Economic valuation of ecosystem services provided by Mediterranean wetlands in terms of adaptation to climate change

Dr. Céline Dubreuil-Imbert1 & Juliette Balavoine2 - Plan Bleu

1 cdubreuil@planbleu.org ; 2 jbalavoine@planbleu.org

Wetlands act as « climatic buffer »

«Wetlands are 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»

(Ramsar Convention, 1971)

Wetlands deliver a wide range of ecosystem services that contribute to human well-being. The Millennium Ecosystem Assessment (2005) classified the ecosystem services provided by wetlands into four categories:

• Provisioning services like food, freshwater and fibre
• Regulating services like climate and flood regulation
• Supporting services like soil formation and nutrient cycling
• Cultural services like spirituality aesthetics, education and recreation

One of the most important roles of wetlands may be in the regulation of global climate change through sequestering and releasing a major proportion of fixed carbon in the biosphere. For example, although covering only an estimated 3-4% of the world’s land area, peatlands are estimated to hold 540 gigatons of carbon, representing about 1.5% of the total estimated global carbon storage and about 25-50% of that contained in terrestrial vegetation and soils (MEA, 2005). Wetlands, such as mangroves or floodplains, can also play a critical role in the physical buffering of climate change impacts, such as sea level rise or storms surges. The provision of such services is closely linked to the ecosystem state (damaged or not).

Mediterranean region: a «hot spot» of climate change

The Mediterranean basin is one of the most vulnerable regions to climatic and anthropogenic changes. Important negative environmental and socio-economic effects are expected. According to a recent study on different socio-economic scenarios, Mediterranean surface waters would warm up from 2 to 4°C by the end of 21st Century (cf. Figure).

Since the late 1970s, mean annual temperatures have increased by 0.1°C per decade and precipitation has decreased by 25 mm per decade (Xoplaki et al., 2004). These trends are set to continue between now and 2050. Temperatures should rise by 1.5–2.5°C and annual precipitation should decrease by 5 to 20% (IPCC, 2007; Milano et al., 2012). These changes should cause an aridification of the Mediterranean climate, sea level rise and an increase of extreme events (droughts, floods, storms...).

The role of ecosystems as adaptation tools remains underappreciated and has not been sufficiently studied!

Med-ESCWET project

→ Initiated by Plan Bleu in 2013, in partnership with Tour du Valat, this 3-years project seeks to promote the recognition of the “climatic buffer” role played by wetlands to facilitate its integration in Mediterranean national adaptation strategies to climate change.

Med-ESCWET project aims at (i) improve knowledge of the services and benefits provided by wetlands in climate regulation; and (ii) to economically assess regulating services based on four Mediterranean case studies, to facilitate decision-making in terms of adaptation strategy to climate change.

• Why an economic valuation of ecosystem services?
  • Since ecosystem services are not traded in commercial markets, they are often given too little or no weight in decision-making.
  • Economic valuation is a tool for valuing ecosystems and their services in monetary terms. It quantifies the benefits provided by ecosystems and the impact of ecosystem changes on the wellbeing of people.
  • It creates a common language for policy-makers, business and society;
  • It gives economic arguments for integration of ecosystem services in development planning;
  • It allows evaluating trade-offs between different ecosystem management options and choosing between competing uses, e.g. land use.

• Few existing economic valuation studies of regulating ecosystem services provided by wetlands in the Mediterranean

• How to value regulating ecosystem services?
  • A variety of economic valuation approaches exist to quantify all or parts of total economic value of an ecosystem service. Methods which may be used for regulating services studied in Med-ESCWET project are listed in Table below.

• In the face of natural hazards, becoming more frequent and severe with climate change, human-made protection infrastructures had not always the intended effects or even exacerbated negative effects (e.g. dams which alter erosion dynamics or sediment deposition).

Wetlands can offer an effective alternative at a lower cost, which should be taken more into account in adaptive management policies. Conservation and restoration of wetlands are key actions to increase resilience to climate change!

Med-ESCWET project

Composites of sea surface temperature extremes across Italy and Greece (Baseline for the 2005-2099 period (in °C)) (Adapted from IPCC, 2007)

Graph: Distribution of economic valuation studies of ecosystem services provided by wetlands in the Mediterranean basin by type of service analysed (Source: translated from OZHM, 2010)

Graph: Four combinations wetland/regulating service selected in Med-ESCWET project

Composites of sea surface temperature extremes across Italy and Greece (Baseline for the 2005-2099 period (in °C)) (Adapted from IPCC, 2007)

Graph: Distribution of economic valuation studies of ecosystem services provided by wetlands in the Mediterranean basin by type of service analysed (Source: translated from OZHM, 2010)

Graph: Four combinations wetland/regulating service selected in Med-ESCWET project

Other methods

Avoided cost
Cost of artificial substitute
Market data easily available as they are revealed in the market by prices
Market data for the price of a substitute for ecosystem service must be established
Useful technique when few local data are limited. Rapid development of econometric methods and availability of data are very important
Useful technique when few local data are limited. Rapid development of econometric methods and availability of data are very important
arbitrations
Values can be very inaccurate, as many parameters have to be defined
Some calculations are possible to estimate values
Risks of over / under / over estimation are significant
Arbitrations reflect economic effects without taking into account the value of benefits

Economic valuation is a tool for valuing ecosystems and their services in monetary terms. It quantifies the benefits provided by ecosystems and the impact of ecosystem changes on the wellbeing of people. It creates a common language for policy-makers, business and society; It gives economic arguments for integration of ecosystem services in development planning; It allows evaluating trade-offs between different ecosystem management options and choosing between competing uses, e.g. land use.

Avoided cost
Cost of artificial substitute
Market data easily available as they are revealed in the market by prices
Market data for the price of a substitute for ecosystem service must be established
Useful technique when few local data are limited. Rapid development of econometric methods and availability of data are very important
Useful technique when few local data are limited. Rapid development of econometric methods and availability of data are very important
arb...