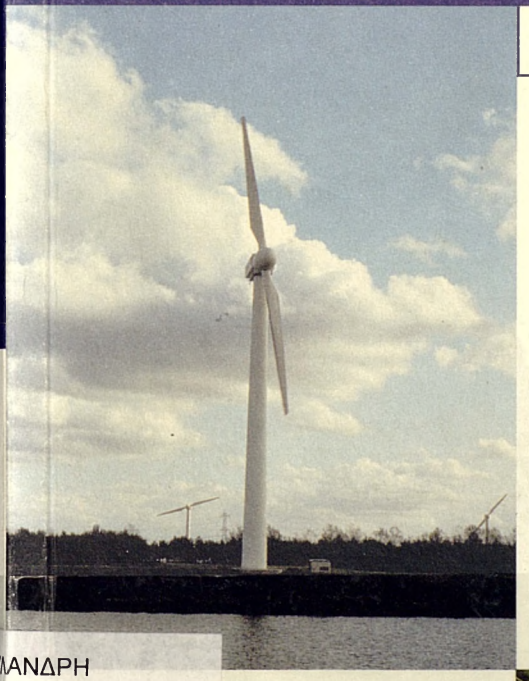
*Proceedings*

# Globalisation, Ecology and Economy

## Bridging Worlds



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## 7.7 Total Economic Value as a tool for wetland conservation in the decision making process in Greece

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### Introduction

Many physical, chemical and biological functions may take place in a wetland, such as groundwater recharge, floodwater and sediments trapping, heat storage and release, carbon dioxide absorption, harnessing the sun's energy to sustain food webs, etc. These functions, acting alone or in combination, produce various ecological, social, and economics goods and services, called values. P.A. Gerakis and Koutrakis (1996) have listed 18 wetland values; a nineteenth value (the therapeutic value derived from the presence of thermal springs) can be added to that list *(Table 1)*.

*Table 1. Values that can be identified in a wetland*

| | | |
|---|---|---|
| • Biological (in terms of biodiversity) | • Wood supply | • Recreational |
| • Drinking water supply | • Hydroelectric power generation | • Flood control |
| • Irrigation | • Salt extraction | • Protection against erosion |
| • Fishing | • Sand extraction | • Improvement of water quality |
| • Grazing | • Scientific | • Climate improvement |
| • Hunting | • Educational | • Therapeutic |
| | • Cultural | |

Wetlands vary widely in the number of functions they perform and in the level of their performance. Accordingly, the values they contain and the size of these values differ between wetlands. Greece hosts about 400 wetlands of various types, sizes, functions, and values (Zalidis & Mantzavelas 1994) covering a total area of about 200,000 hectares. Before 1920 wetlands covered one third of the area of Greece. The severe loss that took place from 1920 to 1962 was a result of programmed drainage to protect land from flooding, to reclaim new arable land, to expand irrigation and to control malaria. The few reservoirs constructed during that period did little to counterbalance the heavy loss of natural wetlands. At that period wetlands, especially marshes, were perceived as wastelands, and moreover a source of disease. The values listed in Table 1 were not acknowledged.

The increasing recognition of wetland values during recent decades, as well as other factors, have contributed to the arrest of further losses in the wetland area of Greece. However, degradation of their quality is far from being fully arrested. Problems

continue and several ways of addressing them are being explored. One approach is the Total Economic Value. The objective of this paper is to briefly present the problems that Greek wetlands currently face, and will possibly go on facing in the near future, and to discuss the concept of Total Economic Value as one of the tools for addressing these problems.

## Problems of wetlands in Greece

Wetland values in Greece are threatened by deterioration as a result of:

- Insufficient regulation of uses and activities;
- Insufficient law enforcement and protection;
- Inadequate material and properly staffed infrastructure;
- Insufficient level of public awareness.

These give rise to environmental impacts that may be grouped into four categories (Zalidis et al. 1997): change in water regime, depletion of wetland resources, change in water quality, and loss of wetland area. Wetland types in Greece are affected in different way by each impact category *(Table 2)*.

*Table 2 Percentage of wetland types in Greece affected by each impact category (Zalidis et al., 1997)*

| Wetland Types | Change in water regime | Depletion of natural resources | Change in water quality | Loss of wetland area |
|---|---|---|---|---|
| Deltas | 0% | 42% | 100% | 50% |
| Estuaries | 4% | 16% | 64% | 52% |
| Lagoons | 0% | 24% | 42% | 44% |
| Lakes | 10% | 38% | 48% | 21% |
| Marshes | 0% | 16% | 42% | 60% |
| Reservoirs | 18% | 41% | 29% | 0% |
| Springs | 50% | 0% | 50% | 13% |
| Rivers | 40% | 30% | 75% | 0% |
| Total (%) | 12 | 26 | 54 | 32 |

Wetland problems can be addressed more effectively through the development of a proper wetland strategy. Such a strategy should give priority to the following four general actions:

1. Creation of wetlands;
2. Restoration of previously existing wetlands;
3. Rehabilitation of degraded wetlands;
4. Sustainable management of all wetlands.

In all these actions a cost-benefit analysis is required. A feasibility study is also needed to ascertain the necessity to create or restore wetland functions and values. Wetland restoration should be carried out in the context of the no-net-loss approach. Sustainable management requires a detailed analysis of all existing functions and values and identification of the best management approach that leads to sustainability.

### The significance of Total Economic Value (TEV) in wetland conservation

The perception of the wetland values in each case must be based upon the Total Economic Value (TEV), where: TEV=direct + indirect + option + bequest + existence values of the wetland unit (Turner & Jones 1990).

Brief definitions of these values are:

- *Direct values* are values gained from the direct use of the wetland (IUCN, 1998). Such values are recreation, irrigation, water supply, hunting, fishing, wood supply, etc.;
- *Indirect values* are also use values and cover 'hidden' values derived from the indirect use of the wetland. Skinner & Zalewski (1995) name these values 'environmental services' e.g. flood control, groundwater recharge, biodiversity. In several cases they are untraded products;
- *Option values* are derived from the option of using the wetland sometime in the future (IUCN, 1998) and possibly in a different way. Occasionally they are mentioned as values of future uses;
- *Bequest value* is the wetland value that benefits or will benefit someone else. It is derived from the assurance that the wetland will continue to produce goods and services;
- *Existence value* is the benefit of knowing that a wetland exists even if there is no possibility of using it in any way. It is the intrinsic value of the wetland, derived from the mere fact of its existence.

Bequest and existence values are considered as non-use values and direct, indirect and option values as use values. In some cases there is no clear distinction between them as, for example, the bequest value could be either a use or non-use value. Opinions often vary on the type of value of a certain wetland good or service. TEV is now a well established system for identifying the values of a wetland. Unfortunately, it examines the values from a strictly anthropocentric perspective. For this reason it is proposed to include the estimation of the intrinsic value in the case of biodiversity. Also, as in any economic and social survey, the estimations are not valid in the long term since they express preferences as well as status, trends, and attitudes.

In Greece there are a few examples where new wetland functions and values have been created by building artificial wetlands. In these examples the only analysis was an economic analysis of the cost of the 'construction' and of the potential benefits from a pre-determined objective (such as the hydroelectric power projects and irrigation projects). The new wetland was never considered to be a resource that could provide several benefits. Two new approaches are appearing at the moment: the development of alternative forms of tourism in parallel to the main objective (as in Lake Tavropou, Central Greece), and the estimation or just a simple announcement of the potential use of the newly created wetland for recreation or for enrichment of

biodiversity (as at the river Nestos in Northern Greece). A total economic valuation of the goods and services provided could contribute to the sustainable management of the newly constructed wetland, and in some cases could even allow a shift in the original objectives.

To some extent this happened in Lake Kerkini (Northern Greece), a reservoir that has gradually developed into a wetland of international ecological importance (it is a Ramsar site). Lake Kerkini was created in 1932, primarily for flood protection. In a few decades it became also very important for irrigation, biodiversity, etc. (Skordas & Anagnostopoulou 1995). It must be mentioned that Kerkini was developed upon existing small wetlands, mainly marshes. In this case, TEV could facilitate management decisions. The wetland manager may find that high demands for irrigation water could be met with alternative management practices, or that foregone opportunities and rejected options of water uses could be compensated by developing the capacity of the area for sustainable tourism.

In Greece efforts have been made on wetland restoration and rehabilitation and useful experience has been gained. Scientific research has improved the ability to restore and rehabilitate wetland functions and values. Valuation of direct values seems to be a feasible target, but valuation of the other types of values is still very difficult. The most recent example in Greece where TEV was used is in the restoration planning of the former Lake Karla (Hellenic Ministry of Environment 1999, Zalidis et al., 1999). In fact, the decision to restore the wetland and the willingness of the European Commission to financially support the project are due to the importance of the environmental values. A functional analysis is a helpful tool for the assessment of wetland functions (Zalidis & Gerakis, 1999). Lake Karla is seen as a pioneering project for Greece. Rehabilitation of degraded wetlands also involves the removal of the causes of degradation; TEV analysis is a useful tool for regulating uses and activities.

Another large project in Greece is the rehabilitation of Lake Koronia (Northern Greece), the most degraded Greek Ramsar site due to pollution and over-abstraction of water for irrigation and industry (Zalidis et al., 1999). This is a formidable challenge because it is not yet certain whether the system is already irreversibly damaged. The Koronia project is based on the economic and ecological importance of the wetland, even if there was no economic analysis for indirect and non-use values. There are other small-scale rehabilitation plans where a TEV analysis could strengthen the implementation, as at Lake Maurouda, Lake Kastoria, Lake Chimaditis and Axios Delta. The inventory of the Greek wetlands that the Greek Biotope/Wetland Centre has carried out (Zalidis & Mantzavelas, 1995) includes a form of evaluation of direct and indirect values. Even though these data were not fully elaborated, they provided useful information for many sites and must be considered as an important input for detailed estimation of use and non-use wetland values. The questionnaire forms for the inventory of the wetland values and uses are presented in Tables 3 and 4. The information this yields could contribute to the identification of trends and attitudes on wetland uses. At this point it is important to highlight the indirect, existence, bequest and option values and also to develop and apply methodologies for wetland evaluation (with real data, in real times and places) as an essential tool for the decision making process.

*Table 3. Part of questionnaire, inventory of Greek wetlands: Most significant present values (Zalidis & Mantzavelas, 1995)*

***Questionnaire: Mark with an 'x'***

| | Size of Value | | | | |
|---|---|---|---|---|---|
| **Value** | Great | Medium | Small | Non-existing | Unknown |
| Drinking water | | | | | |
| Irrigation water | | | | | |
| Fishing | | | | | |
| Fodder | | | | | |
| Game support | | | | | |
| Logging | | | | | |
| Salt production potential | | | | | |
| Hydro-electric power potential | | | | | |
| Sand extraction potential | | | | | |
| Scientific | | | | | |
| Cultural | | | | | |
| Recreational | | | | | |
| Educational | | | | | |

*Table 4. Part of questionnaire, inventory of Greek wetlands: Significant present uses (Zalidis and Mantzavelas 1995)*

***Questionnaire: Mark with an 'x'***

| | Intensity of use | | | | |
|---|---|---|---|---|---|
| **Use** | High | Medium | Low | Non-existent | Unknown |
| Drinking water supply | | | | | |
| Irrigation water supply | | | | | |
| Fishing | | | | | |
| Aquaculture | | | | | |
| Grazing | | | | | |
| Hunting | | | | | |
| Wood supply | | | | | |
| Salt production | | | | | |
| Hydro-electricity production | | | | | |
| Sand extraction | | | | | |
| Recreation | | | | | |
| Tourism | | | | | |
| Sports | | | | | |
| Environmental education | | | | | |

## Prospects

In a decision making process, the economic evaluation of existing and expected values is mainly based on market economic value, and in most cases it measures only the flow of money and the monetary goods. The perception of TEV covers a broader area of values. The wetland manager can use techniques for the estimation of Total Economic Value as an input for implementing sustainable management. It is underlined that TEV is not an end in itself but could indicate solutions and contribute towards sustainability. TEV must be combined with the management objectives in order to identify which values are relevant and should be measured. It does not substitute for management planning; in some cases a full TEV may be inappropriate because it could be extensive, expensive, time-consuming and difficult (IUCN, 1998). Moreover, several sources of errors and bias could be mentioned, especially for the measurement techniques. TEV, then, is not a panacea, but it is believed that in countries which are rich in wetlands, such as in Greece, it can provide a more comprehensive illustration of the carrying capacity of these natural recourses and also mitigate problems. It can do this by:

- Contributing to the regulation of the well understood uses and activities;
- Enhancing appreciation of wetland functions and values among decision makers, managers, organisations, users, and the public;
- Increasing the demand for protection of all wetland values.

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