

Mangrove Restoration for Coastal Resilience in the Mekong Delta of Vietnam

Phục hồi rừng ngập mặn cho khả năng chống chịu ven biển ở Đồng bằng sông Cửu Long của Việt Nam

The Netherlands and Vietnam are long-standing partners in the field of water and agricultural cooperation, both being low-lying delta countries. As part of the collaboration between the Governments of the Netherlands and Vietnam, Royal HaskoningDHV and Wetlands International support the Vietnamese Ministry of Agricultural and Rural Development and the Asian Development Bank in developing a large-scale mangrove restoration project to strengthen coastal climate resilience in 5 provinces of the Mekong Delta: Tiền Giang, Bến Tre, Trà Vinh, Sóc Trăng and Bạc Liêu, applying state-of-the-art restoration techniques adapted to the local context.

Climate resilience challenges in the Mekong delta

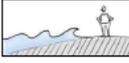
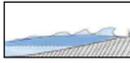
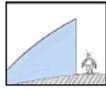
Vietnam is one of the hardest hit by climate change impacts; Vietnam is #1 in GDP loss according to a study (Dasgupta et al 2007) comparing the 10 most affected developing countries. Over the past 60 years, the average temperature in the country has increased by 0.89°C; while coastal water levels from 1993 to 2014 increased by 3.34 mm/year. In 2016 alone, drought and saltwater intrusion affected 527.7 hectares of damaged rice, of which about 44% of the area was completely damaged.

The Mekong Delta accounts for 12% of the country's surface and 19% of the country's population; it produces more than 50% of the country's food. Climate change impacts the region through sea-level rise and related coastal erosion and salt water intrusion, typhoons, and even droughts. Other problems in the Mekong Delta include land subsidence, depletion of groundwater aquifers, and changes in surface water availability and sediment transport due to dams upstream in the Mekong River.

Mangroves for coastal resilience

Along the Mekong Delta's coasts, mangroves play a key role in combating climate change impacts: they protect shorelines from waves, storm surge and coastal erosion, acting as self-repairing sea defences that can naturally adapt to the effects of climate change. There has especially been a rapid rise in appreciation of the coastal protection offered by mangroves following the Indonesia tsunami in 2004. Similarly, when typhoon Haiyan/ Super Typhoon Yolanda hit the Philippines in 2013, impacts were severe in coastal settlements where mangroves had been destroyed, versus unaffected villages with intact mangroves.

These coastal risk reduction services have been documented in hundreds of scientific papers and summarized in *Mangroves for Coastal Defence - Guidelines for coastal managers & policy makers* (Wetlands International and The Nature Conservancy, 2014). The below table provides an overview, also detailing the properties of the mangrove forests which provide these risk reduction services.

		HAZARD				
		Waves 	Storm surges 	Tsunami 	Erosion 	Sea level rise 
MANGROVE FOREST PROPERTIES	Width	Hundreds of meters needed to significantly reduce waves (wave height is reduced by 13-66% per 100m of mangroves)	Hundreds of meters needed to significantly reduce wind and waves on top of surge Thousands of meters needed to reduce flooding impact (storm surge height is reduced 5 - 50 cm/km)	Hundreds of meters needed to reduce tsunami flood depth by 5 to 30% Mangroves do not provide a secure defence (nor do many engineered defences)	Sufficient mangrove forest width needs to be present to maintain sediment balance. This can help to prevent erosion and may encourage active soil build-up.	
	Structure	The more obstacles the better: dense aerial root systems and branches help attenuate waves	Open channels and lagoons allow free passage, while dense aerial root systems and canopies obstruct flow		Complex aerial root systems help slow water flows, allowing sediment to settle and causing sediment to accrete rather than erode.	
	Tree Size	Young & small mangroves can already be effective	Smaller trees and shrubs may be overtopped by tsunamis and the very largest storm surges		Young trees already enable soils to build up. The more biomass input into the soil the better.	
	Link to other ecosystems	Sand dunes, barrier islands, saltmarshes, seagrasses and coral reefs can all play an additional role in reducing waves				Allow room for landward retreat of the mangrove
	Underpinning factors	Healthy mangroves are a prerequisite for all aspects of coastal protection. Healthy mangroves require: sufficient sediment and fresh water supply and connections with other ecosystems. Conversely, pollution, subsidence (due to deep groundwater/oil extraction or oxidation upon conversion) and unsustainable use jeopardizes mangroves.				

Mangrove loss in the Mekong Delta

Vietnamese mangroves have been on a strong decline. A report by Ministry of Agriculture and Rural Development (MARD) forestry department showed that in 2014 Vietnam had 166,000 hectares of mangrove forests, 60 per cent less than in the 1940s. In the Mekong Delta, the rapid development of the shrimp farming industry has been the largest driver of mangrove loss in past decades, with other drivers include expanded agricultural production, embankments, industrial zones and seaports.

Locally adapting mangrove restoration expertise

The Vietnamese Government and international partners have been running afforestation programs in an effort to protect and develop forests, while putting many regulations in place. Building on these efforts, Vietnam and the Kingdom of the Netherlands collaborate now on mangrove restoration for the resilience of the Mekong Delta coast. Royal Haskoning DHV, with their local presence and lead role in the Mekong Deltaplan processes, have partnered with leading mangrove organisation Wetlands International, to provide the government of

Vietnam and Asian Development Bank (ADB) with their state-of-the-art expertise. The aim is to support MARD and ADB in developing a large-scale mangrove restoration project, for ADB financing, in 5 provinces.

This project is financed by the Partners for Water programme and contributes to the Agricultural Transformation Program, that Vietnam and The Netherlands are currently designing in close collaboration with the international partners based on a MoU signed by both prime ministers in 2019. As part of the assignment, which runs from July until the end of December 2021, Royal Haskoning DHV and Wetlands International will document best practices in mangrove restoration, translate and adapt these to these Mekong Delta context, engage stakeholders and co-develop the ADB project documentation with MARD. These practices include Building with Nature approaches, similar to those applied in Demak, Indonesia, while critically looking at – often unsuccessful – tree planting.



Phục hồi rừng ngập mặn: Trồng rừng hay không trồng rừng?

Trong thập kỷ qua, rừng ngập mặn ngày càng trở nên phổ biến rộng rãi. Tuy nhiên, có thể thấy rõ rằng nhiều nỗ lực trồng rừng bị thất bại mà do đó sẽ không đạt được mục đích tốt đẹp. Một phương pháp tiếp cận hiệu quả trong phục hồi rừng ngập mặn là tìm hiểu, nghiên cứu nhằm tạo điều kiện phù hợp để rừng ngập mặn có thể phát triển trở lại một cách tự nhiên. Rừng ngập mặn được phục hồi theo hướng này có thể tốn tài và phát huy các chức năng hiệu quả hơn, cũng như có khả năng chống chịu tốt hơn. Tài nguyên được xây dựng nhằm góp phần phục hồi rừng thông qua việc tìm hiểu cấu trúc mà những người tham gia vào công tác phục hồi rừng ngập mặn cần quan tâm, đó là: "Nên trồng rừng hay không trồng rừng?"

Mangrove restoration: To Plant or not to Plant?

Phục hồi rừng ngập mặn: Trồng rừng hay không trồng rừng?

Mangrove planting has become hugely popular, but the majority of planting efforts are failing. A more effective approach is to create the right conditions for mangroves to grow back naturally, without the need of any planting. Mangroves restored in this way generally survive better, are more biodiverse and resilient. Therefore, anyone involved in mangrove restoration always needs to ask this question: 'To plant or not to plant?'

- Restoration is necessary as in many parts of the world they have been lost or degraded, along with their valuable services for e.g., coastal protection or fisheries.
- Successful restoration results in the establishment of a sizeable, diverse, functional and self-sustaining mangrove forest that offers benefits for nature and people.
- When the enabling biophysical and socioeconomic conditions are put back in place applying Ecological Mangrove Restoration principles, nature will do the rest. When that happens, species to site matching is optimal, resulting in better survival, faster growth, and a more diverse and resilient mangrove forest.
- In some cases, planting can assist or enrich the natural regeneration process. But avoid planting in non-mangrove habitat and areas showing natural recruitment.

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