

Summary of Impacts to the Coastal Zone

Living organisms are an essential link in the turnover of biogeochemical cycles through coastal systems. They are themselves vulnerable to rapid changes which take place in the coastal zone due to anthropogenic activities, but changes in the structure of populations of organisms will in turn affect the geochemistry of the habitat, to a point where such cycles might become dysfunctional. The consequences of such changes taking place in coastal ecosystems may have consequences at global level leading to an unbalance in fluxes of energy and minerals at the interface between land and sea. The dynamics of such systems are very high and complex meaning that conservation is not just concerned with fixing the coast line to its physical actual limits, fighting erosion and sea level rise. Because coastal systems are alive, they are able to cope with changes of any sorts, but what counts is more the rate of change than the nature of the change.

What makes the current period – often referred to as the anthropocene unique is the rapidity of changes inflicted by humans to natural systems. Threats of all sorts from human activities onto ecosystems are now well documented but action remains difficult and uncertain because of a lack of understanding of the scale and of the speed of observed changes. Notably, the variability of natural systems is difficult to include in any political reasoning which relies on the certainty of statements for decision making. Through improving the scientific understanding of the performance of coastal ecosystems in terms of fluxes of energy and matter in relation to human impacts, integrated coastal management should become more able to predict the effects of measures taken and find adapted responses to the fast evolving demands from society.

Table 1: Multiple uses of coastal resources: potential environmental changes and impacts of social concern (modified from Sorensen and McCreary, 1990) *Note: this table is only an indicative list of sketchily described impact chains, and is not intended to explain cause and effect relationships*

USE OR ACTIVITY →	→ ENVIRONMENTAL CHANGE	→ IMPACT OF SOCIAL CONCERN
A. Estuary, harbour and inshore water quality impacts		
domestic and industrial sewage and waste disposal	estuary pollution, particularly adjacent to urban areas	decreased fish yields, contamination of fish, shellfish and water contact areas
tourism sewage disposal	estuary pollution	decreased fish yields
domestic and/or tourism sewage disposal	estuary and beach pollution	decreased tourism and recreation attraction
flood control and/or agricultural development, impoundments or diversions of coastal rivers	increased estuary salinity, decreased estuary circulation	decreased field yields
coastal oil development, chronic release of oil and/or large oil spills from accidents	oil pollution of estuarine and inshore waters	decreased fish yields, tainted fish and shellfish, decreased recreation or tourism quality
port development and shipping and/or offshore shipping of oil, chronic release of oil and/or large oil spills from accidents	oil pollution of estuarine and inshore waters	decreased fish yields, decreased recreation or tourism quality
agricultural pesticides	toxic pollution of estuaries and inshore waters	decreased fish yields, fish kills
agricultural development and fertilizer	increased amount of nutrients entering estuaries, eutrophication, pollution	decreased fish yields, fish kills
crop, grazing, mining or forestry practices in coastal watersheds	watershed erosion, estuary sedimentation and increased turbidity, watershed erosion, floodplain deposition	decreased fish yields, increased flood hazard
crop, grazing or forestry practices in coastal watersheds	watershed erosion, increased sedimentation, changed deposition of sediments in bays, deltas and inshore waters	beaches covered with unattractive sediment, decreased recreation and tourism attraction
crop, grazing or forestry practices in coastal watersheds and inshore areas	watershed erosion, increased sedimentation of bays, deltas, and port areas	sedimentation of navigation channels and berths
coastal mining	increased sedimentation and turbidity, change in composition of bottom sediments	decreased fish yields
B. Groundwater quality and quantity		
agricultural development, tourism and residential development	withdrawal of groundwater at rate greater than natural recharge, salt water intrusion of aquifer	contamination of groundwater for domestic and/or agricultural use
C. Filling of wetlands (including mangroves)		
port development	filling of wetlands	decreased fish yields
port development	filling of wetlands	decreased fishing or mariculture areas

USE OR ACTIVITY →	→ ENVIRONMENTAL CHANGE	→ IMPACT OF SOCIAL CONCERN
mining and soil disposal, tourism development, residential development	filling of wetlands	decreased fish yields
D. Mangrove impacts		
agricultural, maricultural or salt evaporation development	draining or diking of mangroves	decreased fish yields, reduction or loss of rare or endangered species
mangrove harvesting for wood chips, fuelwood and building materials	harvesting at rate greater than sustainable yields, decreased productivity	decreased fish yields, decreased timber yield of successive harvests
mangrove harvesting for wood chips, fuelwood and building materials	harvesting at rate greater than sustainable yield, loss of habitat	reduction or loss of rare or endangered species
mining (usually tin)	local removal of mangrove forest	decreased fish yields
E. Coral reef and atoll impacts		
municipal and/or industrial sewage disposal	coral reef pollution	decreased fish yields, decreased tourism and recreation attraction
coral mining	coral reef destruction	decreased fish yields, decreased tourism and recreation attraction, increased shoreline erosion
coastal or offshore mining	sediment and turbidity, pollution of coral reefs	decreased fish yields, decreased tourism and recreation attraction
oil shipping along offshore international routes	oil pollution of offshore waters	decreased growth of coral reef, increased beach erosion, decreased tourism attraction
dredging for construction materials	sediment and turbidity, pollution of coral reefs	decreased fish yields, decreased tourism and recreation attraction
crop, grazing or forestry practices in coastal watersheds	watershed erosion, sediment and turbidity pollution of coral reefs	decreased fish yields, decreased tourism and recreation attraction
fishing with dynamite	coral reef destruction	decreased fish yields, decreased tourism and recreation attraction
intensive, localized fishing effort	harvesting at rate greater than sustainable yield	decreased coral reef associated fish yields
F. Beach, dune and delta impacts		
recreation and/or tourism development	trampling of beach and dune vegetation	initiation or increase of shoreline erosion, increased hazard, decreased tourism and recreation attraction
grazing of livestock	trampling and/or overgrazing of beach and dune stabilizing vegetation	initiation or increase of dune migration onto agricultural areas or infrastructure
mining beach sand	removal at rate greater than natural accretion	initiation or increase of beach shoreline erosion, increased hazard, loss of native vegetation, wildlife habitat and natural amenities, decreased tourism attraction
flood control and/or agricultural development and impoundment or diversions of coastal rivers	decreased supply of beach material to shoreline	initiation or increase of shoreline erosion, increased hazard
G. Fishing effort		
intensive and extensive	harvesting at rate greater than	decreased fish yields

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fishing effort	sustainable yield	
competition between onshore and offshore fishermen for same stocks	harvesting at rate greater than sustainable yield	decreased fish yields, social conflicts between groups
H. Access to the shorelines and subtidal areas		
residential development on the shoreline, tourism development of shoreline	blocked or impaired public access to the shore	resentment among local inhabitants, increased recreation pressure on accessible areas, site deterioration, decreased recreational quality
I. Visual quality		
residential development, tourism development	decreased visual quality of rural or natural landscape	decreased recreation and tourism quality
J. Employment and cultural values		
tourism development	increased salaries in tourism sector relative to other sectors, erosion of local customs and cultural values	loss of agricultural workers, decreased agricultural productivity, resentment and social problems among nationals