by SRVs and targets set for other environmental themes that are associated with the different aspects of wetland ecology. These themes are mainly (according to the classification given by ERM):

- **Inland waters-quality**

The better the water quality, the richer the biodiversity it can sustain, and the better its functions operate. Low water quality inevitably disturbs the ecosystems, in favor of its most resistant elements and at the expense of the more vulnerable ones.

The effects of pollutants discharged into inland surface waters are wide ranging and depend on the amount of substances and on the hydrological, physical, chemical and biological conditions of these bodies. Some pollutants, when exceeding critical concentrations, can be toxic to wetland species, while others may alter the environment in such a way that, for instance, changes to the reproductive capacity of a species and therefore to its competitive ability may occur. Acute effects result more often from emergency conditions (e.g. accidents). Long-term effects are associated with long exposure to pollutants which often do not exceed the normal levels to a great extend.

Organic pollutants (mainly from domestic waste) may lead to rapid deoxygenation of the water and, therefore, to disappearance of fish and aquatic invertebrates or to changes in the community structure towards species tolerable to low oxygen concentration. Decomposition of organic waste results to release of ammonium which, depending on the pH and the temperature can be converted to ammonia, which is poisonous for fish. Organic micropollutants (e.g. DDT, PCBs) have toxic or carcinogenic effects on biota. Pesticides and insecticides which are not biodegradable, also put pressure on natural selection. Oil pollution affects the entire wetland ecosystem, mainly through reduction of oxygen and reduction of light (one litre of oil can cover 1000 m^2 of aquatic surface). Oil pollution affects particularly coastal areas and has great impact on the avifauma, which suffers directly from the toxic effects of oil and the damage of the plumage, and indirectly from the damage on its prey.

Long term biological effects of radioactivity are not very well known. It certainly, though, causes genetic changes. Thermal pollution by nuclear power stations changes plant and animal communities towards species better adapted to high temperature and lower oxygen concentration. Nutrients (from waste, agricultural run-off and detergents) lead to the establishment of eutrophic conditions. Heavy metals have cumulative effects on biota and cause damage to the nervous and other systems of animal species, whereas acute exposition may lead to death. Pathogenic

microorganisms and salinization are also considered as pollutants and may lead to shifts in the biological structure.

Deterioration of water quality is caused mainly by human activities. However, the various uses of wetlands often conflict with each other. For example, the use of rivers and lakes for waste disposal, contradicts their use for public water supply, irrigation, livestock watering or even recreational purposes which require high water quality. Waste disposal also affects the community structure of wetlands and may even eliminate or favor certain species.

Understanding of the interactions between the biotic and abiotic components of the ecosystem is essential for developing models for sustainable use of wetland resources. SRVs covering the whole range of water quality would be very important towards this direction. Records in the STAR database cover a wide range of causes of water quality deterioration (domestic waste water, toxic discharges from various manufacturers) from which many wetlands suffer. SRVs and targets also cover the majority of existing polluting substances. However, the absence of SRV concerning the thermal pollution and the small number of SRVs concerning radioactivity could be a subject for discussion.

- **Inland waters-quantity**

River and stream discharge, the water level of lakes and lagoons, the seasonal fluctuation of the water level in reservoirs, the rate and timing of the recharge of underground aquifers, and other hydrological parameters are of crucial importance not only for the very existence and hydrological regime of the wetland, but also for the survival and welfare of the various animal and plant species that depend on the wetland. Moreover, the quality and quantity of water seem to be strongly interdependent in wetlands. If a large volume of water is removed from a water body, its capacity to dilute and assimilate effluents is reduced.
Particularly groundwater has received strong impacts from human activities concerning its quantity. Wetlands are dependent on groundwater and are notably affected by its scarcity, since groundwater is the most important water source for them during dry periods. Moreover, many wetlands are located in areas prone to flooding, such as river floodplains. There, the shallow depth of the water table is very crucial for the ecosystem and even minor changes in the groundwater level may cause problems. The situation is so crucial that about 25% of Europe's wetlands are potentially endangered from groundwater overexploitation. Other uses of surface water, such as hydroelectric power, require water in large amounts, often leading to construction of dams, reservoirs etc. These may affect aquatic organisms, e.g. by hindering the up- and downstream migration of migratory fish or by changing water velocity and temperature regimes, in a way that the whole water ecosystem is disturbed.

SRVs set in the STAR database concerning quantity of inland water are very well applied to wetlands. However, the small record count (2) designates the need for a more detailed approach of the theme.

- **Eutrophication**

Eutrophication is the excessive enrichment of a surface water body with nutrients. With the known responses of wetland systems to eutrophication, biodiversity is also adversely affected, in favour of few resistant species. Eutrophication stimulates the growth of aquatic plants and especially phytoplankton, which forms surface scums increasing the turbidity of the water. This situation may provoke a shift in the biological structure of the water body and cause disappearance of submerged plants and excessive growth of potentially poisonous blue-green algae. The fish community may also change towards species more tolerant to the turbid environment. As a consequence of the increased algae biomass, oxygen level may fall and the water environment may become gradually inappropriate for freshwater species (e.g. fish, invertebrates). In case toxic algae are developed, the danger of poisoning threatens animal and humans in the wider area.

Targets and SRVs concerning eutrophication in the STAR database, reveal the attempt to control nutrient run-off to wetlands. However, successful restoration of heavily eutrophic small lakes could also be an essential sustainability target.

- **Acidification**

Acidic deposition is a consequence of increased atmospheric emissions of sulphur and nitrogen oxides. Acidification has a strong impact on plant and animal communities. Aquatic organisms are influenced both directly, because of the resulting toxic conditions and indirectly, because of the loss of suitable acid-sensitive pray. Waters with pH below 5.0 are generally devoid of fish. The problem is widespread particularly in northern European countries. For instance, during 1940-75, 1750 out of 5000 lakes in southern Norway became completely devoid of fish as a result of acidification, with another 900 lakes being seriously affected. Any SRV aiming at reducing acidifying emissions of sulphur and nitrogen oxides could also be considered as an indirect SRV for wetlands.

- **Fisheries**

Fish populations play an important role in regulating lake trophic structure. SRVs for fisheries of the inland waters mainly (which are not included in the STAR database), can be useful also in wetlands (i.e. the Maximum Sustainable Yield mainly in closed ecosystems; lakes etc.) in order to protect commercial fish populations.
However, it must be clear that protecting commercial fish does not mean that the protection of non-commercial ones do not require protection. In most cases, non-

commercial species support (through direct or indirect interactions in the food web) the commercial species.
Carefully regulated legal fishing can help protect wetlands, because commercial quality fish will only be found in a healthy ecosystem, with unpolluted waters and rich aquatic vegetation, where the fish can winter and breed. That is why the richness and complexity of a wetland' s fish population, certainly are a proof of its health. Moreover, fish are food for many wetland bird species, whose survival is closely linked to the conservation of fish stocks.
SRVs for resource use in the STAR database could include also the subject **aquaculture** which is also related to wetlands. For example, in order to evaluate the aquaculture intensity, the number of fishfarms, total size and tonnes of fish (shell) harvested/yr by area could be used.

- **Coastal zones and marine waters**

According to the Communication from the Comission to the Council and European Parliament on the integrated management of coastal zones (1995) the coastal zone is defined as a strip of land and sea territory of varying width depending on the nature of the environment and management needs. The natural coastal systems and the areas in which human activities involve the use of coastal resources may therefore extend for several kilometers inland.
This means that SRVs for this theme can directly help coastal wetlands as estuaries, lagoons, river deltas, marshes, mudflats etc., which are found in the coastal zone.

- **Nature and biodiversity**

SRVs for almost every "determinand", e.g. species, habitats, landscape, protected areas etc., inevitably serve also the wetland ecosystems, due to the high interdependence of the determinands within the theme "biodiversity". Inland water ecosystems with impoverished biodiversity may lack the ability to adjust to environmental impacts or changes. Thus biodiversity is important to an ecosystem's: i) ability to maintain its regenerative abilities in spite of external interference/stress, ii) capacity for developmental options and iii) ability to develop naturally, unconstrained by human activities.

Apparently, the fulfillment of SRVs and targets concerning the various themes stated by ERM would, in most cases, mean an improvement of the state of a wetland ecosystem.

Negative spin-offs of wetland SRVs with SRVs from other themes, could exist in relation to fisheries and aquaculture. Thus, the adoption of a SRV or target for wetlands, could (if non-integrated) impose measures that could create problems to fisheries and aquaculture. E.g., protecting the biotope of a bird species, could create problems to local fishermen. However, an integrated approach to setting SRVs, would prevent most of those problems. On the other hand, it is less possible for

fisheries SRVs or targets to have negative spin-offs with wetland SRVs. On the contrary, local fishermen, or at least those who do not see the fisheries as a "one-use" value, are the strongest supporters of wetland conservation.

Theoretically, SRVs are by definition integrated and such cases should not arise. There are examples, however, as with heavy metals where aquatic biota are usually affected by much lower concentrations than the ones set for e.g. drinking water (while the drinking water standard for copper is 100 to 3000 μg/l, salmonid fish are affected at a 10 to 50 μg/l). Should a case like this ever arises, though, SRVs and targets should be modified in order to accommodate conservation needs.

This issue brings about another crucial aspect of biodiversity SRVs: Biodiversity being a "sink" theme, accumulating impacts from a great number of heterogeneous human activities (related to practically all other themes), possibly more than any other theme, requires an integrated spirit in the establishment of its SRVs. Therefore, before establishing SRVs, the rationale behind them must be clear, the baseline ecological, biodiversity, social and economic conditions must be recorded, monitored and carefully evaluated over time and economic incentives for conservation should be designed. Sustainable use practices should be applied at the catchment scale because at this level the hydrological cycle links the atmosphere with land and water ecosystems.

Accordingly, the SRVs which have been set for wetlands, i.e. the ones emerging from the documents 1,2,3 and 4 mentioned in chapter XXXX, certainly serve the entire theme of biodiversity, and to a certain extend the themes noted earlier in this chapter. Soil quality and climate change are also closely linked.

6. DISCUSSION

Biodiversity is affected by practically all human activities, directly or indirectly ("sink" theme). Of course there is no policy directly aiming to harm biodiversity. Nevertheless, all policies regulating the principle production practices, on their own and by their interaction, finally have an impact on biodiversity. Since the causes for declining biodiversity may be multiple and very complicated, they are not easily identified, and even if attempted, their identification, in most cases, includes high scientific uncertainty. Therefore the linear approach of the DPSIR framework proposed by ERM and used in the STAR database, does not operate effectively in this theme. Causality is not very clear, even in the forward direction. All the more it is very difficult to run backwards through the framework, in order to determine the necessary corrective measures. Moreover, there is a conspicuous shortage of SRVs and targets in all categories except from "pressure" and "state". Quantitative SRVs and targets for biodiversity are practically missing, probably because (as stated in the Review of the inventory, "SRVs may be more related to good management than quantitative targets". Nevertheless, the framework is useful in i. placing existing

long and medium term objectives for biodiversity in a systematic structure, ii. in highlighting the gaps, and particularly the shortage of international SRVs in the driving force category, iii. in illustrating the complexity of the issue of biodiversity and the scientific knowledge required to identify causality among policies, human activities, states and impacts and iv. in treating the issue of environmental problems through an integrated approach.

To our opinion, wetlands are well placed within the nature and biodiversity theme. Their consideration as a distinct theme would be meaningless, since i. wetlands are systems with multiple functions and uses and ii. closely associated themes, such as inland water quality and quantity, eutrophication, etc. are considered distinctly. If they were treated in isolation, overlapping with other themes would be extensive. Positive (mainly) and negative spin-offs between SRVs for wetlands and SRVs for other themes, as well as SRVs of other themes that serve wetland conservation, have been discussed in the relevant chapters of this paper. Additional entries associated to wetlands, but also to biodiversity in general, are proposed in the Appendices. Due to the complexity of wetland ecosystems, all the drawbacks described above with regard to the entire biodiversity theme, apply also to wetlands.

Apparently, there are certain difficulties in placing SRVs and targets for biodiversity (including wetlands) within the DPSIR framework, which for the moment and particularly for the "sink" themes, seems to be of restricted applicability. The DPSIR framework, though, seems to be working well for grouping SRVs and targets for other themes. Therefore we believe that the STAR database, with its existing structure, should be enriched and if possible, tested, e.g. by decision makers (or members of political and scientific committees, etc.) at the European level, in order to obtain a feedback on its actual usefulness as a tool for tackling environmental protection affairs. If testing verifies its usefulness, and the database is established as a tool, it would be an important omission if nature and biodiversity goals and targets, even though mostly qualitative, were completely absent. Perhaps an idea might have been to ban the theme nature and biodiversity as such, and incorporate it into the rest of the themes. Nevertheless, assuming that we do that, most of the entries under it would not fit into the rest of the themes. The theme nature and biodiversity should remain in it despite the identified difficulties and drawbacks, and effort should be focused on filling the gaps and responding to the research needs.

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APPENDIX A

PROPOSED SRVs FOR WETLANDS IN THE THEME "NATURE AND BIODIVESITY"

1. SRVs emerging from the Ramsar Strategic Plan 1997-2002

They have been classified as SRVs and not as targets, because, in the plan "... it is fully acknowledged that each contracting party is free to chose the extent to which it will implement the Strategic Plan, the level of resources that it would allocate to this endeavour, and the pace of its actions ..." and that it constitutes a challenge for the contracting parties.

Suggested SRVs:

Category: State

Determinant: wetlands

Description:	Wise use and conservation of wetlands
Reference:	Ramsar Strategic Plan 1997-2002 (Ramsar Convention)
Other target::	To achieve the wise use of wetlands by implementing and further developing the Ramsar Wise Use Guidelines
Target/SRV:	SRV
More information:	www:http://iucn.org/themes/ramsar/

Description:	Wise use and conservation of wetlands
Reference:	Ramsar Strategic Plan 1997-2002 (Ramsar Convention)
Other target::	To raise awareness of wetland values and functions throughout the world and at all levels
Target/SRV:	SRV
More information:	www:http://iucn.org/themes/ramsar/

Description:	Wise use and conservation of wetlands
Reference:	Ramsar Strategic Plan 1997-2002 (Ramsar Convention)
Other target::	To reinforce the capacity of institutions in each Contracting Party to achieve conservation and wise use of wetlands
Target/SRV:	SRV
More information:	www:http://iucn.org/themes/ramsar/

Description:	Wise use and conservation of wetlands
Reference:	Ramsar Strategic Plan 1997-2002 (Ramsar Convention)
Other target::	To ensure the conservation of all sites included in the List of Wetlands of International Importance (Ramsar List)
Target/SRV:	SRV
More information:	www:http://iucn.org/themes/ramsar/

Description:	Wise use and conservation of wetlands
Reference:	Ramsar Strategic Plan 1997-2002 (Ramsar Convention)
Other target::	To designate for the Ramsar List those wetlands which meet the Convention's criteria, especially wetland types still under-represented in the list and transfrontier wetlands
Target/SRV:	SRV
More information:	www:http://iucn.org/themes/ramsar/

Description:	Wise use and conservation of wetlands
Reference:	Ramsar Strategic Plan 1997-2002 (Ramsar Convention)
Other target::	To mobilize international cooperation and financial assistance for wetland conservation and wise use in collaboration with other conventions and agencies, both governmental and non-governmental
Target/SRV:	SRV
More information:	www:http://iucn.org/themes/ramsar/

2. SRVs emerging from the Mediterranean Wetlands Strategy

Suggested SRVs:
Category: State

Determinant: Mediterranean wetlands

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To endeavour to obtain the widest possible acceptance and commitment to the implementation of the Mediterranean Wetlands Strategy
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To achieve the wise use of Mediterranean wetlands, including restoration or rehabilitation of lost and degraded wetlands
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To increase knowledge and raise awareness of wetland values and functions throughout the Mediterranean
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To reinforce the capacity of institutions and organizations in the Mediterranean to achive conservation and wise use of wetlands
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To ensure that all wetlands in the Mediterranean are effectively managed, particularly those under legal protection
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To confer legal protection on the major Mediterranean wetlands and strengthen relevant legal frameworks
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To strengthen international cooperation and mobilise international technical and financial assistance for wetlands in the Mediterranean
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

Description:	Wise use and conservation of Mediterranean wetlands
Reference:	The Mediterranean Wetlands Strategy (Venice, June 1996)
Other target:	To strengthen collaboration among governmental and non-governmental organizations at all levels, as well as the private sector, for wetland conservation and wise use in the Mediterranean
Target/SRV:	SRV
More information:	Greek Biotope/Wetland Centre (ekby@the.forthnet.gr)

APPENDIX B

PROPOSED INTERNATIONAL TARGETS FOR THE THEME "NATURE AND BIODIVERSITY"

Targets emerging from the Convention on Biological Diversity

Suggested targets (supplementary to the existing entries in the STAR database):

Category: State

Description:	To conserve and enhance biodiversity
Reference:	1992 Convention on Biological Diversity (CBD or Biodiversity Convention)
Other target:	To maintain and promote i. Local and indigenous practices which favour biodiversity conservation, and ii. Customary use of biological resources in accordance with traditional cultural practices, compatible with conservation.
Target/SRV:	Target
More information:	Articles 8 (i) and 10 (i) of the CBD

Description:	To conserve and enhance biodiversity
Reference:	1992 Convention on Biological Diversity (CBD or Biodiversity Convention)
Other target:	To i. Mitigate and ii. Anticipate, adverse impacts on biodiversity. Iii. To support local populations in undertaking remedial action where needed.
Target/SRV:	Target
More information:	Articles 8 (i) and 10 (ii and iii) of the CBD

Description:	To conserve and enhance biodiversity (in situ conservation)
Reference:	1992 Convention on Biological Diversity (CBD or Biodiversity Convention)
Other target:	To adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of biodiversity
Target/SRV:	Target
More information:	Articles 11 of the CBD

Description:	To conserve and enhance biodiversity (in situ conservation)
Reference:	1992 Convention on Biological Diversity (CBD or Biodiversity Convention)
Other target:	To facilitate access tp, and carry out research based on, genetic resources provided by Contracting Parties, aiming at the wise use of these resources. To take measures required to secure the equitable sharing of benefits from research, development, commercial or other use of genetic resources
Target/SRV:	Target
More information:	Articles 15 of the CBD

Description:	To conserve and enhance biodiversity (in situ conservation)
Reference:	1992 Convention on Biological Diversity (CBD or Biodiversity Convention)
Other target:	To promote technical and scientific cooperation, within and among Contracting Parties, in the field of conservation and sustainable use of biodiversity, to assist implementation of national policies, the development and use of technologies. To promote joint research programmes
Target/SRV:	Target
More information:	Articles 18 of the CBD

Description:	To conserve and enhance biodiversity (in situ conservation)
Reference:	1992 Convention on Biological Diversity (CBD or Biodiversity Convention)
Other target:	Each Contracting Party should offer financial support and incentives for activities intended to fulfill the obligations of the Convention. Developed country Parties should assist developing country Parties
Target/SRV:	Target
More information:	Articles 20 of the CBD

APPENDIX C
EXAMPLES OF PROPOSED NATIONAL SRVs TARGETS FOR THE THEME "NATURE AND BIODIVERSITY" (GREECE)

Category: Driving force

Determinant: wetlands

Description:	Maintenance of ecological equilibrium in river and lake ecosystems
Reference:	Law No 1739/87: Management of water resources - Greece
Other target:	The competent authorities should determine minimum river discharge and minimum lake water level, in order to safeguard the maintenance of their ecological equilibrium
Target/SRV:	Target
More information:	Articles 11, paragraph 7

Description:	Conservation of protected wetlands
Reference:	Law No 1739/87: Management of water resources - Greece
Other target:	The implementation of this law is of priority in water resources protected at national of international level
Target/SRV:	Target
More information:	

Description:	Stricter water quality standards for sensitive ecosystems
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	The establish lower acceptable levels of pollutants in particularly sensitive aquatic ecosystems
Target/SRV:	Target
More information:	Articles 9, paragraph 3

Determinant: environmental impact assessment and mitigation

Description:	Imposition of environmental conditions on development projects
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To impose specific environmental conditions on every project that can possibly cause environmental degradation
Target/SRV:	Target
More information:	Articles 3, paragraph 2

Determinant: financial tools for conservation

Description:	Taxation on environmental damage
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To impose taxes to all who endanger the natural environment and use of the income for environmental conservation
Target/SRV:	Target
More information:	Articles 6, paragraph 4

Description:	Economic penalties for environmental damege
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	The impose taxes to all who endanger the natural environment and use of the income for environmental conservation
Target/SRV:	Target
More information:	Articles 30, paragraph 1 and 2

Description:	Financial and other measures to meet the cost of conservation
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To establish financial or other compensation measures (e.g. exchange of land) for all who are negatively affected by environmental protection measures
Target/SRV:	Target
More information:	Articles 22, paragraph 1 and 2

Category: Pressure

Determinant: nature and landscape protection

Description:	Prohibition of human activities detrimental to nature and landscape
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To prohibit all activities, within strict nature reserves, and every activity which is potentially detrimental to the environment within nature reserves and natural formations
Target/SRV:	Target
More information:	Articles 19, paragraph 1 and 2 and 4

Category: State

Determinant: wetlands

Description:	Conservation of nature and landscape
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To protect coasts, river banks and lakes, including their bottom and islets, as natural resources and as parts of ecosystems and landscape
Target/SRV:	SRV
More information:	Article 1, paragraph 3

Determinant: precautionary conservation measures

Description:	Prevention of pollution and degradation
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To prevent pollution and degradation of the environment and implementation of precautionary conservation measures
Target/SRV:	SRV
More information:	Article 1, paragraph 2

Description:	Rational use of natural resources
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To secure the sustainability of renewable resources and the rational use of the non-renewable of scarce ones
Target/SRV:	SRV
More information:	Articles 1, paragraph 2

Determinant: conservation of natural ecosystems

Description:	Preservation of ecological equilibrium of natural ecosystems
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To preserve the ecological equilibrium of natural ecosystems and secure their regenerating ability
Target/SRV:	SRV
More information:	Articles 1, paragraph 2

Description:	Protection of surface and groundwater
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To protect surface and groundwater, considered as natural resources and as ecosystems
Target/SRV:	SRV
More information:	Articles 1, paragraph 3

Description:	Conservation of nature and landscape
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To protect and preserve nature and landscape, and particularly the areas of great biological, aesthetic and geomorphological value
Target/SRV:	SRV
More information:	Articles 1, paragraph 3

Determinant: species

Description:	Conservation of wild species
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To protect and preserve wild species of flora and fauna, and in particular the rare and endangered ones and the ones with declining populations, together with their habitats
Target/SRV:	SRV
More information:	Articles 20, paragraph 1

Description:	Conservation of wild species
Reference:	Law No 1650/86: Protection of the environment - Greece
Other target:	To formulate a list of protected species and to implement restrictions, prohibitions, protective measures and conditions for scientific research
Target/SRV:	SRV
More information:	Articles 20, paragraph 2