



National Research Priorities - Submission, 22 August 2002

Background

The Australian Marine Sciences Association (AMSA) is the largest and most broadly representative national professional body of marine scientists in Australia, with a membership of close to 1000. On behalf of our members, AMSA is pleased to contribute to the consultative process for the establishment of National Research Priorities (NRPs). This submission has also had the benefit of input from the Australian Coral Reef Society, which represents over 300 coral reef scientists. AMSA would strongly urge that the Expert Advisory Committee takes into account the need to ensure that the National Research Priorities reflect explicitly the importance and influence of Australia's marine jurisdiction, to the health and wealth of both our nation and that of the broader global community.

Unlike its terrestrial counterpart, Australia's marine environment forms a 'common' national asset, to be used and enjoyed by people who do not possess exclusive rights. This is reflected in the goals of *Australia's Oceans Policy 1998* - "*the benefits from the use of Australia's common ocean resources, and the responsibilities, for their continuing health and productivity should be shared by all Australians*". Therefore, the onus is on Government to ensure a holistic and nationalistic approach to the understanding and ecologically sustainable use of Australia's marine environs and resources.

Under the United Nations Convention on the Law of the Sea, Australia has rights and responsibilities over some 16 million square kilometres of ocean. Australia's Exclusive Economic Zone (AEEZ) is the largest in the Southern Hemisphere and currently the third largest in the world. Australia's marine domain is more than twice the area of the Australian continent and includes all oceanic temperature zones, from tropical to polar. However, to date our knowledge of the habitats and species within the AEEZ is limited to less than 2%. This knowledge is mainly confined to the biota and ecological processes of the continental shelf (ie. in depths less than 200 m), and is limited to vertebrates, corals, and some of the larger crustaceans. For comparison, the invertebrate phyla constitute some 95% of marine biodiversity – yet the majority of marine invertebrates remain unknown or undescribed. It is also recognised that biodiversity in the marine environment often peaks on the continental slope, in depths of about 200 to 1000 m. However, while some 80% of the AEEZ is deeper than 200 m, to date these deep-water systems have been little explored. Despite these limitations, we do know that Australia's coastal and oceanic marine environments boast many unique characteristics, for example:

- the world's largest areas and highest species diversity of tropical and temperate seagrasses;
- one of the largest areas of coral reefs in the world, including the World Heritage listed Great Barrier Reef Marine Park, and the very different coral reef system off Western Australia;
- the highest mangrove species diversity in the world;
- a high degree of endemism in our estuarine flora and fauna;
- a high degree of endemism in temperate marine flora and fauna (~80 - 90%); and
- the highest levels of biodiversity in the world for a number of groups of marine invertebrates.

Given the above list, it is highly probable that there remains many more globally unique and socially beneficial aspects of marine biodiversity that await discovery.

Marine resources and industries make a significant contribution to the Australian economy, and now contribute more than the agricultural sector. Estimated marine industry earnings grew from just under \$11 billion in 1984/85 to \$41 billion in 1995/96; current estimates stand at \$50 billion. Proportional contributions from Australia's major marine-based industries are in the order of (as at 1997): 50% for tourism and recreation; 27% for oil, gas and engineering; 13% for shipping, transport and ship building; and 5% for commercial fishing and aquaculture. In addition there are 'hot' emerging areas with the promise of future economic and social returns for Australia; some of these include: the use of marine organisms for biotechnology, pharmaceuticals and other industrial applications; instrumentation technology; and the use of the marine environment as a renewable energy source. Indeed the 1995 report to PMSEC, *Australia's Ocean Age*, predicted that "*Australian marine science and technology will become the backbone to the nation's economic prosperity*". The realisation of this prediction is highly dependent on Government support and a strong, cooperative, and effective national research effort.

Australia's marine environment also has an important role in the provision of ecosystem services (ie. the functions that sustain or fulfil human life that cannot be replicated in any other way). Some examples of ecosystem services are: primary and secondary productivity; the purification of air and water; and the biological breakdown and recycling of wastes. A greater understanding of these natural system functions and their contributions is critical to the informed management of natural resources and the environment. Preliminary global studies into the relative economic value of ecosystem services have estimated an average value for Australian marine ecosystems of around US\$640 billion per year, ie. many times our GNP. Australia's marine and coastal systems also depend on, and influence, global climatic and oceanic current systems. This has implications for the productivity and sustainability of resources and habitats, not just in the sea, but also on the land. On a global level, the tracking of oceanic conditions such as sea-surface temperature and sea level have enormous implications for the prediction of continental weather patterns, agricultural productivity, and future developments regarding global climate change. As the country with the largest marine jurisdiction in the Southern Hemisphere, Australia carries significant national and international obligations in this respect.

The foundation report, *Our Sea, Our Future* (SOMER 1995) stated that: "*A lack of knowledge of our marine ecosystems, their functioning and interactions, is the greatest barrier to developing the huge potential of the resources of the oceans in a way that protects marine biodiversity and maximises resource utilisation*". A sound, strategic and nationally coordinated marine science and technology effort is fundamental to ensuring this deficit is addressed. AMSA considers that the main priority for Australia is to develop and populate the information-base to underpin decision-making about future marine-related activities and resource use. Without such a national, high quality, accessible foundation of knowledge, which we have called *A National Oceans Blueprint*, the following will be considerably less effective: R&D planning and conduct (eg. biotechnology, mining); viability of marine industries (eg. tourism, shipping); resource assessments (eg. fisheries and bycatch); risk management contingencies (eg. as in oil spills or invasive species); and monitoring benchmarks (eg. protected areas, global climate change). Attached is a proforma containing one set of nominations from AMSA for the NRP process. All the priority research goals nominated also have strong backing within the well-supported nationally consultative processes that led to *Australia's Ocean Policy 1998* and *Australia's Marine Science and Technology Plan 1999*.

Yours sincerely

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2. *Nomination for broad thematic priority.*

- 1) **A National Oceans Blueprint - understanding our marine domain for future health and wealth**

3. *Nomination for priority goal(s) within the broad thematic priority.*

A) National Marine Biodiversity Inventory - 1) Rapid Biodiversity Assessment for Marine Regions

Develop a comprehensive National Marine Biodiversity Inventory by collating current knowledge combined with a series of coordinated, intensive, field-based workshops involving national and international expertise.

B) National Marine Biodiversity Inventory - 2) Indicative National Habitat & Oceanographic Map for Australia's Marine Domains

Collate current knowledge, identify regions where marine habitat and oceanographic mapping are inadequate, and map priority areas using a series of nationally coordinated expert workshops.

C) National Marine Information Portal

Develop a World Wide Web based, nationally and internationally accessible 'one-stop-shop' for Australia's marine information, contacts, policies and data.

4. *Key objectives.*

KO1) Strength, opportunity, need –

The current dearth of knowledge regarding marine biodiversity for the huge area of the Australian Exclusive Economic Zone, impedes the capacity of government agencies, industry, and other users to meet the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* and similar State/Territory legislation, and at the national level, obligations under the Biodiversity Convention and the United Nations Convention on the Law of the Sea (UNCLOS). It also impedes the capacity of industry and resource managers to identify and develop significant marine resource potential and to ensure that developments are ecologically sustainable. A series of successful, collaborative workshops held over the last 10 years in Western Australia (and supported by AMSA) have shown the enormous benefits of bringing together a group of national and international taxonomic experts to intensively study a region for a limited period (2 to 3 weeks). Similarly, the Representative Area Program recently undertaken by GBRMPA involved a diverse group of experts from a variety of disciplines who contributed their published and unpublished data to determine the boundaries of the numerous bioregions within the Great Barrier Reef. The cost effectiveness of the 'intensive-collaborative' approach saves years and significant dollars off the research effort, and the scientific gains are exponential.

A National Map of Marine Habitats and associated Oceanographic Processes is needed to underpin the proposed National Marine Biodiversity Inventory, and together form a National Oceans Blueprint. At present, marine habitat and oceanographic information are disparately distributed across jurisdictions and institutions around the country. Existing information also suffers from a lack of cohesion, with inconsistent standards and measurements used for data collection, analysis and storage. A collaborative desktop study is urgently needed at the national level to identify existing information and data formats, to collate data that can be drawn together, and to identify gaps and priorities for future mapping. This work needs to be done at both the regional and depth-related levels. The pooling together of mapping experts (ie. in workshop format) combined with sharing knowledge of technology advancements in this area would expedite a national indicative marine map for Australia. This process could have the added benefit of training and education aspects for students. Accessibility to some data may be an issue, however access to repositories of data held/managed by both State/Territory and Commonwealth organisations is imperative. Of significance to such a process is the recent Report by Ponder *et al.* (2002) that provides an extensive review of the conservation status of marine invertebrates. Some consensus on national standards for habitat classification, inventory and mapping techniques, measurement methodology, and data storage and information management may be another useful outcome of Research Priority B). The habitat and oceanographic information gained from this process will underpin both biodiversity assessments and natural resource management activities, such as fisheries and aquaculture. It would certainly assist the allocation process regarding Marine Protected Areas.

There is an urgent need for a nationally accessible Portal-type website, to house and provide links to national-level data on all types of marine related information, including the marine biodiversity, habitat, and oceanographic information of the proposed National Oceans Blueprint. Foundation databases exist across various government agencies (eg. Environment Australia – endangered species [these are currently terrestrially based, with only some larger marine fauna listed, eg. whales, dolphins, turtles etc.]; various ABRS catalogues; Geoscience Australia – Estuaries) but currently there are limited formal linkages between these, and no coordinated approach to their development. [There are also some pilot studies currently being undertaken by OZCAM (funded by EA) to link natural history museum databases]. The centralised access to relevant existing databases, combined with existing and developing technological capability in geographic information systems (GIS) and information protocols, will allow for synergistic outcomes, including more accurate distribution maps and identification of knowledge gaps. It is imperative that future work related to our marine Information Economy be undertaken in a nationally coordinated, rather than *ad hoc*, fashion. The development and implementation of a national web-based Portal for Marine Information would provide easy access to a wealth of information and data that should expedite marine related research efforts nationally, provide baseline data for benchmarking, as well as being of benefit to the Marine Industry sector and the wider community.

KO2) Shifting, new/improved, or targeting research effort –

Marine Science and Technology in Australia has been hamstrung in the past due to many factors, amongst which are:

- the vast size of Australia's marine jurisdiction
- limited accessibility for researchers
- often high costs of marine research (ie. ship time)
- large amounts of material remain in Australian museums with inadequate resources to sort them (note: sorting is cheaper than collecting new material) and insufficient taxonomic capacity for many major groups
- competitive nature of accessing limited research funding

- lack of cross-jurisdictional and cross-institutional arrangements/cooperation (leading at times to duplication of effort or inaccessibility to data)
- lack of consistent approach and nationally agreed standards (leading to incompatible data)
- no nationally focused body overseeing marine research efforts

The above Research Priority Goals, A), B), and C), all rely on a shift to a nationally focussed collaborative-based research effort. They also provide the opportunity to identify strategic and targeted directions for marine research in the areas of biodiversity, habitat and oceanographic mapping. It seems that a collaborative, cooperative and cost-effective approach to Australia's marine research efforts would maximise the opportunity to overcome the limitations identified above. The research goals identified by AMSA are also supported by the sentiments expressed in the excellent report, *Australia's Marine Science and Technology Plan 1999* - a plan which to date has received no Government funding for its implementation.

5. Selection Criteria.

For Priority A) National Marine Biodiversity Inventory - A) Rapid Biodiversity Assessment for Marine Regions

Criterion 1:

The scope for increased Commonwealth research effort in the priority area to deliver a measurable and significant positive impact, by:

- a) achieving an appropriate 'critical mass' of excellent research through specific support and/or coordination and collaboration at the national level; and
- b) addressing Australia's strengths, opportunities or needs arising from:
 - our nation's geography, climate, bioresources, economy, way of life and/or culture
 - issues of global importance which impact significantly on Australia
 - Australia's competitiveness in a global context

Criterion 1a) By its nature Priority A) is based on the premise of achieving a 'critical mass' of excellence, by bringing together the right experts in the one place and time, and has all the hallmarks of coordination and cooperation at the national level. It would be envisaged that all Australia's major museums, tertiary institutions, and State/Territory and Commonwealth marine research institutions/agencies must be involved to some degree. It may also be possible to enlist industry support regarding implementation (eg. ship time, accommodation etc.).

Criterion 1b) Priority A) would draw on Australia's current strengths, in terms of resident experts in the various taxonomic fields but would also bring together international experts. This will allow greater exchange of information and provide opportunities for training and other spin-off activities (eg. educational lectures or training workshops for students). This may to some extent contribute towards current critical shortfalls in Australia's taxonomic infrastructure. Biodiversity is a globally important issue. Priority A) would provide information on both Australian endemic and other species, and assist with determinations of marine pest invasions. This work *will* result in the identification of many taxa and species new to science. For example, the series of Western Australian workshops has so far resulted in the formal identification of over 300 species new to science and vastly improved the distribution knowledge of many more. A more accurate and thorough knowledge of Australia's marine biodiversity will underpin both conservation and economic goals. A complimentary thread of research effort is the development of broader scale marine mapping techniques and tools and the development and application of more predictive models of patterns and trends in biodiversity (ie. representing an adjunct to current bioregionalisation approaches).

Criterion 2:

The scope for Australia to build the capacity needed to achieve that impact, taking into account:

- a) existing expertise, experience and technological capacities or whether such capacities can be reasonably acquired or accessed
- b) the availability, quality and scale of necessary research infrastructure
- c) research conducted in other nations and the potential benefits of international collaborations
- d) the overall magnitude of the investment required to make the impact.

Criterion 2a) Australia has a range of internationally acclaimed taxonomic expertise – however this can only be considered a limited resource in the face of the vast number of taxonomic groups known to occur in the marine environment. In addition Australia has a rapidly ageing workforce of marine systematists, and upcoming replacements are too few. The bringing together of Australia's expertise combined with selected international experts would certainly enhance Australia's future capacity in terms of developing a National Marine Biodiversity Inventory and providing an invaluable opportunity for training our next generation of systematists.

Criterion 2b) The scale of research infrastructure would be small – dependent on existing field and laboratory infrastructure and equipment, or the use of alternate existing accommodation. Access to ship time could be an issue for deep water sampling, however 'ships of opportunity' could be employed if access to government vessels were not possible.

Criterion 2c) The success of the workshops would be dependent upon proportional international presence and follow-up (ie. collaboration). The WA series of workshops has shown that the willingness in the international community is there – a strong professional network already exists.

Criterion 2d) The magnitude of investment compared to the impact would be small. Funds would be required for supporting the initial desktop study, coordination of workshops, travel to workshop sites, to support accommodation, and the follow-up work including analysis, databasing and publication of results.

Criterion 3. The scope for Australia to capture the benefits of the research, through the potential of the research to:

- a) achieve commercially, socially or environmentally relevant outcomes over the cycle of the priorities regime
- b) enhance significantly Australia's overall innovation capacity by broadening the knowledge base, and fostering acquisition of skills and understanding of emerging areas of 'hot research'.

Criterion 3a) Outcomes of Priority A) would be environmentally relevant and have the potential to be commercially relevant, and will certainly reveal new species that have strong industrial application (ie. for food, pharmaceuticals, etc.). Outcomes would also be socially relevant in terms of their foundation value for legislative requirements and international obligations for marine biodiversity and resource conservation and management. Outcomes could be achieved in a very short timeframe, due to the 'rapid assessment' nature of the Priority, and certainly within the cycle of the priorities regime (ie. 2 to 5 years).

Criterion 3b) Outcomes of Priority A) would significantly broaden Australia's marine biodiversity knowledge base. This would have implications for marine natural resource management (eg. bycatch in fisheries activities) and other industry operations (eg. shipping). Such research has the potential to uncover many species new to science, some that may have unique application to 'hot research' areas such as biotechnology and pharmaceuticals. For example, recent 'Biodiscovery' work by AIMS off the Western Australian coast has found a higher than expected proportion of bioactive chemicals from marine organisms. These are strong 'leads' with potential for various applications such as: agri-chemicals, sun screens, biocides, and anti-viral, anti-tumour and anti-cancer compounds.

For Priority B) National Marine Biodiversity Inventory - B) Indicative National Habitat/Oceanographic Map for Marine Domains

Criterion 1:

The scope for increased Commonwealth research effort in the priority area to deliver a measurable and significant positive impact, by:

- a) achieving an appropriate 'critical mass' of excellent research through specific support and/or coordination and collaboration at the national level; and
- b) addressing Australia's strengths, opportunities or needs arising from:
 - our nation's geography, climate, bioresources, economy, way of life and/or culture
 - issues of global importance which impact significantly on Australia
 - Australia's competitiveness in a global context

Criterion 1a) As for Priority A), Priority B) relies on utilisation of a critical mass of excellence bringing together habitat and oceanographic experts from a range of organisations, including tertiary institutions and marine research institutions, to work alongside biodiversity experts to put data onto a readily accessible GIS or spatial framework. Based on the WA workshop model discussed above, it is envisaged that Priority B) would involve intensive short-term 'working sessions' with the aim to thoroughly characterise areas identified as priorities, such as major knowledge gaps. This exercise will draw together and build upon current knowledge. Priority B) also provides an important opportunity to match existing data with new data on biodiversity distributions. This collation would involve a cooperative/collaborative effort of database managers and scientists in organisations at State/Territory and Commonwealth levels. For offshore areas, where knowledge is limited and fragmentary, it may be possible to enlist industry support regarding implementation.

Criterion 1b) Priority B) would draw on Australia's current strengths in terms of resident experts. In addition to expertise at the Commonwealth level, most regions of Australia have a wealth of local expertise in benthic and other habitats, oceanographic processes, GIS and mapping etc. Some international experts may be involved where the need is identified, for example from recognised Centres of Oceanography such as the Scripps Institution of Oceanography (USA) and the Insitut fuer Meereskunde (Germany). Workshops could be organised around leading edge topics in benthic ecology, oceanographic processes, GIS mapping etc. which would attract international experts and generate new collaborations. Priority B) provides an important opportunity to network experts from across the nation with international colleagues, in the common goal of matching habitat, oceanography and biodiversity and thereby further cementing Australia's strength and knowledge in these fields. Co-ordination of such expertise across the extraordinarily diverse bioregions of Australia's AEEZ will undoubtedly enhance the nation's competitiveness in the field of habitat/biodiversity mapping (an issue of global importance). As a complement to the National Biodiversity Inventory, these works will form the National Oceans Blueprint, which would provide information on which to base future planning, decision-making and management (and therefore R&D). This work also has important implications for global climate modelling and predictive work.

Criterion 2:

The scope for Australia to build the capacity needed to achieve that impact, taking into account:

- a) existing expertise, experience and technological capacities or whether such capacities can be reasonably acquired or accessed
- b) the availability, quality and scale of necessary research infrastructure
- c) research conducted in other nations and the potential benefits of international collaborations
- d) the overall magnitude of the investment required to make the impact.

Criterion 2a) Australia has internationally regarded experts in the fields of marine habitat characterisation and oceanography, across many institutions. Much of the data already

exists, particularly for nearshore areas, but this may not have been collated, or is not accessible at the national level. The challenge is coordination of existing expertise for on-site workshops to characterise marine habitats in areas identified as priorities. Local access to oceanographic vessels will not be necessary where data already exists. In regions where habitat characterisation would benefit by such an approach, 'ships of opportunity' could be employed.

Criterion 2b) For the most part, the scale of research infrastructure needed is small, depending on existing field and laboratory infrastructure or the opportunistic use and adaptation of existing facilities as per the AMSA sponsored WA model. Access to ship time for deep-water habitat characterisation however will be an issue.

Criterion 2c) The WA workshop model has demonstrated the enthusiasm of international experts to work alongside their Australian colleagues to characterise regional marine biodiversity. This network, now over 10 years old, strengthens with every workshop. Undoubtedly this approach can be expanded to include national and international experts in the fields required to characterise and map the various marine habitats and oceanographic processes.

Criterion 2d) The cost-benefit of Priority B) would be favourable. The overall magnitude of investment would be small compared with the comprehensive outcomes and significant impacts of the research. Funds would be required for an initial desktop study to identify data currently available on Australia's marine habitats and oceanographic features, and where these data complement biodiversity. Funds would also be required to support coordination of and travel to workshops, accommodation, GIS databasing, analysis and publication of results. Access to ship time for deep-water habitat characterisation will be an issue, unless 'ships of opportunity' can be used (eg. fishing vessels, cargo vessels, Navy vessels).

Criterion 3. The scope for Australia to capture the benefits of the research, through the potential of the research to:

- a) achieve commercially, socially or environmentally relevant outcomes over the cycle of the priorities regime
- b) enhance significantly Australia's overall innovation capacity by broadening the knowledge base, and fostering acquisition of skills and understanding of emerging areas of 'hot research'.

Criterion 3a) Outcomes of Priority B) will have far-reaching environmentally and socially relevant outcomes over the cycle of the priorities regime and long-lived benefits for the future. The significance of a solid foundation of knowledge on which to base commercial and industry planning and operations is enormous. At present, Australia is intent on delivering on the goals and objectives identified in *Australia's Oceans Policy 1998*. To provide two pertinent examples, this includes determination of the criteria needed for designation of Marine Protected Areas as part of the *Regional Marine Plans* and the identification of priorities for the *Representative Areas Program* recently undertaken for the Great Barrier Reef Marine Park. However the full implementation of Oceans Policy will take many years, possibly decades, and certainly longer than the time frame of the NRP cycle. Australia cannot afford this time lag – a workable information base (ie. Blueprint) for our marine environment, resources and industries is needed now. Matching of data from Priority B) with that generated from Priority A) will provide a comprehensive and synergistic database or 'Blueprint' with which to make scientifically based decisions on a range of issues relevant to the marine sector. Such issues are of utmost importance to the health Australia's marine environment and are socially relevant to all users of Australian's marine resources. The data are urgently needed for *National State of the Environment Reporting*, now a legislative requirement under the EPBC Act 1999. Commercially, the outcomes will be vitally important to maintain the attraction and value of our marine environment and resources; a significant contributor to Australia's tourism based economy.

Criterion 3b) Outcomes of Priority B) will significantly broaden our understanding of Australia's marine environment and in doing so will empower Australian students and scientists with skills in great demand internationally, for example: automatic classification of multibeam seafloor images, and the exploration for marine resources by 3D computer modelling of the tectonic and sedimentary evolution of continental shelves. The Oceans Blueprint formed from the outcomes of Priorities A) and B) and made available through the outcomes of Priority C), will be a fundamental resource for both existing and developing marine industries. For example habitat and oceanographic information will be vital for R&D related to Renewable Energy sources from the sea. Likewise, biodiversity data and the discovery of new species will be vital to the Biotechnology sector. A comprehensive National Oceans Blueprint will also service existing industries such as tourism, transport, mining and fisheries by assisting with planning, management and risk assessment. Australia needs the capacity to have sound knowledge management for its massive marine jurisdiction and the opportunities that exist therein. A National Oceans Blueprint would enable better-informed decision-making and facilitate sustainable practices in the marine sector.

For Priority C) National Marine Information Portal – incorporating national and international access to the National Oceans Blueprint.

Criterion 1:

The scope for increased Commonwealth research effort in the priority area to deliver a measurable and significant positive impact, by:

- a) achieving an appropriate 'critical mass' of excellent research through specific support and/or coordination and collaboration at the national level; and
- b) addressing Australia's strengths, opportunities or needs arising from:
 - our nation's geography, climate, bioresources, economy, way of life and/or culture
 - issues of global importance which impact significantly on Australia
 - Australia's competitiveness in a global context

Criterion 1a) Priority C). Portals are redefining online communication and service delivery for governments and citizens. Based on the 'one-stop-shop' principle, they provide a gateway to the services and information of a number of agencies. As such the Portal demands inter-agency cooperation and coordinated service delivery, but this is achieved without large scale departmental reorganisation or merges. There are many examples in Australia and globally, of cross agency cooperation creating true intention based portals for citizens. In this case the Portal would service a variety of stakeholders, including government, scientists, industry, educators and the community. Development and population of a National Marine Information Portal relies on the coordination and collaboration at the national level of marine data custodians. These would need to supply links to the information and existing websites and databases deemed to be of importance/relevance to the marine stakeholder sector. The National Marine Information Portal would be the major repository for the National Oceans Blueprint data and information.

Criterion 1b) By connecting fragmented entities, in this case the various cross-jurisdictional and cross-agency parties, information access and useability is vastly increased. Pooling relevant national marine data and information through a Portal system, strengthens Australia's information base regarding its marine jurisdiction and creates opportunities for knowledge sharing, value-adding to existing knowledge, and synergistic partnerships that may otherwise have not occurred. At present Australia is hamstrung by a 'micro' jurisdictional approach to marine information collection, analysis and storage. We suffer for the lack of a big-picture, nationalistic and holistic approach. The holistic approach is vital for meeting our international obligations and for contributing to issues of global importance. We lack 'real-time' information. An effective, Internet based, Marine Information Portal also

strengthens our competitive stance and strategic capability in a global context through all the benefits garnered from the Information Economy age.

Criterion 2:

The scope for Australia to build the capacity needed to achieve that impact, taking into account:

- a) existing expertise, experience and technological capacities or whether such capacities can be reasonably acquired or accessed
- b) the availability, quality and scale of necessary research infrastructure
- c) research conducted in other nations and the potential benefits of international collaborations
- d) the overall magnitude of the investment required to make the impact.

Criterion 2a) Portal technology is relatively new, but Australia has provided leadership in this field. Therefore, we have the expertise and technological capacity to develop a fully integrated and functional National Marine Information Portal. This process could build on previously developed but outdated projects, such as EAs Coastal Marine Atlas (based on a distributed system).

Criterion 2b) The infrastructure to support Priority C) is available. It would require a nominated host site and some level of ongoing maintenance and management. However there are various options for development and many institutions that could act as host.

Criterion 2c) The National Marine Information Portal would be an ideal vehicle for linking with other international sites and data sources. This would be particularly beneficial for the oceanographic field. Such a system allows for greater exchange between the national and international marine science communities – this would undoubtedly have benefits such as: shared knowledge, improvements to methodologies, advancements in equipment, project collaboration and global partnerships. The National Marine Information Portal would give Australian Marine Science and the marine sector a window to the world.

Criterion 2d) The overall investment required to develop and maintain the Portal would be relatively small and build heavily on existing infrastructure and capability.

Criterion 3. The scope for Australia to capture the benefits of the research, through the potential of the research to:

- a) achieve commercially, socially or environmentally relevant outcomes over the cycle of the priorities regime
- b) enhance significantly Australia's overall innovation capacity by broadening the knowledge base, and fostering acquisition of skills and understanding of emerging areas of 'hot research'.

Criterion 3a) Capturing the potential of the outcomes of Priority C) are virtually guaranteed given the cooperative spirit of the venture and the almost universal access that would result from the Portal. The sharing of information and knowledge about Australia's AEEZ at national and international levels can only lead to synergistic and value-added outcomes. Outcomes would cover the gamut of commercially, socially and environmentally related benefits, and these would certainly be achieved within the cycle of the priorities regime, as well as into the future. These positive outcomes would assist Australia to overcome the time lag issue that currently hinders the Oceans Policy process (it will take many years to complete all proposed Regional Marine Plans around the nation) – as well as providing a significant source of data and information to expedite the process in future Regional Marine Planning activities.

Criterion 3b) A 'one-stop-shop' for Australia's marine information will significantly enhance the nation's overall innovation capacity by broadening the knowledge base and fostering the sharing of information and effort. The acquisition of skills would be supported by increased

contacts and networking opportunities among marine science and technology professionals through the Portal. Shared knowledge regarding techniques, methodologies and training tools would be enhanced. The ability to 'brain storm' ideas regarding emerging areas of 'hot research' would be possible through *chat rooms* and *discussion groups* facilitated through the Marine Information Portal – at both the national and international levels. It is well recognised that scientific endeavour and discovery is often at its best when a multi-disciplinary team approach is employed – the Portal would enable such 'virtual' multi-disciplinary teamwork to exist at a level never before possible. The National Marine Information Portal would also represent an invaluable Knowledge Management system for Industry planning and investment decision-making and help Australia achieve and maintain international leadership in the various Marine Sectors.

6. Implementation and Monitoring

There already exists in Australia a strong, multi-disciplinary network of Marine scientists and technologists, through: the Australian Marine Sciences Association and various other professional Societies; government research institutions; tertiary education institutions; museums; CRCs, etc. These in turn have strong links with various international professional networks. Australia also has in place the basic infrastructure to support the implementation of a National Oceans Blueprint and Marine Information Portal. The implementation phase would be dominated by planning, coordination and collaboration – all reliant on a strong and consultative Communication Plan backed by cross-jurisdictional government support (both financial and administrative).

Both Priority A) and B) are reliant on a 'Rapid Assessment' or 'Intensive-Collaborative' approach to achieve workable, best-available, outcomes in a relatively short time frame. They depend on the bringing together of relevant national and international expertise in a series of national workshops. These would be field-based for the biodiversity work. The workshops are considered as Phase Two of the process. They would need to be preceded by Phase One, which would entail a desktop study for both Priority A) and B) – to collate existing information and identify knowledge gaps and priority target areas. The biodiversity work would gain significant support from a recent Report, Ponder *et al* (2002), which draws together a vast pool of information on marine invertebrates from various Museum collections and databases. Similarly for the habitat mapping process, a useful comparative exercise has recently been completed for the Great Barrier Reef Marine Park, where 70 bioregions were identified. Both processes for Priorities A) and B) would require follow-up support for analytical work and publication of outcomes.

Development and implementation of a World Wide Web based 'one-stop-shop' site, the National Marine Information Portal, is feasible given current technology and the push at all jurisdictional levels to join the Information Economy age by going online. The Portal would give accessibility to all jurisdictions, house the National Oceans Blueprint, incorporating the National Marine Biodiversity Inventory [ie. data from A) and B)] and provide links to various other national and international marine related information, websites and databases, in addition to facilitating online discussion groups. The National Marine Information Portal will provide Australia with strong international presence and accessibility regarding all facets of its large marine jurisdiction, including associated scientific and R&D activities.

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