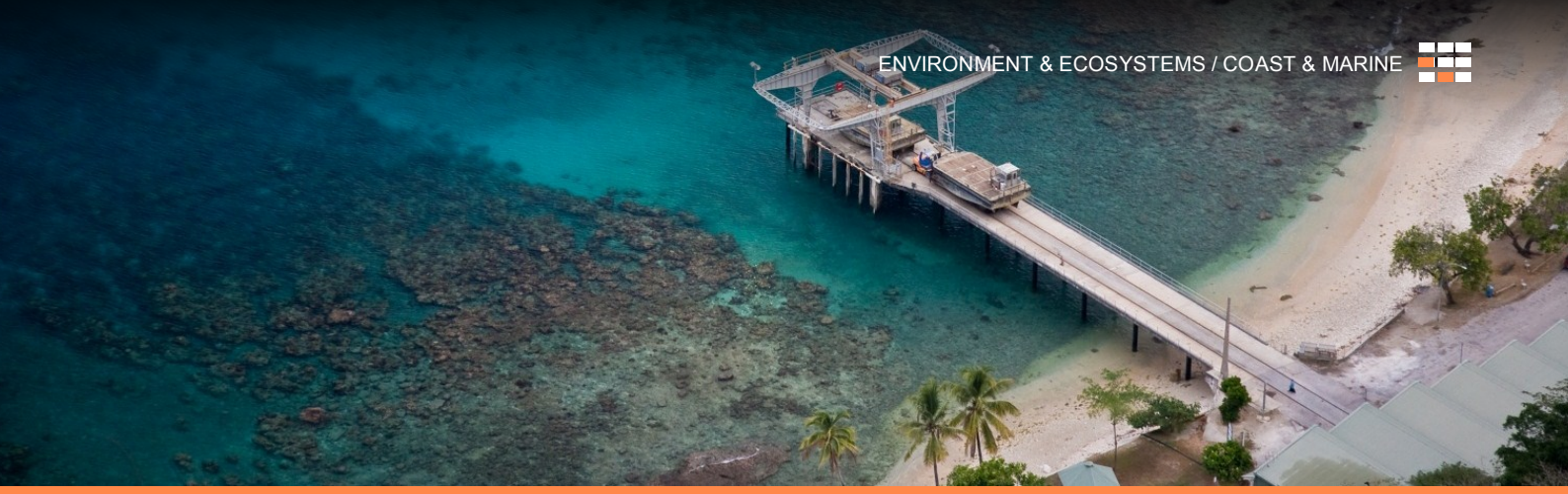

DHI SOLUTION

COMPENSATORY MITIGATION FOR TROPICAL COASTAL HABITATS

Minimising and offsetting unavoidable loss of marine habitats and biodiversity

TROPICAL COASTAL HABITATS – COMPLEX AND DIVERSE ECOSYSTEMS

Tropical coastal habitats are among the most complex and biologically diverse ecosystems on earth. The resources, services and functions they provide are important and beneficial to humans. This includes coastal protection, diverse job and recreational opportunities as well as and provision of food and raw materials. They also contain a vast diversity of flora and fauna that often forms the basis of valuable tourism industries.

Unfortunately, coastal habitats around the world continue to decline due to local pressures such as over-exploitation, coastal development and pollution. The threat level is heightened when combined with climate change and rising sea levels.

When anthropogenic impacts to coastal habitats cannot be avoided or minimised in the initial planning stages, compensatory mitigation is required to replace the direct and indirect loss of these valuable resources. Compensatory mitigation refers to a range of active measures such as restoration, establishment, enhancement, and in some circumstances, preservation of coastal resources to offset unavoidable adverse impacts.

Very often, such compensatory efforts are only marginally successful. More often than not, they are ineffective, poorly implemented and studied, or completely fail to accomplish project goals. These failures are often attributed to inadequate knowledge, experience and stakeholder consultation, resulting in costly project delays. This further raises concerns and scepticism about the efficacy of such mitigation measures in the face of widespread habitat loss and decline.

SUMMARY

CLIENT

- Infrastructure developers
- Port authorities & operators
- Oil & gas industry
- Consultants & contractors
- Government & environmental authorities

CHALLENGE

- Unavoidable environmental impacts of marine construction works
- Loss of habitat, biodiversity, livelihood, and other ecosystem functions
- Need to overcome uncertain outcomes and cost-ineffective solutions

SOLUTION

- Coordinated and project-specific mitigation strategies
- Objective methodologies to estimate impacts and implement appropriate compensatory efforts
- Long-term monitoring systems to effectively assess the adequacy and outcome of the mitigation efforts
- Additional impact offsets through other innovative mitigation and restoration solutions, such as building with nature

VALUE

- Customised solutions in collaboration with clients
- Reduction in environmental impacts
- Cost-effective design of mitigation efforts
- Environmental compliance
- Strategic environmental planning
- Project approval by environmental authorities

OUR EXPERTISE

Since 2003, we have successfully carried out compensatory mitigation projects for a range of coastal developments (such as reclamation and port development), where impacts to coastal habitats were deemed unavoidable. To meet the needs of our clients in a range of industries, we continue to develop and provide robust and fully customisable solutions including:

- coral reef transplantation
- artificial reef development & establishment
- coral nursery & reef restoration
- mangrove forest restoration & rehabilitation
- seagrass replanting & restoration
- long-term habitat monitoring
- biodiversity offsets

Seagrass meadow impacted by adjacent industrial activities

DESIGN, PLANNING AND IMPLEMENTATION

No two compensatory mitigation projects are similar. Specific environmental objectives and project constraints are usually very different — even for similar developments and habitats. Therefore, due diligence must be taken at the onset of every project to identify and implement specific measures required to achieve the project's objectives.

Consequently, the inception phase of any compensatory mitigation effort is critical where particular requirements and targets are identified, defined and planned. This often culminates in the development of a comprehensive plan that provides a framework for the actual execution to follow.

Although compensatory mitigation efforts are often centred on the keystone or foundational biota (for example, scleractinian or reef-building corals), we believe that mitigation measures should also strive to provide a more holistic approach towards the conservation of an impacted habitat's biodiversity. Through our projects, we have endeavoured to ensure that other constituents as well as threatened flora and fauna of any impacted coastal habitats are adequately conserved through such mitigation efforts.

When properly designed and executed, compensatory habitat mitigation efforts can be very effective in restoring, re-establishing and rehabilitating various coastal habitat types like mangrove forests. Barring any unanticipated impacts, monitoring has scientifically documented that relatively high survival rates can be maintained. It has also shown that within the span of a few years, high-quality functional coastal habitats can be re-established to further attract and support healthy populations of other associated taxa.

DHI transplanting hard corals to a suitable recipient site

DHI biologist monitoring newly planted mangrove saplings

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