Dredging – what is the impact on the Great Barrier Reef?

The debate about dredging near the Great Barrier Reef in recent years highlighted that there were gaps in our knowledge about the impact of dredging and sediment and led to the creation of an expert group brought together through a joint initiative of the Great Barrier Reef Marine Park Authority (GBRMPA) and the Australian Institute of Marine Science (AIMS).

The 19-member panel of technical and scientific experts published their Dredging Synthesis Report in March 2015.

The report broadly concluded that under the current rules that the Reef-wide impact of dredging is much less significant that of run-off from rivers.

However, it also identified "significant areas of insufficient knowledge" including sediment dynamics, monitoring, and sensitivity of coral and seagrass to increased sediment exposure.

The impact of dredging

There are two major types of dredging. Maintenance dredging keeps ports open – maintaining the depth of shipping channels and the like. Capital dredging is associated with the development of new facilities such as new ports and new channels. Both forms of dredging create sediment spoils that have to be deposited somewhere.

In 2014 AIMS and GBRMPA jointly formed an independent expert panel to review the effects of dredging and sediment disposal on the Great Barrier Reef.

The panel identified the following impacts:

Removal of sediment by excavation during dredging operations causes significant localised impacts but the overall ecological impact to the Reef is minimal.

Burial at marine dredge material disposal and reclamation sites causes significant local impacts but the overall ecological impact to the Reef is small.

Changes to bathymetry and hydrodynamics by excavations are localised and can be predicted by modelling.

Increased artificial lighting (at night) and underwater noise may have significant impacts on marine wildlife. However, it is difficult to isolate impacts of dredging from other coastal development activities.

Release of fine sediment by dredging and disposal creates significant plumes of suspended sediment that affect marine organisms. The extent and duration of these plumes appears to have been underestimated in the past.

Potential contributions to chronic suspended sediments. The panel debated the extent to which sediments from dredge plumes are resuspended and transported throughout the Great Barrier Reef region. Existing research shows that dredging sediments are potentially similar in scale to natural inputs of sediments from rivers, combined with the sediments from agriculture and other human land uses in catchment areas.

The government decision in March 2015 to ban disposal of capital dredge waste in marine environments means that dredging will likely produce no more than five to 10 per cent of the long-term average river contribution.

Seagrass meadows near dredging activities have high exposure and sensitivity to dredging pressures, although some also have high capacity for recovery. But even small losses are of concern in the Great Barrier Reef.

The report highlighted gaps in our knowledge of the sources of sediment on the Great Barrier Reef and of the impact of these sediments. More research is needed to resolve this issue.

AIMS is filling gaps in our knowledge of the impacts of dredging and other coastal and catchment developments

AIMS has a series of long-term studies into the impact of sediments on reef communities including:

- assessing the resilience of Great Barrier Reef inshore ecosystems to water quality
- developing regional models of coastal environmental condition and function
- determining the impacts of known and emerging contaminants
- identifying zones of influence of, and biological responses to, dredging activities.

The aim is to enhance capacity within government and the private sector to predict and manage the environmental impacts of sediment and dredging, and to facilitate more informed environmental decision-making.

What is the impact on other northern Australian ecosystems?

Ports are growing across northern Australia – from north Queensland, to Darwin and WA's vast North West Shelf gas projects. Dredging for these growing facilities is likely to impact on local marine ecosystems. AIMS is working with port developers to help them understand and minimise the risk of damage to marine ecosystems.

AIMS is working with the Western Australian Marine Science Institution (WAMSI) on Australia's largest dredging research program. This work has already informed approval processes for projects such as the Port Hedland Outer Harbour and the large port developments in Darwin.

AIMS' latest tool in this research is SeaSim, a series of sophisticated aquaria in which we can recreate and monitor the impact of sediments on coral, coral communities and seagrass. It will allow us to advise the most effective ways to mitigate environmental risk when developing or expanding ports across northern Australia, and in tropical ecosystems around the world.

Darwin's East Arm Wharf is a major port expansion for oil, gas and bulk materials, and it will also host a supply base for offshore industry and a naval facility. AIMS provided an observing system, built hydrodynamic models, and provided advice on sediment transport, toxicology and the impact of dredging. This input allowed the Darwin Ports Corporation to improve the design and take an ecologically sustainable approach to construction and future operation of the East Arm Wharf area.

Further reading

Dredging Synthesis Report:
http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/expanding-knowledge-of-dredging

(McCook, LJ, Schaffelke B, Apte SC, Brinkman R, Brodie J, Erftemeijer P, Eyre B, Hoogerwerf F, Irvine I, Jones R.; King B, Marsh H, Masini R, Morton R, Pitcher R, Rasheed M, Sheaves, M.; Symonds A, Warne, MStJ 2015, *Synthesis of current knowledge of the biophysical impacts of dredging and disposal on the Great Barrier Reef: Report of an Independent Panel of Experts*, Great Barrier Reef Marine Park Authority, Townsville)

The Report provides detailed references.