Technology Fact Sheet

# Sea dikes[i]

## 1) Technology description

- Applied in a large scale in countries such as The Netherlands, the USA, Bangladesh or Thailand, etc.
- Many seas dikes have been built in Vietnam since 1960, but have been degraded in many parts ever since. Currently, Vietnam has more than 2000 km of dikes that need strengthening.

## 2) Socio-economic benefits

- Protecting low-lying coastal lands, coastal zones, preventing flood due to sea-level rise.
- Low investment capital costs compared to other structural measures.

## 3) Environmental benefits

- Offering protection against water pressure, storm surges and flood waters, minimizing adverse impacts and stabilizing the coastline.

## 4) Status of technology

- Sea-dike in Vietnam was built in the 60s of 20$^{th}$ Century so there are many passages have deteriorated. The current weakest or most incidents passage occur as long as 30 km, passing the Giao Thuy, Hai Hau and Nghia Hung districts in Nam Dinh province. The design of Vietnam's sea-dike can only withstand strong storms and tidal average 9-level. If it cross 9-level storm, combined with high tides, the dike cannot stand. There is urgent need to improve sea-dikes in Vietnam.

## 5) Application potential

- Two sea dike upgrade programs have been approved to repair levees from Quang Ninh to Quang Nam starting in 2006 and from Quang Ngai to Kien Giang during 2009-2020, with a total investment cost of 19,481 billion VND (934 million USD).

## 6) Barriers

- Altering sea dynamic processes, reshaping the coastline due to changes in deposit layers; affecting coastal ecosystems; freshening coastal wetlands; destroying structures of conservation areas and biodiversity reserves; blocking migration routes of marine animals; and losing benefits from sea and ocean species.
- Insufficient observation data or long-term research on natural conditions (wind, storm, tide or sea-level rise, etc.); lack of social, economic and environmental impact assessments when building sea dykes.
- Difficult in choosing appropriate designs.
- Occupying a wide area which may lead to the community’s objection.

- Blocking the visibility and landscape value for sea tourism, especially in areas with highly potential value of tourism.
- Large investment and maintenance costs.

## 7) Costs

Implementation technology application costs

- Investment costs are cheap compared to other hard protection structures but the volume of sea-dike construction is large and expensive. According to Department of Dike Management, it takes 100 billion VND (4.8 million USD) per km to withstand 12-level hurricane and Vietnam has 2,000 km of sea dikes.
- According to a comprehensive scheme to upgrade the sea dike system, there is stage 1 from Quang Ninh to Quang Ngai and stage 2 from Quang Ngai to Kien Giang. The total investment cost is 10,000 billion VND (480 million USD) for each phase and for the 5-year implementation period. According to a calculation by Hillen et al. (2010), to build 1-meter high sea dikes in Vietnam we have to invest from 0.9 to 1.6 million / km in length (USD 2009).
- (Hillen, 2008) stated that dike maintenance costs each year in Vietnam is 0.03 million USD / km long, the Netherlands is 0.14 million USD / km long (AFPM, 2006).

Incremental costs to adapt to climate change (compared to conventional technology)

- Also according to Hillen, the sea dike maintenance cost will increase significantly due to climate change and sea level rise.

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[i] **This fact sheet has been extracted from TNA Report - Adaptation for Vietnam. You can access the complete report from the TNA project website http://tech-action.org/**