

## Improving Sustainability Concept in Developing Countries

# Planning Coastal Areas and Waterfronts for Adaptation to Climate Change in Developing Countries

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### Abstract

Most of developing countries suffer from climate change impacts. Scenarios projected increase intensity and frequency of climate hazards especially sea level rise and storm surge. Coastal areas in developing countries already suffer coastal erosion in developing countries situation of coastal areas is the worst due to human-induced pressures on environmental and absence of sustainable development. The inevitability of climate change highlights the importance of adaptation. Climate change adaptation through land use planning strategies increase the resilience to risks, enhance economic and social conditions of community and safeguarding resources for next generations. Mainstreaming the UN millennium development goals in climate change adaptation process through sustainable planning of coastal areas will maximize the benefits of the adaptation process. Land use planning adapt with sea level rise risks through use some strategies ranging between official or local plans, zoning, land subdivision and development controls, design guidelines, environmental review of development projects.

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**Keywords:** climate change impacts; climate change adaptation; planning Coastal Areas; Coastal Areas and Waterfronts; Developing Countries, land use; urban development; costal development; development plans vulnerability; coastal vulnerability; adaptation strategy; mainstreaming development into climate change adaptation framework.

### 1. Introduction

Coastal areas attract a lot of people in developing countries due to availability of economic activities such as marine transportation, resource extraction, fish cultivation, recreation and tourism, also availability of species and habitats

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that provide many benefits to society and natural ecosystems.[1] Population densities in coastal regions are about three times higher than the global average, nearly a quarter of the world's population lives both within 100 km distance of the coast less than 100 m above sea level, 60% of the world's 39 metropolises with a population of over 5 million are located within 100 km of the coast.[2] Low elevation coastal zones that altitude less than 10 meters account for 2% of the world's land but are home to 10% of the world's population.[3]

## 2. Assess coastal vulnerability

Assess the current vulnerability of social, economic and environmental condition of the community to determine the objectives that development plans failed to address them also project the development challenges that will be faced in the future.[4] Assess current and future climate change impact on environmental and socio-economic conditions, direct impact of climate change impact on coastal areas include sea level rise, storm surge and heavy precipitation, raise water temperatures and ocean acidification, this factors generate indirect threats on public health and safety, drinking water. Identify the linkage between unmet development goals and vulnerability to climate change for underlying factors that cause vulnerability, identify the objective and capacity of adaptation process, build up and specify scenarios of vulnerability in the future and mutual influence between climate change and development to putting climate change adaptation into development context to enhance climate change adaption and sustainable development and avoid maladaptation in developing countries.[5] Convert this amount of information maps into maps to be handled by planners.

### 1.1. Assess development plans vulnerability

The major direct factors development plan failed to address them in coastal regions and have indirect effect on climate change adaption in developing countries include heavy use of resources, pollution of industry and agriculture activities, uncontrolled rapid urbanism, change land use, unsustainable management of coastal regions, deterioration of services and spread of poverty, illiteracy and health problems. Pressure on natural resources such as fishing by destructive harvesting methods shattering coral, damage habitats and remove seaweed. Industry and agriculture activities discharge sewage, fertilizers and heavy metals into coastal waters which have long-term toxic effects due to accumulate within fish tissues also extractive activities such as sand mining and hydrocarbon cause coastal erosion and oil spills that cause water contamination.[6] Rapid urbanism with high population density along coastlines pressure on natural resources, the average population density in global coastal areas is about 80 persons per square kilometer but at coastal areas in northern Africa reaches 500 to 1,000 people per square kilometer[7]. Change land use of waterfronts or fill wetlands such as mangroves deforestation to reclamation or expand industrial and urban development. Urban sewage discharge into sea without being treated cause infections and transmit diseases and reduces the amount of dissolved oxygen in the water body and impaired growth and reproduction of ecosystems, In some developing countries, more than 90 percent of domestic wastewater are discharged in coastal waters without being treated cause in die of 3 million people every year due to water-related diseases.[8] Engineering structures such as dams and recreational structures on coastal regions maybe change circulation patterns of freshwater, sediment and nutrient delivery to ecosystems on the sea. Unsustainable management that focus only on economic development with neglect environmental issues and absence of Integrated coastal management of economic sectors including tourism, fishing, agriculture, aquaculture, forestry, manufacturing, oil and gas extraction, waste disposal, marine transportation, and real estate development in coastal zones. [9] Most of developing countries suffer from deterioration of services and the spread of poverty, illiteracy and health problems. 17 % of people in the developing world lived at or below \$1.25 a day in 2011, [10] more than 50 percent of Africans suffer from water-related diseases such as cholera and infant diarrhea, every 3.6 seconds another person dies of starvation, over 40 percent of the world's population do not have basic sanitation and more than one billion people still use unsafe sources of drinking water,[11] 38 % of African adults are illiterate, two-thirds of these are women.[12] Unmet development redouble the climate change impacts, increase vulnerability of coastal regions to climate change and hinder adaptation and development process.

### 1.2. Assess vulnerability to climate change

Assess current and future vulnerability of climate change on environmental and socio-economic conditions. Climate

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