

DREDGERS

The idea of a dredger smashing its way through a pristine coral reef to widen a shipping channel might seem like a throwback to a distant past, in our current era of environmental regulation, routine impact assessment and applied mitigation - but could it still happen? Traditionally, dredging has had a terrible public perception, with projects frequently blamed, by default, for perceived losses of important biological habitats, reduced fishing success, and loss of aesthetically pleasing environments. But does dredging still cause environmental degradation? Is legal and scientific knowledge really up to scratch? Are dredges acting in a more eco-friendly way? And are we as scientists helping to protect the environment? As a scientist working in the environmental assessment and regulatory field, what I see both pleasantly surprises me as well as frustrates my environmental conscience.

Increased dredging operations around the world

In the last five years there has been a construction boom in the coastal realms of the tropics which has been driven by the growth of the Chinese and Indian economies. The boom has generated a huge demand for natural resources from regional areas including Australasia, Africa, South America, and even the Pacific Islands and in turn this has created enormous growth in the global shipping industry, created a need for new and bigger ports, new larger and deeper shipping channels, and expansive coastal infrastructure to transport materials to where they are needed.

The boom in coastal development in the tropics has not just been about industrial growth. Tourism is now one of the world's largest industries with the development of tourist infrastructure resulting in coastal regions changing at an incredi-

Dr Richard Unsworth



ble pace. In particular, many countries in the Middle East are channelling funds from oil profits into ambitious schemes to develop their coastlines in an effort to attract business and tourism dollars.

With these enormous coastal developments comes the need for huge marine dredging projects, using ever larger, more powerful dredges that can dig up more sediment. And as a result the risk to sensitive habitats, such as coral reefs and seagrass meadows, appears to be growing in direct proportion to coastal development and dredging.

The Australian resources boom means more ports and more dredging

Focusing on Australia, the resources boom has led to the creation of numerous new ports (particularly in Western Australia) and the significant expansion of existing infrastructure. As an example, coal mine expansion in Queensland has resulted in the tripling and even quadrupling of port capacity in some areas. With these coastal developments comes the need to understand the impacts of projects that may involve the dredging of over 20 million cubic metres of material - with zones

Lange Wapper trailing suction hopper dredger. The name 'Lange Wapper' is a legend about a giant who irritates or provokes people

Picture credit: Jeremy Sofonia



In this article

Dr Richard Unsworth a

Fisheries Biologist from the Northern Fisheries Centre, Cairn, Australia, questions whether scientific knowledge is keeping up with the boom in coastal development and dredging in Australia

of effect potentially covering hundreds of square kilometres. As a result marine scientists are increasingly being called upon to advise both the proponents of such projects, and the governments that regulate them, as to how impacts may be controlled and the potential negative environmental footprint reduced.

The primary tool that is used by marine scientists to assess the potential impact of developments is the Environmental Impact Assessment (EIA), and from what I can see, at least in North Western Australia, where coral-dominated ecosystems are present within or adjacent to

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Dredging in an ever changing world

planned dredging areas, the good news is that the days of the proponent who doesn't care, or doesn't spend the money are all but over. Instead the main difficulty now in North Western Australia is the general lack of site-specific baseline data and scientific knowledge to fully understand the potential impacts of dredging.

Western Australia – pristine habitat under threat from dredging?

Nowhere is the lack of data more acute than along the Western Australian coast, where vast areas are still scientifically unexplored and the majority of the existing scientific knowledge resides in the filing cabinets of large private businesses. In fact so little is known about Western Australia's marine life that only

this year a new species of dolphin, the snubfin dolphin, was discovered living near to Port Hedland on the central coast. Because of its limited population and industry, Western Australia contains some of the least impacted marine environments in the world. But things have changed in the last few years: the economy has expanded rapidly, coastal development is on the increase and the question now is how are these areas best protected whilst also allowing sustainable economic growth?

There is no simple answer and legislators and regulators are under increasing pressure as they are, all too often, called

upon to make critical decisions - some irrevocable - about developments in biodiverse ecosystems that often contain unique fauna such as the newly discovered Australian snubfin dolphin. The solution to-date has been to increase regulation and produce more detailed guidelines to inform proponents, scientists and stakeholders of what is required to allow developments to occur. Yet another problem is that with the rush to develop, come the risks and difficulties in obtaining staff with the appropriate skill sets and a push to use, often untested science, at a pace that might not always be appropriate.

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Port authorities and scientists managing for the long-term

These problems in Western Australia are in stark contrast to development on the eastern coast of Australia, where coastal plains are more populated and marine habitats better understood. The existence of large scientific organisations such as the state fisheries departments, the Great Barrier Reef (GBR) Marine Park Authority, and an abundance of marine research institutes mean that scientists and proponents are better informed of project risks. Habitat maps, experimental data, and monitoring programmes are often available as sources of local information on the eastern coast of Australia. This level of information is simply not available within Western Australia.

One thing that is also clear in the GBR region is the awakening over the last decade to the role that marine habitats play in supporting key fisheries. This has changed some of the approaches to port management and development. For example, many ports are government owned, and as such have taken longer-term views in regard to environmental management and expansion rather than short-term profit grabbing. This has been beneficial for the environment and has been aided, at least in part, by making best use of local knowledge using local scientists to monitor and provide ongoing advice and habitat monitoring results. These marine monitoring programmes have indicated that healthy and productive habitats such as seagrass meadows can co-exist with appropriately managed port facilities.

By developing knowledge of local habitats, their productivity, and their ecosystem roles, long-term monitoring programmes in Queensland have helped port managers to make early planning decisions regarding the location and extent of projects such as dredge operations and wharf constructions. In the long-



Green sea turtle on the Great Barrier Reef, where more baseline monitoring data is available so it is easier to assess the potential impact of dredging operations

Photo credit: Pete Faulkner, Marine Photobank

term, this has resulted in coastal developments being conducted in a more sustainable fashion.

Is the knowledge of dredging impacts on marine habitats really sufficient?

As a seagrass scientist I am well aware that the scientific knowledge and tools necessary to predict and mitigate dredge impacts on seagrass are not complete. Limited knowledge is exacerbated in some locations as resilience to disturbance changes with the local environment. But I believe the science is moving in the right direction, and a number of academic reviews highlighting research information

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Routine seagrass habitat mapping in the Torres Strait, Queensland as part of a long-term port management strategy

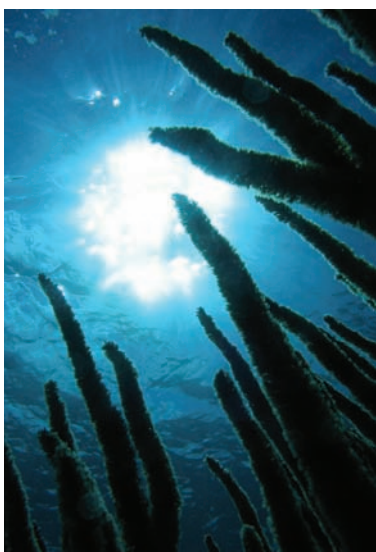
(Picture: Northern Fisheries Centre, Cairns)

gaps have proved particularly useful. This science, however, needs to continue to develop in order to help better predict where impacts will occur, why, and if necessary, how to select and utilise the most effective mitigation or offsetting technique.

But within coral reef environments the availability of good science to help managers, regulators and proponents to assess and mitigate for the impacts of dredging projects remains limited. This problem is as difficult and complex to understand as the complex systems that we seek to protect. Predicting impact is not just about determining when a coral reef will have a certain level of coral



death. Good impact assessment also requires knowing when the corals will become stressed, and if so, how long it may take to recover. As a leading scientist said to me recently; 'if we can't predict impact on a coral reef accurately, then we haven't got a cat in hell's chance of determining the point at which the corals become stressed'.



Seahips on a reef in Western Australia: are these clear coastal waters in the tropics at risk from dredging?

Photo credit: Jeremy Sofonia

To achieve better dredge management, more research and availability of information is urgently required. There are instances in which independent groups are using clever technological advances in dredge impact assessment and management, such as the use of real-time in situ assessment and remodelling of dredge plumes. Such further innovation and collaboration needs to be encouraged by governments and international organisations to assist with making such large developments more sustainable.

International action to prevent destructive dredging

Although dredging is largely operating in a more envi-

ronmentally sensitive manner than in the past, enforcement of regulations is still largely limited to developed nations. There are many locations where dredging still occurs in a destructive fashion using out-dated technology and poor practices. But international initiatives centred through organisations such as UNEP and PIANC are beginning to develop new tools to manage dredging in sensitive tropical marine habitats. Also organisations such as the World Bank, are using global agreements with large banks to utilise guidelines such as the equator principles to force through environmental impact assessment of large projects, whatever the location of a project.

But as habitats become more fragile with the future changing of our climate, I believe that better management and regulation, and stronger science are globally imperative if we are to protect ecosystems from impacts such as dredging and other coastal engineering developments. This is fundamental if we want future generations to enjoy the same benefits, beauty and wonder of our tropical coral reefs and sea-grass meadows. ©

For more information:

Dr Richard Unsworth
PhD M.Sc B.Sc CMarSci
Fisheries Biologist
Marine Ecology Group
Northern Fisheries Centre, Cairns
Policy and Sustainability
Department of Primary Industries and Fisheries
Telephone: +61(0) 7 4057 3732 Fax:
+61 (0) 7 4057 3811
Email:
Richard.Unsworth@dpi.qld.gov.au

Useful Websites

<http://www.pianc-aipcn.org/>
<http://www.unep.org/>
<http://www.wamsi.org.au/>

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