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## Broad costs and benefits of Australia's participation in IODP

From a scientific point of view, Australia's involvement in IODP empowers and enables our scientists to build a fundamental understanding of long-term issues in areas such as climate and oceanographic change, extremophile microbiology, sea-level rise, tsunami hazards and petroleum and mineral deposits. It also helps us understand our world's planetary dynamics, and better understand and manage the biodiversity and potential resources of our marine jurisdiction.

As a minor partner, we have little influence on the global IODP science framework – but we do have considerable influence in attracting expeditions to our part of the world. The Southern Hemisphere is a key region in studies of past global climate and oceanography, and there are very good reasons to bring other types of expeditions to this region. Such expeditions address global problems, but they also bring a dedicated team of 30 scientists from around the world to study our geoscience, not just for the two months of an expedition but for years to come.

There had been 17 DSDP/ODP expeditions and four IODP expeditions in our broad region by the end of 2013, with a present-day cost of perhaps US\$200 million. This is the sort of sum that Australia and New Zealand could never find themselves, and our financial input to these expeditions was almost negligible in these terms.

Our community has long believed that these benefits of our involvement greatly exceed the costs. However, in order to have an independent view of the costs and benefits of Australia's involvement in IODP, the ANZIC Governing Council commissioned the Allen Consulting Group to provide a 94-page 'Review of Australia's participation in the Integrated Ocean Drilling Program'. This was finalised in March 2013 and is available from [iodp.org.au/publications/independent-review-of-australian-participation-in-integrated-ocean-drilling-program/](http://iodp.org.au/publications/independent-review-of-australian-participation-in-integrated-ocean-drilling-program/). Some findings are summarised below.

### Section 6.1. Key findings of the review

Each successive phase of scientific ocean drilling (DSDP, ODP and IODP) has achieved significant scientific and technical results. This has been confirmed by reviews undertaken in the US, UK and Europe and by this study. Planning is already well underway for the next phase, the International Ocean Discovery Program, and a new Science Plan is agreed and revised operational arrangements are being put in place.

In assessing the benefits and costs of IODP, it is important to recognise that there are significant lags between the initiation of a proposal, actual drilling taking place, the analysis of results and publication of scientific papers. This means that during the period of IODP, benefits will arise that are attributable (in part or in whole) to previous phases and similarly the benefit of work done during IODP will flow through to the successive phase.

It is also important to recognise that, as with all science, a range of benefits from IODP would flow to Australia, usually with some lags, even if Australia was not a participating member. However, it is clear from this study that the nature, scale and timing of benefits to Australia would be quantifiably and qualitatively less.

Within the constraints of the data and information available, and recognising the issues of attribution and additionality associated with membership, it is clear that Australia's direct participation in IODP has generated a range of collaboration, capability building, scientific outputs, economic impacts and broader national interest benefits.

In considering the costs of Australia's membership, it is important to account for both direct (e.g. membership fees) and indirect (e.g. support provided by host institutions) costs. Although not practical to quantify, some costs incurred in one phase of scientific ocean drilling (e.g. the work done during IODP on the 2013–2013 Science Plan) may well benefit a successor phase. In total, it is estimated that the direct and indirect costs of Australia's participation in IODP from 2008–2013 totals approximately AU\$14.8 million. Of this amount AU\$3 million is in the form of in-kind contributions from researchers' host institutions that can also be regarded as leverage on the ARC grants for IODP membership, over and above the member institutions' ANZIC consortium fees.

## Section 6.2. Overall assessment of benefits and costs

It is not practicable to quantify in dollar terms the net additional benefit to Australia of IODP membership because there are no robust and generally accepted indicators and/or methodology to do so. Attempting to calculate a standard cost–benefit ratio is therefore not appropriate. In considering the value of the benefits to Australia it is important to recognise that:

- the nature and impact of the benefits are very diverse, ranging from those of a public good nature (e.g. increased knowledge) to those that are commercial (e.g. exploration industry use); many of the benefits are longer term and cumulative in nature (e.g. networks, collaborations and enhanced human capital); the direct (e.g. port visits) and indirect (e.g. industry use) benefits are quite significant in their own right; and
- the potential benefits (e.g. a better understanding of natural hazards, discovery of hydrocarbon resources) are huge'

In summary, the assessment is whether the benefits of membership sufficiently outweigh the costs to justify the investment in IODP and the successor International Ocean Discovery Program. The overall conclusion of the review is that quantifiable and unquantifiable benefits to Australia of direct membership of the IODP consortium far exceed the modest costs of participation. Moreover, it would be detrimental to Australia's interests not to be a member of IODP and such participation is well aligned with current government policy as articulated in the 2012 National Science Investment Plan, the aspirations of the Australia in the Asian Century White Paper and Australia's policy of fostering international scientific collaborations.

The review has also concluded that, based on the value to Australia of participation in IODP and the expected benefits and costs of membership of the International Ocean Discovery Program, there is a strong case for continuing direct Australian membership.

This review and everything else in this volume make a compelling case that Australia is getting great value from its membership of the wonderful international scientific ocean drilling campaign that has been going for more than 45 years, by far the longest international geoscience program ever run.

A brief summary in 2016 would be that the Australian and New Zealand annual membership is 1 per cent of IODP's annual budget, but our scientific return is disproportionately high. The IODP has drilling assets worth US\$1.1 billion and repositories holding more than 400 km of cores. All information goes into the public domain and a moratorium on recovered core material and related data is less than two years. Australian annual membership has direct economic return from each visit of IODP

## EXPLORING THE EARTH UNDER THE SEA

research vessels to Australian ports averaging US\$1 million and indirect economic returns through petroleum exploration using IODP drilling results on our continental margins.

The renewal of ARC funding through until the end of 2020 at AU\$2 million per annum is a very strong endorsement of IODP's value to Australia.

This text is taken from *Exploring the Earth under the Sea: Australian and New Zealand achievements in the first phase of IODP Scientific Ocean Drilling*, edited by Neville Exon, published 2017 by ANU Press, The Australian National University, Canberra, Australia.