Chapter 49. Salt Marshes

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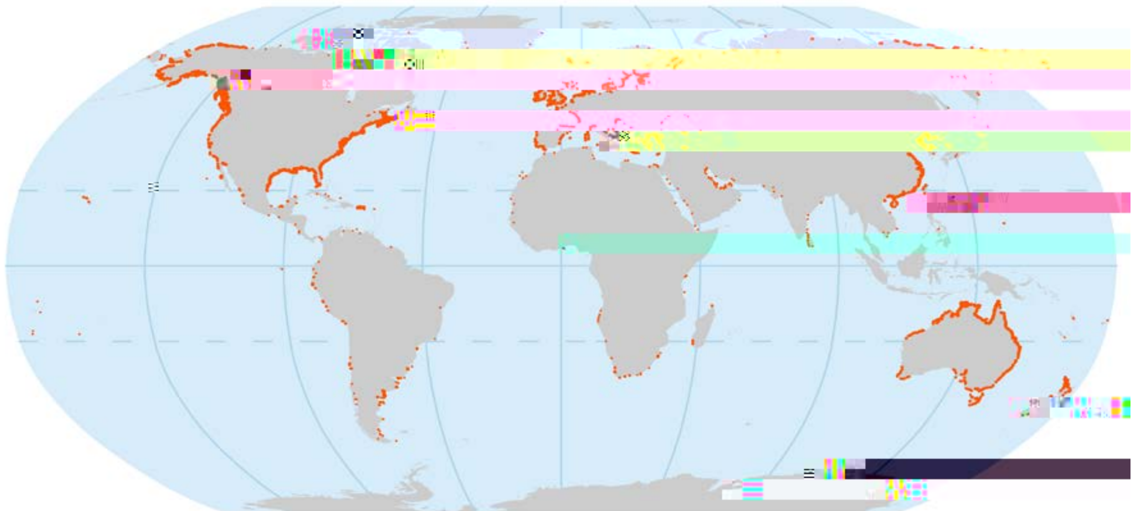
1. Cy lt Mar

IranKs and high latitudes worldwide and a
the subtropics and tropics (see Chapter 48). They ar
Antarctica (Figure 1). In areas of relatively little s
highly organic and often peat-based. In contrast, sal
delivery, such as sheltered estuaries (see Chapt
inorganic substrates.

2. Features of trends in extent

Salt marshes are among the most productive
Contemporary salt marshes developed within the
locations in response to rising sea levels (Millim
Their ecology and global importance has been
Chapman (1960), Ranwell (1972), Doody (2008) a
of salinity anesses



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Figure 1. Salt Marshes (in orange). Source: UNEP-WCMC, 2015.

3. Major pressures linked to the trends

Over 60 per cent of the globe's population lives on or near the coast, and coastal populations are increasing at twice the average rate (UNEP, 2006a; Nicholls et al., 1999), making coastlines highly vulnerable to human activities. Salt and brackish marshes, formerly viewed as useless wastelands, were filled in for urban or agricultural development. Reclamation of land for agriculture by converting marshland to upland was historically a common practice. Coastal cities worldwide have expanded onto former salt marshes and used marshes for waste disposal sites. Airoldi and Beck (2007) estimate that countries in Europe have lost over 50 per cent of their salt marsh and seagrass areas to coastal development. Estuarine pollution from organic, inorganic, and toxic substances is a worldwide problem. Marshes have been drained, diked, ditched, grazed and harvested. They have been sprayed for mosquito control, and have been invaded by a range of non-native species that have altered their ecology. As one example, Massachusetts, United States of America, has lost 41 per cent of its salt marshes since the 1770s, with a loss of 81 per cent in Boston (Bromberg and Bertness, 2005; Figure 2).

Key threats to salt marshes are land reclamation, coastal development, dredging, sea level rise (SLR), hydromodification, alteration of processes (e.g. sediment delivery, freshwater input) and eutrophication. Accelerated SLR is the largest climate-related threat to salt marshes. The Intergovernmental Panel on Climate Change predicts with medium confidence a SLR of 0.26–0.98 m by 2100 (Church et al., 2013). Nicholls et al. (1999) predict that 1 m SLR will eliminate 46 per cent of the world’s coastal wetlands. Some salt marshes can keep pace with SLR, but others, especially those cut off from their sediment delivery via levees and seawalls which come up on the marsh surface at high tide to feed on invertebrates (Shenker and Dean, 1979; Zimmerman et al., 2000). Many migratory shore birds and ducks use salt marshes as stopovers during migrations and some birds winter in the marsh. Wading birds, such as egrets and herons, feed in salt marshes during the summer. Continued marsh loss could therefore dramatically alter estuarine food webs.

SLR is increasing the vulnerability of coastal populations to coastal erosion, flooding, and storms (IPCC, 2007). Salt marshes serve as natural barriers to these coastal hazards. They serve as shoreline stabilizers because they attenuate wave energy and help prevent erosion (Costanza et al. 2008, Gedan et al. 2011, Moller et al. 2014; see Chapter 26). They also slow and store floodwaters, reducing storm impacts on coastal communities (Cobell et al. 2013). While wetlands do not provide complete protection against coastal hazards, even small salt marshes can provide significant shoreline protection (Gedan et al., 2011). Their preservation and restoration may significantly decrease the economic impact and human losses of extreme events such as hurricanes and tsunamis (Gedan et al. 2011).

Salt marshes remove sediment, nutrients, microbes, and contaminants from runoff and riverine discharge (Gedan et al., 2009), acting as sponges absorbing much of the runoff after major storms and reducing flooding. They sequester pollutants from the water that drains down from the land, protecting nearby estuarine areas and coastal waters from harmful effects. They play a major role in the global carbon cycle and represent a major portion of the terrestrial biological carbon pool. They store excess carbon in their sediments, preventing it from re-entering the Earth's atmosphere and contributing to global warming. Salt marshes are thus an important component of the world's "blue carbon" (McLeod et al. 2011) and currently are being incorporated into global carbon markets. Chmura et al. (2003) estimated that tidal wetlands sequester 10 times the amount of carbon sequestered by peatlands. Salt marshes also provide excellent tourism, education, and recreation services, as well as research opportunities.

It is clear that salt marshes provide enormous benefits to society in the form of "ecosystem services". In this regard, coastal wetlands (which include salt marshes) are among the highest valued coastal ecosystems (Costanza et al. 2014). The serious reduction in salt marsh area restoration projects involve removing unwanted invasive vegetation, changing the marsh elevation, and planting the desired species. Monitoring of such projects would need to be done for years after restoration to see if methods are successful or need modification, and to learn how much time it takes before the restored marsh acquires the biodiversity and ecosystem function of a natural marsh (Craft et al., 1999; Zedler and Lindig-Cisneros, 2000; Rozas et al., 2005). Restoration of coastal marshes is now also included among strategies for climate adaptation planning (Arkema et al., 2013, Barbier, 2014) and mitigating greenhouse gas emissions (Olander et al., 2012), highlighting the multiple benefits that may be derived from salt marsh conservation.

Some international legal instruments and policy frameworks, such as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat[1] (Ramsar Convention), the Convention on Biological Diversity[2], and Agenda 21 adopted by the 1992 United Nations Conference on Environment and Development, promote the conservation and wise use of wetlands and support economic valuation to support conservation. Economic valuation can be used to evaluate and compare development uses vis-à-vis conservation uses. Although some estimates have been made (Costanza et al., 1997, Minello et al., 2012), placing a monetary amount on these services is difficult and controversial. Many benefits are non-monetary, which makes comparisons difficult in decision-making (Barbier et al., 2011). Improving the assessment and valuation of salt marsh services could assist current conservation methods.

These important vegetated, intertidal habitats and the ecosystem services they provide, such as fisheries, sequestration of pollutants, and protection from flooding and storm surge, are under threat due to natural and anthropogenic forces. Efforts would be needed worldwide to preserve the remaining salt marshes and restore some of those that have been destroyed or impaired.

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