WESTERN AUSTRALIAN
MARINE SCIENCE
INSTITUTION

DREDGING SCIENCE NODE:

New insights from end-user driven research to minimise dredging hazards

The Challenge

The combined volume of dredging in Western Australia in recent years reached over 200 million m^3 at a cost of some $10 billion – enormous figures even by world standards. Dredging at such scales presents huge challenges in reliably predicting and managing the effects of dredging to minimise its impact on the environment. This has been particularly so for the remote and sensitive areas in northwestern Australia, where most of the dredging occurred and where the understanding of the ecology and diversity has been poor. This predictive uncertainty has led to major delays in environmental approvals, over-conservative regulation and imposition of onerous and costly monitoring requirements.

Approach

Recognising the importance of the need to improve the confidence with which dredging impacts can be predicted and managed, industry and government agreed to pool AUD$9.5 million of offset funds to deliver an unprecedented tailor-made, dredging-specific science program. This collaborative research program, known as the "Dredging Science Node", was facilitated by the Western Australian Marine Science Institution (WAMSI). The results of the research would lead to a better understanding of the system and be translated directly into guidelines to help reduce the uncertainty associated with Environmental Impact Assessment and management of dredging impacts.

To augment the unique opportunity provided by the collaborative program, industry partners also agreed to share with the researchers – through data sharing agreements with WAMSI – their marine environmental monitoring datasets worth $250 million collected during four large capital dredging projects (Pluto, Cape Lambert, Gorgon and Wheatstone). Until recently these data were treated as "commercial in confidence" and were unavailable to scientists. Also, there was no capacity within government to collate and analyse them. The data-sharing agreement constituted an extraordinary breakthrough, as environmental monitoring data of this scale and detail had never been made publicly available before in Western Australia.

Outcome

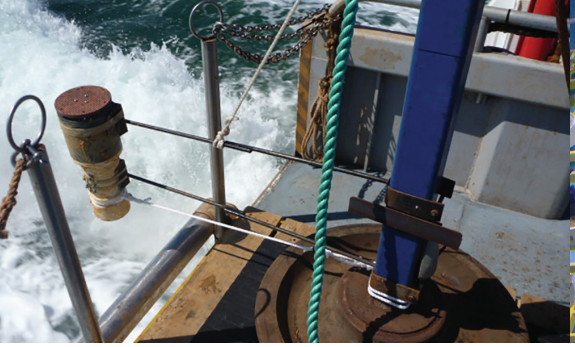
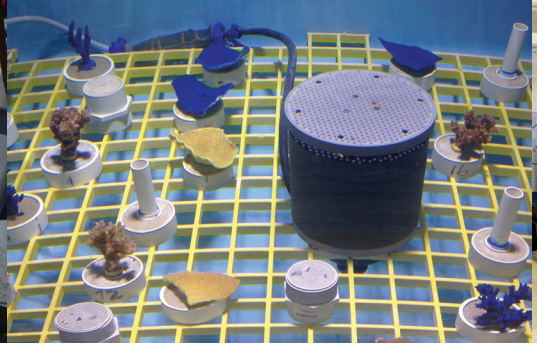
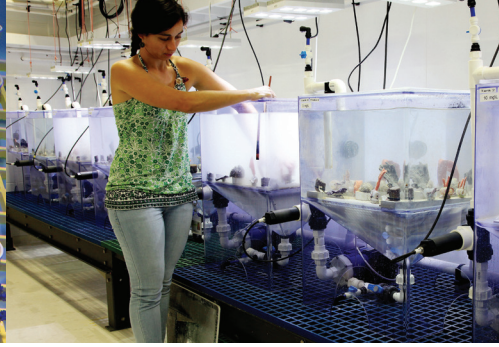
Directly relevant new insights from the Dredging Science Node (DSN) have led to increased confidence, timeliness and efficiency of environmental approval and regulatory processes associated with dredging projects. Being informed by real data from real dredging programs, the cutting edge research enabled relevant, tailor-made manipulative experiments that used high-tech facilities to determine cause-effect pathways and tolerance thresholds of sensitive environmental receptors such as corals seagrasses and sponges.

As a result, there is now a fuller and confident understanding of how key organisms respond to and recover from pressures from dredging. This will benefit impact assessments, the setting of appropriate approval conditions and the auditing and compliance with those conditions. There is now also an improved knowledge of the process of sediment particle generation, dredge-related physical pressures and hence the ability to quantify and predict, manage and measure those pressures.

Pathway to adoption

The new insights from the program are now being translated into improved dredging guidelines that will serve to streamline monitoring by focusing on the relevant and most sensitive aspects and help to improve the effectiveness of management approaches to minimise the hazards from dredging.

The DSN has set a new industry standard with impact beyond Western Australia. As an outstanding example of an exceptional research program in its design and intent, the DSN has enabled early adoption of its key findings in dredging programs in Queensland and the Northern Territory. Internationally, uptake of relevant findings is happening in environmental impact assessments, dredging management plans and technical consultancy advice on dredging projects.

Impact Story

- The `WAMSI "Dredging Science Node" collaborative research program was established and carried out by a joint venture consortium of nine research agencies, who collectively co-invested a further AUD$9.5 million bringing the total investment to AUD$19 million.
- The DSN enabled unparalleled value-add to the existing knowledge base by 80+ scientists from a variety of disciplines committing to deliver end-user-oriented research through a WAMSI-brokered science-regulator-industry collaboration.
- By design, the DSN science plan emphasised synthesis before new experiments and forced scientists to think all the way through how their research would benefit the prediction, monitoring and management of dredging impacts.
- Involvement of a cross-sectoral governing committee and the DSN Node Leader for Policy ensured quality control and delivery of relevant outputs in a form that could be directly applied to improve the triple bottom line outcomes of major marine dredging activities in Western Australia.
- Put in perspective against other costs associated with dredging operations (incl. stop-dredging events and environmental monitoring), the outcome of the DSN research represents a high return on investment, having yielded a treasure trove of new insights of direct relevance to dredge management with long-lasting economic benefits to industry and society.
- The wider impact of DSN research beyond Western Australia was demonstrated by a recent dredging program in the Mediterranean, which adopted DSN research findings (e.g. tolerance limits of sponges and seagrasses, and plume generation by different dredges) into its environmental impact prediction and management approach.
- DSN findings acquired using a new deposition sensor in comparison with sediment traps proved crucial in responding to a level-3 exceedance of sedimentation triggers for seagrass during dredging works in Monaco.
- For its recent maintenance dredging strategy in Darwin Harbour, INPEX relied on DSN research findings to derive turbidity and sedimentation limits based on water quality statistics and reported tolerance thresholds.
- The outcome of the Dredging Science Node also served as a source of inspiration for the recent 'Engineering with Nature' research program by the US Army Corps of Engineers.

Further information, including links to all reports and publications, is available at: www.wamsi.org.au

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