Vulnerability Assessment of Coastal Areas in Southeast Asia

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Complex and dynamic social, economic and environmental processes influence the vulnerability of coastal nations to global environmental change (GEC), and the ability of those affected to cope, recover and adapt. It has been highlighted that sea level rise and climate change will affect agriculture, water and forest resources, populations and infrastructure of mega-cities. This has clear implications for management and governance of these coastal systems, if development of coastal areas is to be sustainable. This regional collaboration (funded by APN; APN-START; and LOICZ) aims to assess the vulnerability of coastal areas in Southeast Asia to sea level rise (encompassing participating countries: Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam), based on natural and socio-economic country parameters and mitigation / adaptive strategies, for the purpose of developing decision making tools for management. The DINAS-COAST DIVA model (Dynamic Interactive Vulnerability Assessment), which integrates natural and social-economic variables was used. Cases were simulated using scenarios derived from IPCC the Report on Emission Scenarios storylines, with combinations of adaptive strategies available in the DIVA model: dike protection and beach nourishment. Further analyses of model results were conducted using a geospatial clustering tool, LOICZ-DISCO (Deluxe Integrated System for Clustering Operations) to highlight similarities or disparities in the

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countries. Results indicate an overall vulnerability of coastal areas by the number of people affected by flooding, land loss and wetland inundation. There was a high cost of doing nothing, while implementing adaptation measures reduced migration by 40 – 95%. Full nourishment (incorporating coastal cover rehabilitation) was the most cost-effective option for minimising loss of wetland areas (including coastal forests and mangroves), loss of sand and land loss (with consequent reduction in migration of populations), while dike protection was a better option to mitigate the number of people flooded, land loss due to submergence and costs of damage due to flooding from the sea. Beach nourishment effectively mitigated land and wetland losses in Vietnam, Malaysia, Thailand, the Philippines and Cambodia, while dike protection was recommended for Singapore. None of the adaptation strategies could effectively address salinity intrusion. Therefore, engineering measures can limit damage caused by change in the coastal areas to human populations and coastal resources. On global political and governance scales, effort should be exerted towards a target of the B1 or A1Tscenarios (reduced populations, balanced mix of energy resources, and increase in equity among global regions). Also, conceptual diagrams were found to be useful for country-specific case studies to identify vulnerable coastal populations and natural resources.