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Asia-Pacific
Economic Cooperation

Development of a Regional Management Framework for APEC Economies for Use in the Control and Prevention of Introduced Marine Pests

Consultancy Report Phase II

APEC Marine Resource Conservation Working Group

Report prepared by the
Centre for Maritime Policy
University of Wollongong
February 2005

Development of a Management Framework for APEC Economies for Use in the Control and Prevention of Introduced Marine Pests Phase II

Consultancy Report February 2005

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Contents

Contents ***ii***
Preface ***iv***
Introduction ***v***
WORKSHOP STATEMENT ***8***
SUMMARY RECORD OF WORKSHOP ***9***
APEC WIDE MEASURES Consultants' Consolidation of Workshop Discussions ***13***
Session 1: Commercial shipping, military activities, marine tourism, oil, gas and mining 13
Session 2: Other non shipping vectors 15
Glossary ***19***
PART A Information Papers ***23***
INTRODUCED MARINE PESTS: The Threat ***24***
Overview 24
Definition 24
Impacts on Marine Uses and Values 25
Summary 26
References 26
INTRODUCED MARINE PESTS: Vectors and the Introduction Process ***28***
Overview 28
Vectors 28
Summary 30
References 30
INTRODUCED MARINE PESTS: International Legal and Institutional Framework for Managing Introduced Marine Pests ***32***
Overview 32
A. Legally Binding Instruments 32
B. Non-legally Binding Instruments 35
C. Institutional Framework 36
Summary 38
PART B Discussion Papers ***39***
CURRENT CAPACITY Synopsis of Economy Options Papers ***40***
Overview 40
Economy Options Paper Development 40
Institutional Themes 40
Constraints and Challenges 41
Opportunities 42
Summary 43
BEST PRACTISES IMP Management Approaches ***44***
Overview 44
Development of Guidance for an IMP Work Programme and Potential Measures 44
Guidance for an IMP Work Programme 45
Best Practices 49
Summary 53
APEC WIDE MEASURES Capacity Building and Education ***54***
Education and Training System 54
Communication Network & Information Centre 55
Emergency Response System 56

CONSULTANTS' CONSOLIDATION OF WORKSHOP DISCUSSIONS.....60
Session 1: Commercial shipping, military activities, marine tourism, oil, gas and mining.....60
Session 2: Other non shipping vectors.....62
Glossary 67
APEC 2nd WORKSHOP Participant List 70
PART C Appendices 73

Preface

This consultancy report has been compiled in close consultation with APEC Economies to present options to progress the management, prevention and control of introduced marine pests in the APEC Region. Part A presents the statement and summary record of, and consultants' consolidation of, the recommendations and discussions at the APEC – Workshop on Introduced Marine Pasts held in Puerto Varas, Chile 3 –5 May, 2004. Parts B and C present the information and discussion papers that were considered at the workshop and additional information presented during and after the workshop.

Introduction

Introduced marine pests (IMPs) pose significant threats to the economic productivity of the oceans, to human health, to marine biodiversity and to the maintenance of marine values and uses. Unchecked by natural predators, diseases and other constraints of their native habitat, populations of introduced species can grow rapidly to become pests. They can cause significant ecological impacts through predation on native species, and competition with them for habitat, food and other resources. This can lead to displacement and even extinction of native species and major changes in plant and animal communities. Where they displace or limit the productivity of local economically significant species the costs can be high.

Some transfer of marine species has been occurring since ships became capable of long voyages but huge increases in the size and speed of vessels and the volume of shipped cargoes have led to huge increases in the potential for transfer of species. Other means of transfer have developed though movement and escapes of aquaculture species and their pests, pathogens, parasites and other associated species. But aquaculture is also an increasingly important economic activity that can be put at serious risk through introductions of pests and diseases. A third area of introduction can arise through the intentional or accidental release of aquarium species.

The places at greatest immediate risk from introduced species are those near major ports and aquaculture sites. Many ports are part of the infrastructure of major coastal cities where the coastal ecosystem may be under stress from land-sourced pollution, physical habitat modification and overfishing. There is some indication that the establishment of IMP populations is further enhanced in such degraded locations.

In 2000 in recognition of the need for the countries of the APEC region to work together to address this issue, the APEC Marine Resources Conservation Working Group (MRC WG) approved a project titled *The Development of a Regional Risk Management Framework for APEC Economies in the Use in the Control and Prevention of Introduced Marine Pests.*

Phase I of this two-part project brought together information within the APEC region on the introduction, detection, prevention and remediation of introduced marine pests (IMPs) and pathogens. This information was considered at an APEC workshop in November 2001. APEC economies agreed that IMPs were a priority issue, and adopted the *Elements of a Draft Management Framework* as the way to approach the issue. The workshop sought and discussed suggestions for action for individual economies and for APEC as a whole.

Phase II of the Project was designed to assist economies to further develop the action approach started by decisions from the Phase I workshop. A second workshop was held in Chile on May 3-5 2004 at which APEC economies further discussed actions needed within their jurisdictions and considered collaborative APEC – wide measures to enhance the capacity of the Region and the economies to address the risks of IMPs.

In the four years since this project was endorsed there has been significant effort to progress IMP management. However, the needs and the capacities of APEC economies differ throughout the region. Further work is needed to address these differences and identify the most promising opportunities for a collaborative and mutually supportive approach. The workshop in May 2004 considered approaches that could best assist economies and the Region to address IMPs. These include :

- access to and application of information on the costs and benefits of management approaches to identify and manage species with high risk of becoming IMPs;
- the availability and necessary technical expertise for the APEC economies and the region as a whole to assess and respond to IMPs; and
- capacity needs and opportunities for addressing the issue

This report presents the background information and discussions from the workshop. It addresses recent approaches taken to preventing, controlling and managing IMPs in APEC economies; reports on regional and international efforts; and highlights key areas and questions for further discussion.

This report covers the following areas:

Part A. Workshop Outputs

- **Workshop Statement**
- **Summary Record of Workshop**
- **Consultant Consolidation of Workshop Discussions** describes the outcomes of session discussions and suggested options.

Part B Information Papers

- **Introduced Marine Pests: the Threat** describes what an introduced marine pest is, what marine uses and values can be affected and profiles some pest species and ports in the APEC region.
- **Introduced Marine Pests: Vectors and the Introduction Process** outlines the sources and vectors for introducing and translocating introduced marine pests.
- **Introduced Marine Pests: Instruments and the Institutional Framework** reports on recent developments in the international and regional regime and institutional framework for managing IMPs.

Part B. Discussion Papers

- **Current Capacity: Synopsis of APEC Economies** provides an overview of themes and gaps in the management approaches and capacity of APEC economy.
- **Best practises: IMP Management Approaches** describes examples of best practice management approaches identified in APEC Economies and proposes a set of potential measures to achieve the minimum common capacity and management necessary to begin addressing the problem of IMPs in the APEC region.

- **APEC Wide Measures: Capacity Building and Education** introduces options for APEC wide measures that can be implemented to improve capacity building, communication, economic and technical development, in accordance with the Elements for a Draft Management Framework
- **APEC Wide Measures** outlines areas for further discussion.

Part C. Appendices

- **Workshop Outcomes** contains outcomes of the first workshop including the draft elements of a risk management framework agreed in November 2001.

WORKSHOP STATEMENT

APEC member economies are united by the Pacific Ocean. Its marine resources are vital to trade, economic development and the health and well being of APEC member economies and their people. These resources are, however, under increasing pressure from human induced spread of marine pests. Introduced Marine Pests (IMPs) are estimated by some member economies to have cost them billions of dollars in lost economic activity, increased pressure on food safety, and costs for control measures, as well as trade and socio-economic implications. As marine based activity grows in the region, the economic, environmental and health costs to APEC member Economies will grow unless action is taken to limit the spread of these pest and pathogen species.

A workshop to develop options for regional action to address this growing threat was co-hosted by Australia and Chile in Puerto Varas, Chile from 3-5 May 2004. The workshop was attended by representatives from 17 Economies, the Lead Shepherds of the Marine Resource Conservation Working Group and the Fisheries Working Group, the International Maritime Organisation, the World Conservation Union, the Permanent Commission for the South Pacific, the workshop consultants, and scientific experts.

The workshop builds on previous APEC work and responds to the APEC Oceans Ministers call in the Seoul Oceans Declaration to "*Contribute to further international effort for the control and management of ship´s ballast water and sediments"* and to *"Accelerate efforts to address the threats posed by introduced marine pests, destructive fishing practices, and sea-based and land based sources of pollution".*

A shared awareness and understanding of the risks that IMPs pose to regional growth and sustainability is urgently needed, given the cross-sectoral nature and complexity of the problem. Due to the way marine pests are transferred, co-ordinated regional action is essential and can help reduce the costs of addressing pest problems to individual economies. Some key areas for further work include: coordination of management of IMPs within and between economies; capacity building; information sharing; targeted research; and education and training.

Further integration of the work of the MRCWG with other APEC working groups, regional and international organisations, will demonstrate APEC's commitment to integrated oceans management and regional action based on agreed principles and practices.

Given the direction that Chile, the APEC host for 2004, has given to its related activities and particularly its explicit commitment to sustainable growth, the workshop requests that the MRCWG ask Senior Officials to bring this matter to the attention of APEC Leaders. This would help promote a shared understanding of the problems and a shared commitment to the sorts of actions identified at the workshop in Puerto Varas.

SUMMARY RECORD OF WORKSHOP

ASIA PACIFIC ECONOMIC COOPERATION

Marine Resource Conservation Working Group (MRCWG)

A Management Framework for Introduced Marine Pests in APEC Economies

Phase II

Co-hosted by Australia and Chile

3-5 May 2004, Puerto Varas, Chile

The second workshop to develop a Management Framework for Introduced Marine Pests (IMP) in APEC Economies was held from 3-5 May 2004, in Puerto Varas, Chile. The workshop was attended by delegates from 17 APEC economies: Australia, Canada, Chile, People's Republic of China, Indonesia, Japan, the Republic of Korea, Mexico, New Zealand, Papua New Guinea, the Republic of the Philippines, Peru, Russia, Chinese Taipei, Thailand, the United States of America, and Viet Nam. The Lead Shepherds of the APEC Marine Resource Conservation Working Group (MRCWG) and the Fisheries Working Group (FWG) also attended. Other attendees included the International Maritime Organisation (IMO), the Permanent Commission for the South Pacific (CPPS), and the World Conservation Union (IUCN).

Dr Alex Brown, Undersecretariat for Fisheries, Chile, and Mr Philip Burgess, National Oceans Office, Australia, were Joint Chairs of the workshop.

Opening Remarks and Introduction to the Workshop

The workshop Joint Chairs welcomed delegates and expressed the hope that the sharing of information and ideas would lead to a productive workshop. Delegates were reminded that APEC is an economic forum, that regional trade and growth are vital, and that sustainability and conservation are an important component of that growth.

Mr Ricardo Norambuena (Chile) gave a brief opening address. He emphasised the economic value that APEC economies derive from the marine environment, and the vulnerability of industries such as aquaculture and fisheries to impacts from IMPs.

Dr Brown (Chile) summarised Phase 1 of the project, which focused upon defining the problem of IMPs within APEC and agreeing elements for the draft Management Framework. The issue of IMPs was taken as a priority to MRCWG in 2002, and also to the 1st APEC Oceans Ministerial Meeting, where their importance was highlighted in the Seoul Oceans Declaration.

Mr Burgess (Australia) gave an introduction to Phase 2 of the project, and reminded delegates of the links between IMPs and trade, food security, environmental health and human health. Mr Burgess also encouraged

delegates to take into account IMP-related activities, domestically and at a regional level, which were underway in the region.

Ms Donna Petrachenko, Lead Shepherd of the MRCWG, thanked co-hosts Chile and Australia for their work on the project. Ms Petrachenko emphasised the importance of raising awareness of IMP issues within APEC, with other working groups and senior officials.

Mr Stetson Tinkham, Lead Shepherd of the FWG, thanked Chile and Australia and noted that IMPs are a concern to both the FWG and MCRWG and the relevance of this project to both groups. He encouraged delegates to consider methods of achieving private sector participation in IMP policy and program design, given the implications for the private sector of IMP management decisions.

Synopsis of Workshop

Consultancy Report

The University of Wollongong Centre for Maritime Policy, consultants to the project, presented the Draft Report of the consultancy. The consultancy report included:

- A summary of current IMP management among APEC economies;
- Best practice examples of IMP management approaches; and
- Suggested APEC-wide measures for capacity building and education to improve IMP management.

The discussion papers would form the basis of later discussions within working groups.

Economies were also briefed on the individual Economy Options Papers, which were prepared as a preliminary analysis of the IMP management and institutional approaches of each APEC economy and assisted the consultants in the preparation of their Report. The Options Papers also included a range of potential options that individual economies may choose to implement to address gaps in their domestic IMP management capacity.

Mr Jaime Rovira (Chile) briefed the workshop on Chile's National Biodiversity Strategy and policy for the control of invasive species. The approach applied by Chile to their domestic management of invasive species includes principles of precaution, risk analysis, and mechanisms for control, monitoring, and eradication.

Mr Steve Raaymakers (International Maritime Organisation) updated the workshop on the International Convention for the Control and Management of Ships' Ballast Water and Sediments. The Convention was adopted in February 2004 by IMO members, and entry into force now requires ratification by 30 countries with a total of 35% of world shipping. Mr Raaymakers encouraged APEC economies to consider the ratification of the ballast water convention as a positive step to addressing this key IMP vector.

Mr Raaymakers also reported on the IMO GloBallast Programme and emphasised the value of regional GloBallast demonstration sites for technical cooperation, capacity building and raising awareness of ballast water management issues. A standard modular training package, focusing upon ballast water management, has been developed by IMO and can be applied by other training centres. This is available to APEC economies.

Self-financing mechanisms within GloBallast demonstration sites, and the possibility of matching funds in the case of joint APEC/IMO activities, were also suggested as items of potential interest to APEC. IMO extended an invitation to APEC to become a partner in the planned future "GloBallast Partnerships" program.

Mr Carlos Canales (Chile) gave a presentation on the actions of the Heads of Maritime Safety Agencies Forum in relation to ballast water management. Mr Canales also summarised the Chilean approach to ballast water management, which consists of a risk management approach whereby high risk ports, high risk species, and vulnerable areas are identified. Ballast water exchange is required for ships entering Chilean ports. Non-compliant ships must undergo mandatory ballast water treatment.

Mr Gennady Boltenko (Russia) provided a brief summary of Russia's progress in IMPs management. Links within Russia between IMPs management and human health management were noted. Russia submitted a national report prepared by Sakhalin Research Institute of Fisheries and Oceanography (SakhNIRO).

Dr Melba Reantaso (Aquatic Animal Research Pathologist) spoke on the development of "Assistance for the Responsible Movement of Live Aquatic Animals", a regional framework for aquatic animal health management. This FAO-supported project was initiated at the request of 15 Asian governments. The project development featured clear designation of national coordinators and undertook extensive consultation to achieve consensus.

Products include Technical Guidelines, an Implementation Strategy, an Implementation Manual and a Diagnostic Guide. The strategy also features a quarterly reporting system based on a list of diseases either known to exist or of importance to the region. There is a strong emphasis on ongoing scientific observations and monitoring. Other important features include the internet-based Aquatic Animal Pathogen and Quarantine Information System, support for the development of National Strategies on Aquatic Animal Health Management, and a range of capacity building and training workshops.

Dr Gonzalo Gajardo (University of Los Lagos, Chile) spoke on the impacts of introduced marine species upon local environments. Dr Gajardo summarised Chilean efforts to develop policy on managing native and introduced aquatic species, including the balancing of economic interests and conservation priorities.

Delegates divided into three groups for discussions.

Working Group Session 1

The working groups discussed IMP issues related to **commercial shipping, military activities, marine tourism, oil, gas and mining.**

Working Group Session 2

The working groups discussed possible options and recommendations relating to three themes:

Theme 1: *Defining risk and sharing information on IMP and responses*.

Theme 2: *Capacity Building*

Theme 3: *Exploring options for funding regional IMPs Management*

The consultants' consolidation of workshop discussions is at Annex 3.

Final discussion, suggestions and conclusions

Economies were requested to respond to the Workshop Organisers within two months with their final comments on the Economy Option Papers, and to advise the consultants whether their Options Paper could then be made publicly available for circulation. A letter of request will be sent from the workshop secretariat to all economy representatives.

Dr Brown (Chile) thanked all delegates for their attendance and their hard work.

Mr Burgess thanked the secretariat, consultants and rapporteurs, and congratulated delegates on their spirit of cooperation and officially closed the workshop.

APEC WIDE MEASURES
Consultants' Consolidation of Workshop Discussions

Session 1: Commercial shipping, military activities, marine tourism, oil, gas and mining

APEC and support for the IMO process

The workshop expressed appreciation for the update on current ballast water IMP activities. Recognizing the recent action of 74 countries in the adoption of the Ballast Water Convention, the workshop urged Economies to consider APEC wide measures to promote and encourage the objectives of the Convention.

Suggested action:

- harmonization of implementation of measures across the APEC Economies where possible, for example:
    - establishing a timeframe for achieving harmonized procedures, protocols and legislation to implement the convention to ensure uniformity and consistency;
    - participation of APEC in existing IMO databases using standard format;
- that efforts be made within APEC and its member economies to join with IMO in the development and implementation of the next phase of the GloBallast Program- including co-funding and joint technical cooperation, provision of guidelines, capacity-building activity training, education, industry awareness, research, information sharing.

The workshop reflected on the need for better communication with IMO, other organizations with expertise in IMPs such as the Global Invasive Species Program (GISP), and other UN specialized agencies, eg FAO. They noted that this includes internal economy coordination and communication. They suggested that economies consider identifying National IMO Focal Points to communicate with other government agencies with interests in IMPs.

The workshop noted that while the primary approach to implementation of IMO obligations is through legislation, economies consider the use of guide-lines, codes of conduct and other non-legal or interim mechanisms as means of achieving faster progress in addressing IMPs.

The working groups suggested that MRCWG and other relevant Working Groups consider:

- facilitating additional research on the specific issues relating to IMPs;
- participating in the development of IMO guidelines;
- participating in the Marine Environment Protection Committee, and raising other shipping-related IMP vectors in order to encourage application of measures to shipping issues beyond the current IMO focus.

Shipping and structure related vectors not covered by IMO

The working groups noted the current IMO focus on ballast water only within the ship-based IMP vectors.

Suggested actions:

- APEC promote attention to shipping vectors other than ballast water including:
    - Biofouling;
        - Non-commercial shipping including tourism, military, fishing and recreational vessels, oil rigs and platforms;
        - Water intakes, seachests and ballast tanks

The working groups noted:

- The need for continuing research to increase understanding and identify and develop measures for management including design of regulatory actions and performance evaluation of other IMP vectors.

- The need to identify and apply lessons learned from ballast water to other vectors perhaps through a retrospective analysis of ballast water convention process.

The workshop suggested that APEC and its member Economies:

- identify common priorities and approaches to other vectors;
- take initiatives to address other vectors - particularly biofouling upon fishing and recreational vessels, fishing gear etc;
- specifically, APEC economies individually or collectively raise the need to address biofouling on vessels through the IMO, by representation to the MEPC;
- promote development of practical measures to minimize the problem, eg. vessel skirts.

The working groups noted the complexity of enforcing compliance upon “flag of convenience” vessels and considered the potential benefits of providing economic incentives, linked to widely accepted standards such as IMO guidelines, to act responsibly, and to develop positive approaches.

The workshop suggested that APEC:

- consider approaches that provide an economic incentive for industries and communities to act responsibly.

The workshop identified regional cooperation as key – through research, capacity building and information exchange. Information exchange was highlighted as very basic and very important:

- Exchange of baseline knowledge about ports and marine species;
- Exchange of compliance information (relating to individual ships);
- Exchange of Hazard Analysis information;
- Exchange of Management measures (eg. Declaration of no-ballast exchange zones etc).

The working group noted that there are considerable synergies and linkages between the IMO and other international processes such as the CBD. It discussed the potential for measures including:

- baseline surveys that serve the purpose of both CBD and IMO implementation.
- partnerships between APEC, the CBD and IMO involving:
  - Joint projects; and
  - Joint funding.

As well as the need for APEC/CBD/IMO collaborations, the workshop noted the potential for broader synergies on addressing IMPs involving other bodies including Regional Fishery Management Organisations (for fishing vessels), Trade Agreements and consistent quarantine, customs and security measures that might enable the issue of IMPs to be addressed as part of an integrated package of measures. It was pointed out the recent episodes of SARS and bird flu within APEC have illustrated the substantial threats posed by diseases and pests to trade, economic health, and human health.

The workshop emphasized the importance of:

- developing partnerships between APEC and IMO and CBD to facilitate actions to address IMPs,
- developing partnerships between APEC and UN agencies, NGOs and other relevant organsiations to facilitate actions to address IMPs; and
- exploring options for wider collaborations to address IMPs

Session 2: Other non shipping vectors

Theme 1: Defining Risk and Sharing Information

The workshop noted that raising awareness in many economies is of high priority – particularly at senior decision-maker level.

The workshop suggested:

- The production of a plain language status report to identify for senior decision makers the risks and management options associated with IMPs. Aspects for consideration could include socio-economic impacts, trade implications, sub regional issues, and the special considerations of developing and developed economies.
- That baseline information be established in member economies, recognising that this lack of information represents the greatest risk to managing socio-economic impacts of IMPs.
- Bearing in mind that high latitude introductions are of particular concern, the workshop recommended that greater involvement with the existing scientific potential in the Russian Far East be encouraged for APEC cooperation.
- APEC economies note the importance of domestic focal points to manage the sharing of information with other economies.
- More attention to be given to achieving clear and agreed definitions of terms relating to IMPs.

The working groups noted the need to clarify the responsibility of APEC working groups related to IMPs.

The Workshop recommended:

- The elaboration by MRCWG and FWG, in consultation with the Transportation and other relevant Working Groups, of decision rules to determine roles and responsibilities for IMPs in APEC.
- Economies to provide key documents to consultants to send to attendees on CD – for example, legislation, regulatory and policy documents.

The workshop reflected that information sharing is critical and that APEC has established effective networks for other programs.

There is a wealth of relevant existing networks and databases on IMP concerns. The most appropriate approach may be to establish an APEC portal or meta-database for IMP issues, using the existing networks and databases, eg. OIE, IMO and CBD, that provides managers and researchers with linkages to agreed data bases and links to relevant sites with appropriate controls to protect data security and confidentiality. Such a database or portal should be designed to address the management information and research needs of APEC economies addressing IMPs.

The working groups noted that extensive information on existing IMP databases and information systems can be accessed via http://globallast.imo.org .

The workshop suggested that MRCWG and other relevant Working Groups consider:

- Production of a report to identify relevant existing databases and sites, their coverage and make recommendations on how best to utilize them to support APEC economies in the management of IMPs.

  Such a report should also establish metadata requirements to provide information on matters including conditions of access, quality assurance of data, peer review, practicality, data processing protocols, and directories of contacts.

The working groups reflected that it is important that decisions about what information and what level of information to share are the clear responsibility of the individual economy and of the institution managing databases and portals.

The working groups identified elements that could usefully be addressed in an IMP database or portal-Group:

- IMPs biological information
  - Distribution
  - Ecology
  - Impacts
  - Museum collections and long-term taxonomy
- Management activities
  - Emergency response protocols
  - Risk analysis and response design

  - Decision support
  - Vector management
  - Ensuring food security and safety;
- Technology to implement IMP strategy,
- Implementation of partnerships,
- Bibliographic data on IMPs materials

Priority research needs discussed included:

1) Scale and Scope of IMPs in each Economy.
2) Where are they? (through literature, museums, field surveys)
    a. Baseline and time series data on occurrence (museum collections and databases)
    b. Who are they – taxonomy including needing to engage overseas experts if necessary
    c. What are the impacts (environmental, ecological, social)
3) How do they get there?
    a. Who do you trade with?
    b. Biofouling
    c. Vector assessment
    d. Hazard assessment
4) What are the management options?
    a. Vector based
    b. Species based
    c. Post-incursion options
    d Control and eradication

The Workshop recommended:

- APEC support targeted research to address information needs for risk assessment and management of IMPs.

The workshop noted the importance of sub-regional research cooperation and reflected that collaboration with GloBallast was a possible mechanism.

Discussion identified that the APEC Study Centre Network could be appropriate for joint research and that ASEAN funding could also be accessed if an appropriate funding proposal is put forward.

Theme 2: Capacity Building

The working groups discussed the importance of capacity building at all operational levels, from field staff, regional officers to senior decision makers, and considered a range of training targets and subjects

The workshop recommended:

- that APEC support an analysis of training needs and existing training opportunities for IMPs management at the regional and economy levels.

The workshop noted that:

- Substantial expertise exists and is available within the region's economies with AMETEC, based in the Republic of Korea, being a good example.

There is good potential to develop further similar capacity building initiatives.

- Inventory of training capacities, programs and specialized equipment at institutions such as universities and maritime training colleges, universities is absent.
- GloBallast has produced a modular training course on ballast water management that will be made available to APEC economies.
- Training should, as far as practicable, be standardized to compensate for the differences in a region's technologies and budgets. Approaches discussed included:
    - train the trainer approach with the standardized curricula and qualifications,
    - Learning the lessons from Economies with similar ecosystems Economies with similar ecosystems should collaborate, and work together on management of IMP risks.

The workshop recommended:

- evaluation of the IMO training module for application to APEC economies (evaluation including the need for additional information/elements such as the inclusion of biofouling;
- that APEC economies develop collaborative approaches to training
- development of new regional training programmes and approaches including:
    - AMETEC itself, or an AMETEC-type model
    - e-learning / distance learning (internet, CDs) rather than workshops (cheaper)
    - training of the trainers and national replications
    - open libraries, an easy way to exchange literature (journals, articles, books etc)
    - public awareness to ensure public support
    - Regional workshops to share experiences

The workshop noted the need to collaborate with and not duplicate the work of other organizations such as relevant programs of SPREP, IMO, CPPS, CBD and SEAFDEC, and that information could be transmitted to other regional organisations if appropriate, to further transmission.

Priorities noted include:

1. taxonomy (the basic element for successful identification, and could utilize CBD), including a definition of which species are introduced,
2. baseline evaluations, including port surveys adopting standardized methodologies, noting that substantial examples currently exist as outlined in the Consultants' Report.
3. management and treatment of ballast water;
4. Countermeasures for new IMPs, which is linked to vector management
5. Sharing technology and data (equipment sharing occurs now through SPREP) in a way that is easy, accessible, and transparent;

Training targets identified included (not in priority order):

- Scientific: taxonomy and risk assessment analysis.
- Decision makers and government: awareness.

- Industry and stakeholders (both shipping and aquaculture, aquaria, research institutes): awareness.
- Customs inspectors.
- Marine Protected Area managers.

Theme 3: Options for funding IMPs management

The working groups discussed a range of options for start-up funding of IMP management including government appropriations, bilateral aid foundations, organizations such as IOC, NGOs, and the GEF. They also considered options for longer term and sustainable funding including activity-related economic instruments such as fees and fines for industry users (shipowners, aquaculturalists, aquarium industry).

The working groups noted that development of acceptable options typically involves complex discussions with a wide range of stakeholders. Funding from the private sector is an important consideration. A substantial study would be needed to develop accurate costings for initiatives addressing a range of issues including:

- Inventory and Baseline Information
- Vectors Management Database Development
- Risk Assessment Demonstration Projects
- Research Survey to locate the IMP experts and institutions in each economy
- Monitoring of IMPs
- Equipment for management
- Public education and information materials
- Training
- Performance evaluation of management
- Socio-economic and trade implications of IMPs

The workshop recommended that:

- APEC support an expert study of costings for a program on IMPs at the regional level (which could involve partnerships with existing international bodies), and as required, in member economies.
- The US and Russia continue discussing their proposed project on high-latitude introductions, noting that draft areas for such cooperation have been submitted by SakhNIRO.

Glossary

This glossary has been adapted from: Williamson, A.T., Bax, N.J., Gonzalez, E. & Geeves, W. (Editors) (2002). Development of a Regional Risk Management Framework for APEC Economies for Use in the Control and Prevention of Introduced Marine Pests, APEC Marine Resource Conservation Working Group, Final Report.

APEC	Asia Pacific Economic Cooperation
Ballast water	Any water and associated sediments used to manipulate the

	trim and stability of a vessel.
Baseline port survey	Biological surveys that determine the baseline level of introduced marine species in a port.
Biocontrol	Refers to the release of one species to control another.
Bioinvasions	A broad based term that refers to both human-assisted introductions and natural range expansions.
Border	The first entrance point into an economy's jurisdiction.
Contracting Party	Countries, Customs Union or Economic Union that have signed, ratified or acceded to a convention and therefore has accepted the legal obligations set out in the convention.
Cost benefit analysis	Analysis of the cost and benefits of a course of action to determine whether it should be undertaken.
Convention	An international treaty.
Cryptogenic	A species that is not demonstrably native or introduced.
Disease	Clinical or nonclinical infection with an aetiological agent.
FAO	United Nations Food and Agricultural Organisation
Fouling organism	Animals and plants, such as barnacles, mussels, and seaweeds that attach to human-made substrates, such as piers, navigation buoys, and the bottom of ships.
Gap Analysis	A technique that can be used to determine whether a country is compliant with a convention, guidelines, strategy, plan of action or other initiatives.
Governance	Implementing contractual relationships between individuals within an institutional environment. The process of making binding decisions for some collective.
Hazard	A situation that in particular circumstance could lead to harm. The measure of the likelihood of these circumstances and the magnitude of the subsequent harm is a measure of risk.
Hazard assessment	An assessment of associated hazards to qualitatively evaluate the likely risks posed to an environment on the basis of past activities.
IMO	International Maritime Organization.
Indigenous or native	Species that would be present without human interventions.
Intentional introduction	The knowing import or introduction of nonindigenous species into, or transplant through, an area or ecosystem where it was not previously established.
Introduction or	The human assisted movement of an animal to an area outside

translocation	its natural range.
Introduced marine pest	An introduced marine species that threatens human health, economic or environmental values.
Introduced marine species	A marine species that's movement has been assisted by human activities to an area outside its range.
Invasive	An alien species that becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity.
Marine pathogen	A disease causing marine agent.
National legislation	The laws, regulations and other measures imposed by an authority and applicable throughout the territory.
Naturalised or established	A non-indigenous species that produces self-sustaining populations.
Non-indigenous, alien, exotic, introduced or adventive	Species that have been transported by human activities – intentionally or unintentionally – into a region in which they did not occur in historical time and are now reproducing in the wild.
Non-invasive	A non-indigenous species that does not spread but remains localised within its new environment.
Native invasive	Species that get into modified habitats by their own means and then go through population explosions.
Pathway	The route (the geographic corridor from point A to point B).
Pest	A non-indigenous species that threatens human health, economic or environmental values.
Pre-border	Prior to introduction into an economy's jurisdiction.
Post-border	Within the economy's jurisdiction.
Quarantine	The holding of organisms under conditions that restrict their escape or the escape of organisms associated with them into the open natural environment.
Risk	The likelihood and magnitude of an event.
Risk analysis	Risk analysis is made up of three components: risk assessment, risk management and risk communication. The process seeks to identify the relevant risks associated with a proposed introduction and to assess each of those risks.
Risk assessment	The means by which the frequency and consequences of such events (risks) are determined.
Risk management	The culture, processes and structures that are directed towards the effective management of potential opportunities

	and adverse effects.
Risk management framework	An overview of the culture, processes and structures of risk management.
Source	An umbrella term for a pathway. Examples are shipping, aquaculture.
SPREP	South Pacific Regional Environment Programme.
Unintentional introduction	An introduction of nonindigenous species that occurs as a result of activities other than the purposeful or intentional introduction of the species involved, such as the transport of nonindigenous species in ballast or in water used to transport fish, molluscs or crustaceans for aquaculture or other purpose. Involved is the release, often unknowingly, of non-indigenous organisms without any specific purpose.
Vector	The physical means or agent by which a species is transported. Ballast water, ships' hulls, and the movements of commercial oysters are examples of vectors.

PART A
Information Papers

These papers describe the context, issues and concerns.

Paper 1	Introduced Marine Pests: the threat
Paper 2	Introduced Marine Pests: vectors and the introduction process
Paper 3	Introduced marine Pests: legal regime and institutional framework

INTRODUCED MARINE PESTS: The Threat

Overview

We rely on the oceans as a source of food and income, as a medium for transport and infrastructure, and as a place for recreation. Our reliance is well documented, and is increasing as the seas become ever more critical for the production of protein to feed the growing human population. However the oceans and marine biodiversity are under threat, and the consequences, linkages and impacts of unsustainable uses are increasingly apparent. Negative impacts associated with fishing, maritime transport, and increasing development and intensive use of coastal lands include unsustainable fishing practices, land based and marine pollution, and habitat destruction.

The Asia Pacific Economic Cooperation (APEC) held a workshop on Introduced Marine Pests, 3-5 May 2004, to look at approaches that APEC can take to address the management of intentional, and unintentional, movement of marine species outside their natural range. Species moved outside their natural range are known as introduced marine species (IMS). When species are moved to a favourable environment, free from the predators and diseases that control them in their home range, IMS can become introduced marine pests (IMP) and establish large populations. This can occur if they are overwhelmingly successful in preying on local species or out-competing them for food or habitat. They are most likely to be regarded as pests where the species or habitats that they threaten are important for local fisheries, aquaculture and amenity.

Introduction of marine species has been occurring as long as we have used vessels to travel between marine habitats but they are often unrecognised. A massive invasion by a marine species such as an alien barnacle species is often much less conspicuous than, for example, an invasion by a brightly flowering garden plant (Williamson et al, 2001). However, over the past 20 years IMPs have received global attention as an emerging issue for management.

This paper describes what IMPs are, the threats that IMPs pose for marine ecosystems and biodiversity, marine based industries, human health and marine values and uses, and collates useful references.

Definition

By definition, an introduced marine species is a species that's has been moved by human activities to an area outside its natural range (FAO 2000). However, not all IMS become pests.

APEC has chosen to use the term "introduced marine pest" to describe a species that occurs outside its natural range that also shows threatening characteristics. Harmful human and fish pathogens moved by human activities to an area outside their natural range also fit the definition of an IMP. Other terms used include: alien, exotic, invader, non-indigenous, nuisance or

introduced species. The distinction between an introduced marine species (IMS) and an introduced marine pest (IMP) depends on the impact of its introduction and population density.

The point at which an introduced species becomes an introduced pest is vague. Ecological factors such as predation by local species and limitations in water quality or availability of local food and habitat, or the inability to breed in the new environment prevent most species from reaching the densities required to achieve pest status (Williamson et al, 2002).

Box 1. Introduced Pests in San Francisco Bay

Two hundred and twelve established exotic species have been identified in the San Francisco Bay and delta area. These are so pervasive that virtually every coastal habitat in the bay is now dominated by one or more exotic species (Cohen and Carlton 1995).Within San Francisco Bay, it is thought that a new exotic species establishes itself every 3-6 months. Studies suggest that four vectors have been roughly equal in importance in the introduction process: ship biofouling (26 per cent of introduced species), ballast water (24 per cent), accidental introductions due to mariculture (22 per cent), and deliberate introductions (20 per cent). Some introductions have resulted in the collapse of fisheries and massive losses in revenue, including the impact of the Asian clam *Potamocorbula amurensis*, which reaches densities of over 10,000 per square metre.

Impacts on Marine Uses and Values

Increasingly, scientists and policy makers see the introduction of alien species as a major threat to marine biodiversity and a contributor to environmental change (Bax et al. 2001). In addition to ecological impacts, IMPs can have negative impacts on fishing, aquaculture other marine based industries, marine uses and values (Williamson et al, 2002). They can also impact human health through toxic algal blooms and pathogenic bacteria. Table 1 describes the likely impacts of IMPs on marine uses and values that were identified at the APEC MRC IMP Workshop in 2001.

Table 1. Known impacts on selected marine uses and values.

Marine Uses and Values	Impacts
Ecosystem • Structure • Biodiversity	• Decreased biodiversity Compete with native spp. Predate on native spp. Loss of iconic and rare spp. • Alteration of ecosystems Dominate habitats Disturb habitats Remove ecologically important spp. Change ecological processes (energy flow, nutrient cycling) • Institutional pressures Direct cost of combating incursions

Marine Uses and Values	Impacts
Commercial Industries (shipping, fisheries and aquaculture, marine and coastal tourism, petroleum exploration and production, marine infrastructure)	• Losses in potential economic output Loss of stock Decreased efficiency Loss in revenue Loss of productivity • Maintenance costs • Institutional pressures Direct cost of combating incursions Additional regulations (quarantine, prevention)
Customary, recreational and artisanal activities	• Loss in productivity • Loss of aesthetic values • Loss of iconic spp. • Institutional pressures Direct cost of combating incursions Additional regulations (quarantine, prevention)
Human Health	• Death • Injury/illness • Institutional pressures Direct cost of combating incursions Monitoring Additional regulations (quarantine, prevention)
Social values	• Loss of existence values • Loss of aesthetic values • Socioeconomic impacts Loss of employment Loss of revenue

Box 2. The impact of *Asterias amurensis* on the Derwent Estuary

The Northern Pacific seastar (*Asterias amurensis*) was detected in the Derwent estuary, Tasmania, Australia, but misidentified as a native species for at least 5 years. Transported to the Derwent by ballast water from ships that had uploaded ballast water from a Japanese port, the seastar entered the southern hemisphere and established a reproductive population as its physiological requirements matched local conditions. Since its introduction, the Northern Pacific seastar population numbers and distribution has increased. The seastar has displaced and predated on native species and caused losses in local shellfish aquaculture stocks.

Summary

Human uses of the marine environment have long been associated with the introduction of marine species. The threats caused by some of these species can be severe and impact on a wide array of marine uses and values.

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INTRODUCED MARINE PESTS:
Vectors and the Introduction Process

Overview

Marine species have been unintentionally transported to new marine ecosystems for centuries. The spread has steadily increased in parallel with global human migrations and trade. In the era of sailing vessels, the duration of journeys, the small size of vessels and consequently the small hull areas and cargo or ballast volumes limited the scope for species transfer. Today, the rapid movement of bulk commodities and people over long distances, in ships and aircraft, has hugely increased the opportunities for movement of species across water systems. Other marine based activities and industries have also facilitated the movement of species. This paper discusses the uses and activities that facilitate the movement of introduced marine pests and the introduction process.

Vectors

Pathways for marine pests follow trading routes, and subsequent flow of product (fishery, aquaculture, bulk commodity), and are described as the geographical corridor between point A and point B (Carlton 2001). Once a pathway between two places has been established, there are numerous vectors that can physically transport the species from one place to another

Vectors for marine introductions are any mechanism that physically transports a marine organism from coastal waters to similar habitats outside the species' home range. These species will only pose a threat to the recipient location if they survive, establish and become invasive. Historically vectors are associated with shipping and have included biofouling (and boring), dry and semi-dry ballast, ballast water. Other early unintentional introductions have been associated with the importation of exotic species for mariculture (Campbell and Hewitt 1999).

Emerging vectors include the aquarium trade, recreational users, and the marine based infrastructure (i.e. oil, gas and construction industries). Factors that have contributed to the invasion process include: advances in technology and changes in the practices of shipping and other marine based industries, increasing trade and partners, increased speed and shorter transit time between habitats and the absence of management. These factors have increased the number of vectors available for species introductions. Increasing populations in the coastal zone have also introduced more enteric bacteria, viruses and fungi into the adjacent waters as waste discharge (Goldberg 1995). Table 2. describes the vectors for new introductions (New) and vectors that translocate introduced species domestically (Dom) and the types of species likely to be transported by these.

Table 2. Anthropogenic vectors for marine introductions (adapted from Carlton 2001 and Williamson et al 2002).

Source	Vector	Target taxa	Source region	Brief Description
Commercial shipping	Ballast water	Plankton, nekton, benthos in sediment	New / Dom	Water ballast is loaded from one location and offloaded at another.
	Hull fouling	Encrusting, nestling, and some mobile species	New / Dom	Biofouling species attached to ships can fall off by themselves or be removed during maintenance into new waters. They may also spawn
	Solid ballast	Encrusting, benthos, meiofauna and flora	New / Dom	Biofouling species attached to solid ballast, including rocks, shingle, cobble, and sand –loaded at source and off-loaded in or near a harbour.
Aquaculture and fisheries	Intentional release for stock enhancement	Single species (plus associated species)	New / Dom	The introduction of species to enhance stocks, create new fisheries, etc, is a vector for introducing marine pests.
	Gear, stock or food movement	Various	New / Dom	Moving aquaculture and fishing equipment (buoys, nets, etc.) is another vector for fouling species introductions. Stock can also escape and establish populations in proximity to aquaculture farms.
	Discarded nets, floats, traps, trawls, etc.	Various	New / Dom	Floating debris, including fishing nets and plastics can carry a variety of fouling species.
	Discarded live packing materials	Various	New / Dom	Packaging materials can carry a variety of fouling species and can enter waters when disposed.
	Release of transgenic species	Single species	New / Dom	Transgenic species released into waterways
	Unintentional release	Various	New / Dom	Parasites and pathogens of aquaculture species can be introduced unintentionally. Through introduction of new farm stock or in association with live catch or frozen feed for stock.
Drilling platforms	Ballast water and surrounding water	Plankton, nekton, benthos in sediment	New / Dom	Slow movement of drilling platforms, used for oil exploration and extraction can result in introduction of plankton and nekton in the ballast.
	Hull fouling	Encrusting, nestling, and some mobile species	New / Dom	Movement of drilling platforms, used for oil exploration and extraction can result in introduction of fouling organisms attached to the platforms.
Canals	Movement of species through locks due to water motion or active swimming	Various	New	Species introductions can be facilitated by movement of marine fauna and flora through locks in man made canals.

Source	Vector	Target taxa	Source region	Brief Description
Aquarium Industry	Accidental or intentional release	Aquarium fauna and flora	New / Dom	This live trade in fish can result in the intentional or accidental released of species that can establish populations in the recipient region.
Recreational boating	Hull fouling	Encrusting, nestling, and some mobile species	New / Dom	Oceanic and domestic recreational vessels can transport species via hull fouling. Recreational vessel pathways vary considerably.
Dive practices	Snorkelling and scuba gear	Algal spores, bacteria, some small mobile species,	New / Dom	Divers taking personal dive equipment with them on their travels may accidentally transport marine fauna and flora.
Floating debris	Discarded plastic debris	Encrusting and some mobile species	New / Dom	Plastics, timber and other floating debris may be encrusted with biofouling species. These can be transported across seas.

Summary

Humans play an integral role in the movement of species outside their natural range. There are many vectors that physically transport species; these are typically associated with trade and transport.

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INTRODUCED MARINE PESTS: International Legal and Institutional Framework for Managing Introduced Marine Pests

Overview

Recent international efforts to protect and conserve the marine environment, and to ensure that uses are consistent with principles such as ecologically sustainable development (ESD), have identified introduced marine pests as a major challenge for management.

Introduced marine pests (IMPs) threaten the health of marine ecosystems, marine-based industries, human health, values and aspirations, and no single vector accounts for all introductions. The range of impacts and diverse sources complicate management efforts, which is traditionally sectoral.

No comprehensive, cross-sectoral approach for preventing, controlling and managing IMPs is yet to be promoted in the international forum. However the Asia Pacific Economic Cooperation (APEC) has recognised the need for a single management framework to assist member Economies to address IMPs. APEC, through the Marine Resource Conservation Working Group (MRC WG) has supported the development of a management framework that:

- complements existing international and regional frameworks and arrangements;
- establishes a work program for facilitating the development and implementation and monitoring of IMP management approaches;
- supports options for building capacity of it's members;
- facilitates the transfer of species information, research developments and IMP incursions throughout the APEC region; and
- investigates funding options for Economies.

This background paper provides a brief summary of the existing international regulatory and institutional regime for managing IMPs.

A. Legally Binding Instruments

The awareness of the need to manage IMPs has existed for over 20 years; however relatively few international instruments attempt to address this threat and no single instrument addresses all vectors. Many of the existing instruments support ecologically sustainable development; the precautionary approach; ecosystem based management; integrated coastal zone management and integrated oceans management. The applications of these principles is fundamental for ensuring management measures that achieve long-term sustainability of marine uses and the conservation of marine biodiversity are holistic, integrated, and precautionary in approach.

1. The United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea 1982 (LOSC) attempts to provide a framework for the management of the marine environment,

marine resources and uses. The LOSC requires States to ensure they "take all measures to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes" (Article 196). These responsibilities are typically implemented domestically through conventional quarantine regulations and risk based import regulations, and conservation measures that aim to protect the marine environment from disturbances.

Vectors:
- Non-specific (shipping, intentional introductions etc).

Link:
http://www.un.org/Depts/los/Convention_agreements/convention_overview_convention.htm

2. Convention on Biological Diversity

The Convention on Biological Diversity (CBD) acknowledges that contracting parties should "prevent the introduction of, control or eradicate those alien species, which threaten ecosystems, habitats or species" (Article 8 (h)). These responsibilities are typically implemented domestically through environmental legislation and strategies.

The CBD has recognised the serious impediment that alien species pose to the conservation and sustainable use of biodiversity and the urgent need to address the impact of invasive alien species. Some of the ways the CBD is addressing this issue are through developing legislation and guidelines at national, regional and international levels. The CBD has also established a clearing house mechanism (CHM) to facilitate scientific and technical cooperation in the field of invasive alien species. Other measures include the development of a *Toolkit of Best Preventative and Management Practices*, capacity building exercises, and working with other international bodies.

Vectors:
- Non-specific

Link:
http://www.biodiv.org/programme/cross_cutting/alien

3. The International Convention for the Control and Management of Ships" Ballast Water and Sediments (2004).

The recently adopted "new IMO Convention" regulates the discharge of ship's ballast water and sediments to prevent damage to marine and coastal ecosystems from invasive or toxic foreign aquatic species and pathogens that can be transported in the seawater and sediment used for ships ballast. The Convention gives parties the right to take, individually or jointly with other parties, more stringent measures with respect to the reduction or elimination of the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments consistent with international laws.

The Convention requires members to ensure that their ports have appropriate receiving facilities to receive sediments; encourages research and monitoring

of the effects of ballast water management in waters under their jurisdiction; survey and certify ships and monitor ships entering their ports; and support and encourage technical assistance for parties that request technical assistance to train personnel, and ensure availability of relevant technology, equipment and facilities.

The Annex to the Convention is comprised of five sections (A-E) that prescribe; general administration, management and controls required for ships (ships are required to have a Ballast Water Management Plans approved by the relevant Administration), additional measures imposed by parties; standards for ballast water management (ballast water exchange standards and ballast water performance standards) and survey and certification required for ballast water management.

Vectors:
- Shipping, ballast water and sediments

Link:
http://www.imo.org

4. Convention on the Control of Harmful Anti-fouling Systems on Ships (2001)

The Anti-fouling Convention (not yet entered into force), is designed to help phase out toxic anti-fouling chemicals that are used on the hulls of ships. Parties to the Convention are required to prohibit or restrict the use of harmful anti-fouling systems on ships that fly their flag.

The Anti-fouling Convention lists prohibited and controlled substances in Annex 1 and provides for the establishment of a technical group to include relevant people to review the proposed substances to be restricted or prohibited. Four resolutions have been adopted by the Convention that look at future anti-fouling work, test and approval methodology of anti-fouling systems and promotion of technical cooperation.

Vectors:
- Shipping,

Link:
http://www.imo.org

5. International Convention for the Prevention of marine Pollution from Ships, 1973 as modified by the protocol of 1978, thereto MARPOL 73/78

MARPOL 73/78 was adopted to prevent operational pollution from ships that impact on the marine and coastal environments. Measure for prevention and control of pollution are prescribed in the Annexes (oil, noxious liquid substances, harmful substances in packaged form, sewage etc). MARPOL 73/78 also identifies “special areas” where activities are further regulated or prohibited in recognition of their vulnerability to pollution.

Vectors:
- Shipping

Link:
http://www.imo.org

6. Agreement on Application of Sanitary and Phytosanitary Measures (Marrakach, 1995)

The Agreement on Application of Sanitary and Phytosanitary Measures (SPS Agreement) provides a framework for members to apply food safety and animal and plant health measures. Sanitary and Phytosanitary measures include measures applied to protect human, animal or plant life of health from a) the entry, establishment or spread of pests, diseases, disease carrying organisms; b)to prevent or limit damage from the establishment of spread of pests.

Vectors:
- Intentional introduction of marine fish and plant products.

Link:
http://www.wto.org/english/tratop_e/sps_e/sps_e.htm

Other Relevant Legal Instruments

Other instruments not specific for managing IMPs that have relevant provisions include;
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity (Montreal, 2000)
- Convention on international trade in endangered species of wild fauna and flora (Washington, 1973)
- Convention on the Law of Non-navigational Uses of International watercourses (New York, 1997).
- The Agreement for the Implementation of the Provisions of the Convention Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1992)
- International Health Regulations (Geneva, 1982)

B. Non-legally Binding Instruments

In addition to legally binding instruments that recognise IMPs as a threat to the protection and conservation of marine biodiversity, there are numerous non-legally binding instruments (codes of conduct, declarations, resolutions and recommendations) that address the management of IMPs. Cumulatively, these binding and non-binding instruments provide the policy framework for managing IMPs at the global, regional, sub-regional and national levels. Some of the key ones are identified below.

1. IMO Resolution A.868(20) 1997 Guidelines for Control and Management of Ships' Ballast Water to minimise the transfer of Harmful Aquatic Organisms and Pathogens

The IMO Resolution provides countries guidelines to minimise the risk of unwanted organisms from ballast water and sediment exchange.

2. FAO Code of Conduct for Responsible Fisheries

The FAO Code of Conduct for Responsible Fisheries contains Guidelines on a Precautionary Approach to Capture Species and Species Introduction. These were developed in recognition that the consequences of species introductions are not always identified, and therefore a precautionary approach is necessary.

3. CBD Guiding Principles for Prevention, Introduction and Mitigation of Impacts of Alien Species

These Guiding Principles outline prevention and mitigation measures for alien species. Although not focussed on marine introductions, these Guiding Principles offer countries a process for managing the impacts of alien species.

4. ICES Code of Practice on the Introductions and Transfers of Marine Organisms (1994)

The Code of Practice recommends responsible practices and processes to ensure introductions and transfers of marine organisms do not impact negatively on the marine environment.

5. IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (2000)

These Guidelines were designed to assist countries to reduce the threats posed by invasive alien species to global biodiversity.

6. Asia Regional Guidelines on Responsible Movement of Live Aquatic Animals

The Regional Guidelines provide policy guidance to deal with "Responsible Movement of live Aquatic Animals" in response to the introduction and movement of aquaculture stocks and consequent movement of pathogens.

7. East Asian Regional Strategic Action Plan (SAP) to Minimise the Transfer of Harmful Aquatic Organisms and Pathogens in Ships' Ballast Water

GloBallast has facilitated the development of a Strategic Plan of Action to Minimise the Transfer of Harmful Aquatic Organisms and Pathogens in Ships' Ballast Water. The Action Plan aims to support countries to implement the new IMO Convention and targets administrative, legislative, and policy measures.

C. Institutional Framework

Many global and regional institutions have established work programs, guidelines and strategies to prevent, control and eradicate IMPs. These form a useful guide for actions, offer capacity building and can also serve to integrate international efforts into the regional implementation efforts.

1. The Global Ballast Water Management Programme (GloBallast)

The GloBallast Programme is a global programme implemented by the International Maritime Organisation (IMO), United Nations Development Programme (UNDP) and the Global Environment Facility (GEF). GloBallast assists developing countries to reduce the transfer of IMPs in ballast water. GloBallast is working through six initial demonstration sites to implement existing IMO guidelines and the new Convention. Technical assistance includes education and awareness, ballast water risk assessments, port baseline surveys, training, legal and regulatory capacity building and self financing mechanisms. Regular regional meetings are held by Globallast.

Vectors:

- Shipping, ballast water

Links:

http://www.globallast.com

2. Global Invasive Species Programme (GISP)

The Global Invasive Species Program (GISP) is coordinated by the Scientific Committee on Problems of the Environment (SCOPE), the World Conservation Union (IUCN), CAB International (CABI) and the United Nations Environment Programme (UNEP). GISP was established to address global threats caused by invasive alien species (IAS) and to provide support to the implementation of Article 8(h) of the Convention on Biological Diversity, the CBD. GISP facilitates access to tools and information that can assist countries, agencies and communities to mange invasive alien species, including marine species. Approaches to prevention and management have been made available and supported by capacity building training programs.

Vectors:
- Non-specific

Links:
http://www.gisp.org

3. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)

The Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) is a regional programme implemented by (UNDP, IMO and funded by the Global Environment Facility. PEMSEA has established intergovernmental partnerships to assist countries in managing marine uses sustainably whilst conserving marine biodiversity.

Vectors:
- Non-specific

Links:
http://www.pemsea.org

4. South Pacific Regional Environment Programme (SPREP)

The South Pacific Regional Environment Programme (SPREP) is an intergovernmental organisation that encourages members to work together to resolve local environmental issues such as land based and ship source pollution. IMP management has been identified as an emerging issue for SPREP member countries.

Vectors:
- Shipping, ballast water; aquaculture, intentional import

Links:
http://www.sprep.org

5. Northwest Pacific Action Plan Regional Coordinating Unit

The Northwest Pacific Action Plan Regional Coordinating Unit is a regional programme co-hosted by Japan and the Republic of Korea. The Unit investigates the development and implementation of responsible marine and coastal management. Efforts have focussed on sea-based sources of pollution, but work programs to protect marine resources and biodiversity have been established.

Vectors:
- Shipping, ballast water

Links:
http://merrac.nowpap.org/

5. Permanent Commission for the South Pacific (CPPS)

CPPS is an intergovernmental organisation established in 1952 with the purpose to coordinate marine policies, ensuring the conservation and sustainable use of the marine resources and the protection of the marine environment. CPP is also the Executive Secretariat of the Convention for the Protection of the Marine Environment and coastal Areas of the south pacific, approved in 1981. The regional cooperation activities embrace: monitoring and control of marine pollution; sustainable development of fisheries; marine and coastal biodiversity; integrated coastal zone management; marine and coastal protected areas; climate change (El Nino phenomenon). The introduction of exotic species is a priority concern in the South east pacific Region.

Vectors:
- Shipping, ballast water, aquaculture

Links:
http://www.cpps.org

Summary

There has been considerable international and regional effort placed on ensuring the sustainable use of the marine environment whilst conserving biodiversity. Many instruments and institutions highlight the need to address threats to biodiversity, including over-harvesting, pollution, pressures of coastal developments, and habitat destruction. More recently, introduced marine pests have been added to the top five threats to the marine environment. Despite this significance of this emerging issue, there are few instruments that aim to address IMPs in a comprehensive way.

PART B
Discussion Papers

These papers describe the current situation and identify options for the way forward.

Paper 1	Current Capacity: Synopsis of Economy Options Papers
Paper 2	Best Practises: IMP Management Approaches
Paper 3	APEC Wide Measures: Capacity Building and Training
Paper 4	APEC Wide Measures: Draft Workshop Discussion Paper

CURRENT CAPACITY
Synopsis of Economy Options Papers

Overview

The capacity to develop and implement management approaches to address introduced marine pests varies considerably across economies in the APEC Region. Considerable efforts have been taken by several economies to address IMPs and associated issues. These have included developing: national action plans and strategies; species specific control plans; data intensive risk based decision-making tools; comprehensive baseline surveys of vulnerable areas, eg. ports; and comprehensive emergency response plans. At present, common measures are applied to relatively few vectors (aquaculture and shipping) and there is no single comprehensive framework (policy, operational, research) for managing all vectors and issues.

This paper reports on the institutional themes, constraints, challenges and opportunities across the APEC region. These issues were identified from the situation and gap analyses conducted for each APEC economy and reported in the *Economy Options Papers*.

Economy Options Paper Development

Informal situation and gap analyses on the capacity to manage IMPs were conducted for each APEC Economy. Information was extracted from the Phase I Consultancy Report and updated through web and literature searches, interviews, questionnaires, and other correspondence with the economies. These analyses identified the current situation, areas where further effort could be taken and also identified best practices for addressing the IMP issue (with potential for regional implementation). Potential measures were suggested in the form of a series of actions where gaps were identified. All information was reported in the *Economy Options Papers* and sent to economies for validation of information and usefulness of potential measures and to seek updates on recent activities or measures. The individual *Economy Options Papers* can form the basis for individual economy action through specific suggestions for strengthening their IMP management frameworks. They also complement the regional focused APEC IMP Management Framework.

Institutional Themes

The institutional capacity of economies to manage IMPs was determined by examining polices, procedures, practices and resources currently in place. This process included identifying relevant capacity elements and assigning a ranking based on the development status. Capacity elements included institutional structure, management ability, monitoring, surveillance and compliance, education and awareness programs for sources, and the participation in international and regional forums and implementation of guidelines related to IMP issues.

The following is a summary of institutional trends identified from the development of the *Economy Options Papers*.

- Lead for introduced marine pest responsibilities not always defined.
- Lack of coordination between agencies with IMP or marine environmental protection responsibilities is common.
- Management approaches are not integrated across jurisdictions, or sectors.
- Education and job training is often limited.
- Limited development of specific legislation for managing IMPs.
- Integration of ecological and socioeconomic information into decision making is limited.
- Effort focuses on terrestrial alien species/biodiversity management, not same effort placed on marine.
- Need for IMP policies to compliment biodiversity conservation and environmental protection policies.
- Limited identification of vectors and role of these in managing IMP issues.
- Limited scoping studies of impacts completed.
- Limited ability to identify IMS and IMPs.
- Many vulnerable environments – ports, aquaculture locations etc, not being managed for IMPs.
- Limited baseline data for many vulnerable environments
- Linkages to international and regional forums are not always used or known.

Priorities:

- In many cases no single agencies were tasked with lead of introduced marine pest responsibilities. Need to ensure lead agency has been identified and the role is widely recognised.
- Measures are commonly sectoral based. Need to ensure measures for IMPs are integrated across sectors.
- IMP threat is predominantly a coastal threat which can lead to some jurisdictional issues. Need to ensure management is integrated across jurisdictions.
- Awareness of IMPs and need to manage them and their impacts is varied. Need to ensure adequate awareness of the need to manage IMPs exists.
- Few economies have specific legislation for managing IMPs, however such management can be effected under existing legislation and administrative arrangements. Need to assign responsibility to an agency to administer legislation.
- Many economies have or are establishing invasive programs for terrestrial introduced species. Need to ensure these also consider marine pests or can be used as framework for developing complimentary efforts for IMPs.

Constraints and Challenges

There are many constraints and challenges for building capacity and management of IMPs in economies. These often result from internal constraints - resource prioritisation, awareness, absence of information and expertise, but also external challenges.

The following is a summary of constraints and challenges identified from the development of the *Economy Options Papers*.

- IMP introductions and vectors are diverse and complex.

- Institutional structure and capacity is diverse and complex.
- Priorities for resourcing and funding measures to protect the marine environment differ.
- Lack of expertise in economies (taxonomic, biosecurity etc)..
- Comprehensive identification of threats not always performed.
- Absence of objectives for IMP management.
- Reliance on sea transport and fish trade,
- Reliance on other marine based industries and new uses.
- Lack of communication and information transfer mechanisms.
- Lack of community awareness of what IMPs are and what can be/is being done.
- Absence of reliable information on IMPs (species life history characteristics, control methods, risk assessment methodologies, management approaches, technical developments etc).

Priorities*:*

- Threat management often manages threats without identifying what needs to be protected. Need to identify ecological, economic and social components that need to be protected from IMPs.
- Technical expertise is often absent. Need to investigate ways to train existing staff, access experienced staff or coordinate existing expertise.
- Communication programs to increase awareness and engender stewardship are absent in many economies. Development of targeted communication programs can increase awareness of the issue.
- Access to information is not available to all economies. Need to investigate approaches to increase access to information (may involve regional facilitation).

Opportunities

There are many opportunities to assist economies to manage IMPs. These include: participating in relevant international and regional forums, implementing their conventions, guidelines, utilizing existing institutional efforts for managing other threats to biosecurity and enhancing existing approaches. It is important to identify and avoid the potential for unproductive duplication of efforts and enhance the potential synergies with other forums and initiatives relevant to management of IMPs.

The following is a summary of opportunities identified from the development of the *Economy Options Papers*.

- Ability to utilise existing, global and regional linkages and cooperative projects.
    - International (IMO, FAO, GEF, UNDP, UNEP etc)
    - Regional (NACA, SPREP, PEMSEA, etc)
- Establish IMP research and development programs to complement existing biodiversity or threat studies.
- Increased attention to developing holistic, integrated plans to plan marine and coastal uses, i.e. integrated coastal zone management plans, oceans strategies.

- Increased attention to developing plans and education programs for the prevention of harmful pathogens associated with fisheries and aquaculture operations.

Priorities*:*

- Participate in the development and implementation of a global ballast water regime. IMO has established many guidelines, conventions and resolutions to assist in preventing impacts of introduced marine species on coastal environments.
- Many economies have established approaches to prevent the introduction of harmful pathogens associated with fisheries and aquaculture operations. These programs can be used as a basis for establishing IMP approaches and capacity.
- Research on threats to the marine environment is being conducted by universities, government agencies, and research institutes. This work can be adapted to also include investigations on IMPs and associated issues and integrated.

Summary

Areas that could be assisted from regional action were identified by reviewing trends in capacity across the whole APEC region. Common trends identified include the lack of expertise (scientific, technical, etc) and limited access to important information for decision making.

BEST PRACTISES
IMP Management Approaches

Overview

The complexity of IMP issues, the range and diversity of IMP threats and of institutional structure, culture and capacity of economies, precludes a single approach to addressing IMPs across the APEC Region. However, APEC economies can benefit from a standardized programme of work that incorporates local, regional and international experiences and supports the *APEC Elements of an IMP Management Framework*. This could offer a collection of measures to reflect recognition of the range of financial and administrative opportunities and constraints. Such a system encourages economies to select, modify and continuously adapt the measures to their specific circumstances. During the development of this system, it is important to ensure that APEC builds on and supports existing efforts such as the uniform standardised global regime for ballast water.

This paper outlines the development and origin of the potential measures suggested in the *Economy Options Papers* and showcases best practices identified in economies.

Development of Guidance for an IMP Work Programme and Potential Measures

A standardized programme of work to establish a comprehensive IMP management framework was devised to assist the development of potential measures that APEC economies could take to address IMPs. For each economy, existing actions and outcomes were used as a basis and several potential measures were suggested to consolidate and extend the existing IMP program. In some cases the suggestions involve a sequence of actions where addressing one step is a pre-requisite for the next. In others the suggestions identify a range of actions that can usefully be carried out simultaneously. As far as practicable, alternatives are presented to reflect recognition of the range of financial and administrative opportunities and constraints. The program aims to develop; international and regional linkages; preventative measures; comprehensive surveillance, monitoring and reporting systems; a network of training and capacity building, quarantine; preparedness and response; science and technology; legislation, policies and jurisdiction; and resources and funding.

Guidance for an IMP **Work** Programme

1. The need for management is established

1.1 Threat is recognised

High level recognition of the significance of the threat that IMPs pose to the marine environment, marine uses and values, and the need for coordinated management approach.

Suggested Actions:

- Emphasise the need for ministerial support across relevant ministries and local administrative regions to recognise and respond to IMPs as a priority issue for action.
- Enhance governance arrangements to facilitate IMP management.
- Develop an IMP work plan that reflects international and regional developments in IMP management and approaches (including IMO, FAO and APEC work).

1.2. Socioeconomic and trade implications are understood

Information base on socioeconomic implications of IMP incursions and management options established.

Suggested Actions:

- Develop a methodology for determining the costs and benefits of IMP incursions and IMP management.
- Identify the costs and effectiveness of management options that deal with the establishment of new and spread of existing introductions of IMPs.
- Identify the costs and benefits attributed to existing IMP introductions and incursions in your economy and elsewhere and the implications of further introductions to your economy.

1.3. Community, Industry and government agencies are made aware

Awareness initiatives that raise institutional, community and industry awareness of the threats that IMPs pose and the vectors for introduction.

Suggested Actions:

- Improve community and stakeholder understanding of IMPs, including the threats that IMPs pose, identify high risk species and promote government measures.
- Develop focussed educational campaigns and training to inform industry of the potential dangers of IMPs; how they are transported, and what can be done to prevent the possibility of an IMP outbreak and control or mitigate incursions.
- Establish formal communication mechanisms that facilitate information exchange between government and industry, including the distribution of information on government measures, research etc.

2. A strategic framework for management is put in place

2.1. National baseline and situation analysis is compiled

Activities to determine current situation and identify possible new pests.

Suggested Actions:

- Baseline surveys conducted of areas of potential risk such as ports, aquaculture sites and heavily used coastal marine environments to establish baseline and any current introduced species or Introduced Marine Pests.
- Database of species records established
- Unknown or unexpected species checked with global taxonomic experts

- Report prepared on species known to be introduced, with a discussion of their known or potential role as IMPs.
- Program developed for regular short term monitoring of areas at risk and loger term monitoring of other areas.

2.2National Strategy is developed

National strategy developed that describes current and proposed actions for the prevention and management of IMPs, is inter-ministerial and cross-sectoral in membership.

Suggested Actions:

- Identify operational objectives and establish a whole of government strategy that lists actions, milestones and assigns responsibilities to agencies to meet and monitor these objectives.
- List recommendations for implementing national actions to prevent introduction, control eradicate and mitigate IMPs.
- Work with all agencies, provincial units and stakeholders to provide management guidance to develop an integrated process to address IMPs to support any formal government IMP strategy.

2.3 National legislation is put in place

Implemented legislation that authorises responsible practices, prescribes agencies with general IMP responsibilities and enforcement, lists key IMP species, by creating new legislation and/or modifying existing legislation to encompass a new IMP management framework. These should be consistent with international and regional obligations as stated above (IMO, FAO, etc).

Suggested Actions:

- Establish national legislation that regulates activities and advocates responsible actions to prevent the introduction of IMPs from both international and domestic activities.
- Establish an IMP legislative framework that amends existing pieces of legislation that cover quarantine, fisheries, environmental protection, shipping and transport etc to include IMP provisions.
- Amend current legislation with provisions that outline requirements for developing IMP management plans that address IMP detection, quarantine, prevention, control, mitigation, eradication i.e., action plans or threat abatement plans.

2.4. Administrative responsibilities are designated

National agency assigned responsibility to carry out or coordinate government actions and functions, e.g. regulating high risk activities, developing and maintaining responsible IMP practices, policies and procedures, collecting and sharing IMP information and enforcing IMP legislation and regulations.

Suggested Actions:

- Assign an agency lead role for IMP matters.
- Define and extend IMP responsibilities to each national and provincial agency that manages activities associated with IMP introductions and incursions.
- Establish a new unit that consists of at least a manager, policy adviser and technical officer.

2.5 National coordination mechanisms are put in place

Committee, taskforce or group that crosses national and state departments established (fisheries, aquaculture, shipping, ports, agriculture, environment, health) and include representatives from wider stakeholders (industry, conservation groups, community groups) to coordinate actions, facilitate transfer of information, monitor developments, etc.

Suggested Actions:

- Establish an inter-departmental committee for coordinating IMP matters that includes representatives from national and provincial departments.

- Supplement an existing committee that oversees marine and ocean management by adding IMPs to the agenda.
- Establish a formal coordinating mechanism (committee) that oversees IMP management, includes representatives from national and provincial government agencies, research, industry, community and non government organisations.

3. Management mechanisms are put in place

3.1. Management plans are developed

Programs need to effectively prevent, detect, quarantine, eradicate, control and mitigate IMPs. These could be species specific, vector specific, cross sectoral or all of the above.

Suggested Actions:

- Develop an IMP non-species specific action plan that can be adapted for species of concern.
- Establish emergency management procedures for IMP incursions that focus on control and eradication.
- Establish a National Action Plan for preventing IMPs from ballast water (consistent with IMO recommendations). This could be adapted for other high risk vectors.

3.2. Relevant officials and community members are adequately trained

Relevant officials and community members with practical IMP responsibilities participate in national, regional and international training programs on specific IMP issues, management techniques etc.

Suggested Actions:

- Support the establishment of IMP training program for the APEC region.
- Arrange for relevant staff to participate in international, regional and national IMP related workshops and conferences.
- Build upon existing skills developed from aquatic health management measures to begin training staff for IMP matters.

3.3. Existing instruments for IMP management are implemented

Existing conventions, agreements and guidelines ratified by implementing national legislation consistent with that recommended measures to prevent, control, manage and mitigate IMP incursions from a variety of vectors/sources.

Suggested Actions:

- Implement IMO guidelines and support the rapid implementation of the new IMO ballast water convention.
- Ratify relevant IMP instruments as identified from APEC recommendations.
- Adapt or develop complimentary measures to the CBD initiatives that target introduced terrestrial species.

3.4. Regional initiatives and cooperation in place

Involved in developing, supporting and participating in initiatives to strengthen the ability of economies and the region to address IMPs.

Suggested Actions:

- Establish a node for a regional communication network with neighbouring economies for notification for IMP incursions, developments in treatment and control methods etc.
- Work with neighbouring countries to establish a Regional Task Force and Regional Action Plan for ballast waters matters as recommended by IMO.
- Support cooperative projects to establish safe transport corridors between economies i.e., safe ballast water uploading locations for ports, certified aquaculture operations, cleaning procedures etc.

3.5. Responsible industry supported

Enforce industry requirements that enable the safe trans-boundary movement of vessels, import and export of live marine species etc, including measures.

Suggested Actions:

- Request/require arriving ships to submit reporting forms (IMO template) and establish a national information system for the data from these forms.
- Provide ships' crews with training in ballast water issues (through national maritime training academies) (GloBallast is developing standard modular training package).
- Require ships flying your country's flag or calling at your country's ports to carry and implement a shipboard ballast water management plan (in accordance with IMO Guidelines A.868(20)).

4. Adequate technical and resource support is provided for management

4.1. Management plans are implemented

Implement necessary program of work to achieve awareness of, compliance with and enforcement of IMP management plans and to monitor operational objectives.

Suggested Actions:

- Ensure management plans have complimentary awareness, compliance enforcement programmes.
- Conduct and support research and development of IMP control methods, i.e. effective ballast water treatment technologies.
- Assess the feasibility of shore-based ballast water treatment facilities or joint facilities with a neighbouring economy, and implement where practical and cost-effective.

4.2. Sampling and monitoring programs for IMP are in place

Establish sampling and monitoring programs to identify presence and abundance of IMPs within marine environment and enhance detection abilities in high risk areas, i.e., ports, and aquaculture farms.

Suggested Actions:

- Establish formal monitoring and sampling program protocols for known IMP vectors. Implement these in high risk locations according to protocols and priorities
- Sample ballast water and biofouling of ships calling in your ports for the presence of introduced marine species. (Recommended by IMO).
- Conduct port biota baseline surveys using standard GloBallast methodology to investigate the presence of IMPs in your marine environment and track new introductions.

4.3. Information management, access and transfer systems are operating

Establish formal mechanisms that facilitate the transfer of information between agencies at the national, state and local levels in addition to the wider public. Develop and advertise a reporting procedure for IMP sightings.

Suggested Actions:

- Utilise existing cross-agency committees, or establish new ones, to facilitate the transfer of information between government agencies.
- Establish an information transfer system with industry that facilitates the circulation of new regulations, IMP sightings and incursions, but also provides an access point for industry to obtain additional information from government agencies.
- Develop a centralised web based information system that provides species information, overviews of management measures, a sighting protocol and links to other IMP sites and government sites that may be useful.

4.4. Decision support for IMP management is put in place

Identify the significance of current and potential pathways and vectors for IMPs. Establish priorities for action to prevent IMPs.

Suggested Actions:

- Develop risk assessment methods to identify high risk activities (eg. deballasting water uploaded from high risk areas) and prioritise management responses.
- Determine priorities for managing vectors from international and domestic activities and known established IMP populations (the former should be based on outcomes form baseline surveys).
- Investigate ways to link port surveys and monitoring programs (as previously suggested) to an early- warning system, whereby ships, aquaculture operations etc can be alerted to outbreaks of harmful species.

4.5. Sustainable funding strategy in place for IMP management

Dedicate funds to finance the development of a national IMP management framework, to ensure continued monitoring and enforcement of IMP legislation and also to assist for any mitigation/control activities that may occur.

Suggested Actions:

- Investigate cost sharing arrangements with marine users.
- Polluter pays principle.
- Investigate cooperative projects with other economies.

Best Practices

Several best practices (effective and practical approaches to IMP issues) have been identified from the *Economy Options Papers* and incorporated into the IMP Work Programme as potential measures. The descriptions of these provide realistic advice based on practical experiences made in IMP policy, research, management, and technical fields. Best practices, outlined below, can assist economies to determine suitable options; however the most appropriate approach for each economy will depend upon a wide range of local factors, including availability of skills and resources.

Biosecurity Unit

Purpose:	Central unit with policy, technical and practical skills to administer relevant legislation and manage biosecurity threats.	
Examples:	Ministry of Fisheries, Biosecurity Unit New Zealand's ministries with environmental responsibilities each have a biosecurity unit. These units manage all threats to biosecurity, including IMPs.	New Zealand

Considerations:

- Consider biosecurity expertise (disease, IMP, pathogens etc).

IMP Coordination Committee

Purpose:	Committee with coordination and development of policy roles. Participation across relevant sectors and jurisdictions.	
Examples:	National Invasive Species Council Interdepartmental council, leads invasive species management, facilitates coordination of agencies and information sharing, including marine species.	USA

	National Introduced Marine Pests Coordination Group (NIMPCG) Coordinates IMP policy development, includes representatives from Australian government, State/Territories, industry representatives, environment representatives.	Australia

Considerations:

- Membership should include representation form all relevant sectors to be integrated and effective.
- Identify agency that will be the secretariat for the committee and ensure information is facilitated to participants.

IMP Prevention Legislation Requirements

Purpose:	To regulate activities that pose a risk to introducing IMPs.	
Examples:	Quarantine Act 1908 and Quarantine Amendment Act 1999 Includes arrangements for managing international ships ballast water and import of live and frozen fish products.	Australia
	Non-Indigenous Aquatic Nuisance prevention and Control Act 1999 Includes arrangements for managing ballast water, established an Aquatic Nuisance Species Task Force.	USA

Considerations:

- What is the appropriate legislation required?
- What would be the timeframes involved in developing new legislation?
- What are the priorities for regulatory action, what activities need to be further regulated, i.e. ballast water, live fish trade?
- Ensure there is regulatory efficiency – prevent duplication.

IMP Action Plans/Strategies

Purpose:	To develop and implement a strategy that outlines actions and focuses effort and resources for the prevention and management of IMPs.	
Examples:	IMP Prevention, Control and Management Plan Agencies with responsibilities for fisheries, environment and maritime transport have joined efforts to formulate and implement an integrated and comprehensive plan for prevention, control, and management of introduced marine pests.	Chile
	National Plan of Action Minsters have endorsed an invasive alien species plan as a priority for action under to Canadian Biodiversity Strategy and called for the development of a National Plan of Action to address the issue	Canada
	National Invasive Species Management Plan The Plan is an output of the National Invasive Species Council and it aims to establish a system for invasive species prevention, detection, control, eradication and restoration of habitats.	USA

	National System for the Prevention and Management of Marine Pest Incursions The National System comprises of three main elements; prevention regime, emergency response to new incursions, and continuing management and control of established populations of IMPs.	Australia

Considerations:

- Identify funding and resources.
- Identify objectives.
- Assign responsibilities to relevant agencies and facilitate ownership of IMP management.
- Include a monitoring and review process to test the applicability of actions in the future.

Education (Industry and Community)

Purpose:	To provide the community and industry with information on IMPs, vectors and management approaches and to engender stewardship of the marine environment.	
Examples:	Guidebook on Toxic Red Tide Management A Guidebook, workshopping, and farm visits were provided to supplement a government initiative to manage the problems of toxic algal blooms. These looked at administrative elements, preparedness, responses and recovery.	Philippines
	Agency Communication Program Written, television and outreach programs have been established to inform the community and industry of the threat of aquatic invasive species, and how to prevent the introduction and translocation of invasive species.	USA
	Community Detection Kit Community Detection Kits were released to engender stewardship and assist the community to detect and identify IMPs.	Australia

Considerations:

- It is important to ensure education programs are targeted, comprehensive, covering all vectors and industries.
- Training the community or community groups to identify IMPs can be part of a broader detection system.

Training (Government, Industry and scientific)

Purpose:	To provide the officials and technical specialists with information and skills on identification and management of IMPs and methods to reduce the risk of entry and spread of IMPs.	
Examples:	AMETEC Established by the initiative of the Korean government at the 1st Ministerial meeting in Seoul, it has contributed greatly to capacity building for development of marine conservation sector in the APEC region through successful operation of professional programs since its opening in 2003.	Korea

Considerations:

- Training should be designed to address the IMP specific skills and responsibilities of the officials and technical specialists being trained.
- Where particular skills are required by a small number of people in each economy there is potential for regional or sub-regional collaborative training.

Detection

Purpose:	To establish programs that facilitates the detection of established and recent IMP incursions.	
Examples:	Toxic Algal Bloom Early Warning System A local Port Authority has established an early-warning system, whereby ships can be alerted to outbreaks of harmful algal blooms and take caution when uploading or offloading ballast water. .	China
	OZCAM mutually accessible database of museum collections data, is operational (ozcam.gov.au) but currently still under development for marine pest species.	Australia

Considerations:

- Comprehensive surveillance, monitoring and reporting systems are beneficial for IMP detection.
- The availability of baseline data can assist to determine species composition changes and IMPs.
- Access to regional and global databases taxonomic and collection records and relevant experts quickly.

Impact Studies (ecosystem, human health, economic)

Purpose:	To gain information on the impacts of IMPs on the marine ecosystem, economic pressures from IMP incursions on marine-based industries, and human health in order to obtain information for sound decision making and evaluation of management strategies.	
Examples:		

Considerations:

- Studies on the impacts of IMPs to the marine environment, economics and human health are beneficial for decision making and management.

Ballast Water Management

Purpose:	To develop measure to prevent the introduction of IMPs to coastal environments from ballast water discharge.	
Examples:	Ballast Water Free Vessel Design Japan is investigating alternatives to the current short term and long term measures recommended for reducing the risk of introducing marine species via ballast water – ballast water transfer and treatment systems, by investigating ballast water free vessel designs.	Japan

Considerations:

- Ballast water is receiving significant international and regional attention.

- Ballast water is considered a high risk vector for introducing IMPs and human pathogens.
- The new IMO Convention puts responsibilities on flag states as well as port states and facilitates the application of ballast water control and treatment methods.
- See risk assessment for risk assessment options.

Risk Assessment (Aquaculture, Aquarium Trade, Ballast Water)

Purpose:	Risk assessments can be used to manage uses or activities to reduce the frequency of introductions, i.e. ballast water being discharged that was up loaded at a high risk location, the intentional introduction of an aquaculture species that has threatening characteristics.	
Examples:	Ballast Water Management Decision Support System This system uses a quantitative risk assessment to determine the risks of species entering and establishing in Australian waters based on the ballast water history. Vessels are advised whether they can discharge ballast water in ports, or have to exchange ballast water at sea.	Australia

Considerations:

- Many risk assessment methods are data intensive.
- Traditional agriculture import assessment will only prevent the intentional introduction of listed species.

Codes of Conduct (Aquaculture, Aquarium Trade, Fisheries)

Purpose:	Codes of conduct can be used to promote responsible uses or activities to reduce the frequency of introductions, i.e. cleaning methods for fishing vessel hulls, the intentional introduction of an aquaculture species.	
Examples:	National Code of Conduct on Introductions and Transfers Sets criteria and authorities for import of aquatic organisms and transfers between regions/zones.	Canada

Considerations:

- Codes of conduct offer users responsible ways to operate.
- Cost effective approach.

Summary

APEC offers a suitable platform to recommend potential measures for economies and the region as a whole. An essential component of this work is looking to economies that have established IMP and associated programs and the lessons learned form these efforts.

APEC WIDE MEASURES
Capacity Building and Education

Overview

It is recognised that legal regimes and institutional frameworks are ineffective unless they are supported by skills and tools that assist implementation. Useful tools include information and communication networks, education, technical training, access to financial resources and the means for identifying and monitoring IMS, and for surveillance and enforcement of measures to exclude or contain IMPs. Some of these tools have been developed for assisting economies to manage

This paper describes options for developing regional IMP communication and support network to supplement existing and recommended domestic measures and facilitate a coordinated training and education centre and emergency response program.

Education and Training System

Education of the community – particularly of those whose activities may be threatened by IMPS or may contain particular risks of introduction of IMPs – can help change attitudes, enhance understanding, achieve participation, awareness and encourage responsibility. Training of officials, relevant industry and scientific personnel to carry out their specific roles in managing IMPs will need to cover many activities and target audiences (government, private sector, community etc). Clearly a number of training packages are needed to address different roles, necessary skills and information backgrounds.

Some options include:

- Training of managers to better understand, incorporate into local laws and implement the commitments enshrined in international conventions
- Training to enhance and facilitate cooperation and coordination amongst agencies with overlapping IMP or environmental protection responsibilities.
- Training in scientific methodologies of survey, identification, monitoring, collection and record maintenance for assessment of the occurrence and threat of IMS and IMP
- Training and provision of equipment to officers for planning and conducting emergency response operations.
- Training of port state officers to conduct inspections on and detention of ships in an effective and non-arbitrary manner which poses the least impediment to maritime navigation.
- The training of port/maritime authorities to better understand new environmental concerns relevant to shipping (e.g. ballast water and alien marine species and TBT pollution.
- Guides to assist in implementing relevant global/regional instruments

Example 1: Managers Training Program
Target: All sectors, all audiences.
Purpose: The development of a comprehensive program of different training courses and education initiatives to assist APEC economies to identify and manage IMP incursions.
Outline: Model a training program on the APEC Marine Environmental Training and Education Centre; directed short courses on: survey techniques, IMP identification, risk assessment methodologies, control options. These could be conducted by an existing institute in different areas of the APEC Region, i.e. Australia, Korea, USA, Chile. Establishment of a virtual web based centre could facilitate access to updates.

Example 2: Port Staff Training Program
Target: Port officers
Purpose: The development of training and education to assist APEC economies to manage ballast water.
Outline: Model training program for port officials on the Globallast program. Short courses could include: ballast water sampling, risk assessment, pathway analysis, etc.

Example 3: Scientific Training Program
Target: Scientific and technical staff of agencies responsible for survey, identification, monitoring, collection and record maintenance of IMS and IMP
Purpose: The development of training and education initiatives to assist APEC economies to collect and maintain consistent, comparable record of IMS and IMP.
Outline: Model a training program for research and museum staff Short courses could include: survey methodologies, taxonomic support systems, collection and record maintenance, risk assessment.

Example 4: Community and Industry Education, Awareness and Training
Target: The public, particularly members of communities living in areas at risk of IMP and staff of industries and agencies whose activities could introduce or could be affected by IMPs.
Purpose: The development of and maintenance of a resource collection of awareness, education and training materials initiatives to assist APEC economies to meet the widest possible range of community training needs on IMS and IMP.
Outline: Collection of materials used by APEC economies and others. Workshop of community education specialists and IMPs managers to identify community education target and material needs.

Opportunities

- Use of the existing regional marine centers for training and education ie. APEC Marine Environment Training and Education Center (AMETEC).
- Participating in training programs developed by IMO, Scientific Institutions and Museums, and other international and regional organizations.
- Participation in Community Information, Education and Extension Networks developed by local government, non-government organisations and specialist agencies.

Communication Network & Information Centre

A key factor in effective response to issues such as IMPS is rapid sharing of information on possible or apparent emerging threats. This could usefully be addressed by establishing an active network to share information on lessons learned, emerging issues and new technologies. A practical means of

achieving this may be through an information sharing network with a meta-data base to enable early awareness of emerging global and regional issues and managed access to shared data from national data bases.

Example 5: IMP Clearing House
Target: all IMP vectors.
Purpose: To establish an introduced marine pest clearing house that brings together all information sources that can assist APEC economies to address IMPS.
Outline: This could be an umbrella initiative that links everything together, rather than duplicating efforts. Economies will be required to use an Introduced Marine Pest Clearing-House (IMP CH). Each economy will be requested to submit information (recommended in the common approaches). Information that should be made available through the IMP CH includes: national IMP legislation and guidelines; risk assessment summaries (species or source specific); information on known IMPs; information on IMP research programs; control options and histories of usage; and a list of contacts for each economy . This information can at first come from the APEC phase 1 and 2 reports, but then there could be annual submission requirement and notifications of known introductions that may impact on other economies. A template could be established for information that each economy, through a representative coordinator, will submit to the co-ordination agency. The IMP CH, which would be largely Internet-based, could be developed by the APEC Secretariat, or alternatively, the MRC Working Group, or a consultant. The design and implementation of the CH should build substantially on meta-database linkages to information and protocols within and beyond the APEC region.

Opportunities:
- Several economies have developed comprehensive websites for IMP issues (USA, Australia, and New Zealand is in the process of developing one).
- Clearing houses have been established for other conservation issues, i.e the Convention for Biological Diversity Clearing House Mechanism.

Emergency Response System

Emergency response capacity differs between economies. There are no guidelines on what could be the most efficient and effective response in part because this will depend on the nature of the specific threat and the species. APEC offers a suitable platform to develop a protocol or system for emergency response to support a regional economy under IMP threat and to minimise the risk of that threat spreading to neighbouring economies or more widely within the region. This system could prescribe economy-specific actions that focus on monitoring, reporting and controlling, but also include measures that report to the wider APEC region.

Example 6: Emergency Response System
Target: Detection of an IMP incursion.
Purpose: To develop an Emergency Response System (ERS) that integrates monitoring, reporting and control methods. The ERS should outline which agencies have what responsibilities, what are the time frames for action, where are funds coming from, and have been endorsed at the appropriate level.The development of such a system is logically linked with the training programs discussed above,

Difficulties that arise in emergency responses include:

- *Lack of coordination*
  Often many agencies with environmental protection responsibilities are also involved in a priority emergency response such as search and rescue or oil spill management . This can lead to IMP response operations being overlooked or hampered if advance planning and coordination of response action is inadequate
- *Availability of experts*
  Experts to confirm the species responsible and appropriate control method are not always available but can, in many cases be contacted and consulted through the internet and web-based collection records and identification materials..
- *Availability of information on control methods and application*
  Information is not often routinely collected or tested unless it is part of a specific research program. Methods need to be species or at least taxa specific.
- *Cost recovery*
  Emergency response can be an expensive exercise and it is essential to have organized how they will be paid.

Opportunities:
- These protocols can link to existing efforts (IMO, FAO, etc).
- They can be made available over the web.

APEC Wide Responsible IMP Protocols:

The development of APEC IMP protocols or Memoranda of Understanding (MOUs) that can be utilised by all APEC Economies to assist preventing or containing introductions.

Example 7: Responsible Marine Species Translocation Protocol
Target: Intentional translocation of introduced marine species (live trade, translocation of aquaculture or aquarium species)
Purpose: To contribute to the safe transfer, handling and use of marine species that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements.

Example 8: Responsible Infrastructure Translocation Protocol
Target: Unintentional translocation of introduced marine species (ballast water, biofouling).
Purpose: To contribute to the safe movement of marine based infrastructure (vessels, fishing gear, drilling platforms) unintentionally carrying marine species that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements.

These are not intended to reinvent procedures, but rather to highlight responsible actions, and their origin, for APEC economies to implement in their processes.

Opportunities:
- These protocols can link to existing efforts (IMO, FAO, etc).
- They can be made available over the web.

APEC IMP Regional Taskforce

The development of an APEC IMP Regional Taskforce would assist the APEC region greatly by continuing efforts to increase capacity of APEC Economies to manage IMPs. Other roles of the Taskforce could include:

- Integrate international, regional and national efforts into the APEC IMP management framework;
- Steer APEC education and training initiatives;
- Steer the development of a communication network;
- Work with contacts in APEC Economies to assist national efforts for managing IMPs;
- Oversee the development of any information system or clearing house,
- Report to relevant APEC Working Groups as necessary.

Example 9: IMP Regional Taskforce
Target: all economies
Purpose: To establish a taskforce to advise and assist economies if an IMP incursion is identified, ways to establish an IMP work programme, identify sources of funding and assist in general capacity building.

Opportunities:

- The Taskforce could utilize experts in APEC Economies as well as receive international and regional input.
- Membership should cover technical, management, scientific, legal and policy streams and all vectors.
- The terms of reference of the taskforce should include measurable objectives so that their work can be assessed at the end of its lifespan.

Scientific, Technological, Resource and Financial Assistance Opportunities

TBA

Example 10: Scoping likely needs and means to address them
Target: All Sectors, agencies, economies
Purpose: To identify reasonable levels of need and resourcing requirements for incursion process management (prevention, detection, quarantine, eradication, control and mitigation) and emergency response capacity.
To identify possible resourcing (community, industry, government, regional, global) to establish and sustain IMP incursion process management

Opportunities:

- Access to Global Environment Fund Funding.

Summary

The similarity of an IMP incursion to a biosecurity threat or pollution spill enables us to look closely at what capacity building, scientific, technological, resource and financial assistance opportunities are available and how these have been established. There are many different options that could be taken, however it is likely that they would be more effective in combination. Funding and administrative time required to establish these are key constraints, however further investigation is required. Some options have a wider mandate than IMPs, such as utilising the existing APEC Marine Environment Training

and Education Center (AMETEC) or modelling approaches on AMETEC training exercises, which could assist in their establishment.

For related information, see:

APEC Marine Environment Training and Education Center (AMETEC) (http://www.kordi.re.kr/ssi/eng/html/centre_01.asp

Globallast (http://globallast.imo.org

CONSULTANTS' CONSOLIDATION OF WORKSHOP DISCUSSIONS

Session 1: Commercial shipping, military activities, marine tourism, oil, gas and mining

APEC and support for the IMO process

The workshop expressed appreciation for the update on current ballast water IMP activities. Recognizing the recent action of 74 countries in the adoption of the Ballast Water Convention, the workshop urged Economies to consider APEC wide measures to promote and encourage the objectives of the Convention.

Suggested action:

- harmonization of implementation of measures across the APEC Economies where possible, for example:
  - establishing a timeframe for achieving harmonized procedures, protocols and legislation to implement the convention to ensure uniformity and consistency;
  - participation of APEC in existing IMO databases using standard format;
- that efforts be made within APEC and its member economies to join with IMO in the development and implementation of the next phase of the GloBallast Program- including co-funding and joint technical cooperation, provision of guidelines, capacity-building activity training, education, industry awareness, research, information sharing.

The workshop reflected on the need for better communication with IMO, other organizations with expertise in IMPs such as the Global Invasive Species Program (GISP), and other UN specialized agencies, eg FAO. They noted that this includes internal economy coordination and communication. They suggested that economies consider identifying National IMO Focal Points to communicate with other government agencies with interests in IMPs.

The workshop noted that while the primary approach to implementation of IMO obligations is through legislation, economies consider the use of guide-lines, codes of conduct and other non-legal or interim mechanisms as means of achieving faster progress in addressing IMPs.

The working groups suggested that MRCWG and other relevant Working Groups consider:

- facilitating additional research on the specific issues relating to IMPs;
- participating in the development of IMO guidelines;
- participating in the Marine Environment Protection Committee, and raising other shipping-related IMP vectors in order to encourage application of measures to shipping issues beyond the current IMO focus.

Shipping and structure related vectors not covered by IMO

The working groups noted the current IMO focus on ballast water only within the ship-based IMP vectors.

Suggested actions:

- APEC promote attention to shipping vectors other than ballast water including:
    - Biofouling;
        - Non-commercial shipping including tourism, military, fishing and recreational vessels, oil rigs and platforms;
        - Water intakes, seachests and ballast tanks

The working groups noted:

- The need for continuing research to increase understanding and identify and develop measures for management including design of regulatory actions and performance evaluation of other IMP vectors.

- The need to identify and apply lessons learned from ballast water to other vectors perhaps through a retrospective analysis of ballast water convention process.

The workshop suggested that APEC and its member Economies:

- identify common priorities and approaches to other vectors;
- take initiatives to address other vectors - particularly biofouling upon fishing and recreational vessels, fishing gear etc;
- specifically, APEC economies individually or collectively raise the need to address biofouling on vessels through the IMO, by representation to the MEPC;
- promote development of practical measures to minimize the problem, eg. vessel skirts.

The working groups noted the complexity of enforcing compliance upon “flag of convenience” vessels and considered the potential benefits of providing economic incentives, linked to widely accepted standards such as IMO guidelines, to act responsibly, and to develop positive approaches.

The workshop suggested that APEC:

- consider approaches that provide an economic incentive for industries and communities to act responsibly.

The workshop identified regional cooperation as key – through research, capacity building and information exchange. Information exchange was highlighted as very basic and very important:

- Exchange of baseline knowledge about ports and marine species;
- Exchange of compliance information (relating to individual ships);
- Exchange of Hazard Analysis information;
- Exchange of Management measures (eg. Declaration of no-ballast exchange zones etc).

The working group noted that there are considerable synergies and linkages between the IMO and other international processes such as the CBD. It discussed the potential for measures including:

- baseline surveys that serve the purpose of both CBD and IMO implementation.
- partnerships between APEC, the CBD and IMO involving:
  - Joint projects; and
  - Joint funding.

As well as the need for APEC/CBD/IMO collaborations, the workshop noted the potential for broader synergies on addressing IMPs involving other bodies including Regional Fishery Management Organisations (for fishing vessels), Trade Agreements and consistent quarantine, customs and security measures that might enable the issue of IMPs to be addressed as part of an integrated package of measures. It was pointed out the recent episodes of SARS and bird flu within APEC have illustrated the substantial threats posed by diseases and pests to trade, economic health, and human health.

The workshop emphasized the importance of:

- developing partnerships between APEC and IMO and CBD to facilitate actions to address IMPs,
- developing partnerships between APEC and UN agencies, NGOs and other relevant organsiations to facilitate actions to address IMPs; and
- exploring options for wider collaborations to address IMPs

Session 2: Other non shipping vectors

Theme 1: Defining Risk and Sharing Information

The workshop noted that raising awareness in many economies is of high priority – particularly at senior decision-maker level.

The workshop suggested:

- The production of a plain language status report to identify for senior decision makers the risks and management options associated with IMPs. Aspects for consideration could include socio-economic impacts, trade implications, sub regional issues, and the special considerations of developing and developed economies.
- That baseline information be established in member economies, recognising that this lack of information represents the greatest risk to managing socio-economic impacts of IMPs.
- Bearing in mind that high latitude introductions are of particular concern, the workshop recommended that greater involvement with the existing scientific potential in the Russian Far East be encouraged for APEC cooperation.
- APEC economies note the importance of domestic focal points to manage the sharing of information with other economies.
- More attention to be given to achieving clear and agreed definitions of terms relating to IMPs.

The working groups noted the need to clarify the responsibility of APEC working groups related to IMPs.

The Workshop recommended:

- The elaboration by MRCWG and FWG, in consultation with the Transportation and other relevant Working Groups, of decision rules to determine roles and responsibilities for IMPs in APEC.
- Economies to provide key documents to consultants to send to attendees on CD – for example, legislation, regulatory and policy documents.

The workshop reflected that information sharing is critical and that APEC has established effective networks for other programs.

There is a wealth of relevant existing networks and databases on IMP concerns. The most appropriate approach may be to establish an APEC portal or meta-database for IMP issues, using the existing networks and databases, eg. OIE, IMO and CBD, that provides managers and researchers with linkages to agreed data bases and links to relevant sites with appropriate controls to protect data security and confidentiality. Such a database or portal should be designed to address the management information and research needs of APEC economies addressing IMPs.

The working groups noted that extensive information on existing IMP databases and information systems can be accessed via http://globallast.imo.org .

The workshop suggested that MRCWG and other relevant Working Groups consider:

- Production of a report to identify relevant existing databases and sites, their coverage and make recommendations on how best to utilize them to support APEC economies in the management of IMPs.

  Such a report should also establish metadata requirements to provide information on matters including conditions of access, quality assurance of data, peer review, practicality, data processing protocols, and directories of contacts.

The working groups reflected that it is important that decisions about what information and what level of information to share are the clear responsibility of the individual economy and of the institution managing databases and portals.

The working groups identified elements that could usefully be addressed in an IMP database or portal-Group:

- IMPs biological information
  - Distribution
  - Ecology
  - Impacts
  - Museum collections and long-term taxonomy
- Management activities
  - Emergency response protocols
  - Risk analysis and response design
  - Decision support
  - Vector management

    - Ensuring food security and safety;
- Technology to implement IMP strategy,
- Implementation of partnerships,
- Bibliographic data on IMPs materials

Priority research needs discussed included:

5) Scale and Scope of IMPs in each Economy.
6) Where are they? (through literature, museums, field surveys)
    a. Baseline and time series data on occurrence (museum collections and databases)
    b. Who are they – taxonomy including needing to engage overseas experts if necessary
    c. What are the impacts (environmental, ecological, social)
7) How do they get there?
    a. Who do you trade with?
    b. Biofouling
    c. Vector assessment
    d. Hazard assessment
8) What are the management options?
    a. Vector based
    b. Species based
    c. Post-incursion options
    d Control and eradication

The Workshop recommended:

- APEC support targeted research to address information needs for risk assessment and management of IMPs.

The workshop noted the importance of sub-regional research cooperation and reflected that collaboration with GloBallast was a possible mechanism.

Discussion identified that the APEC Study Centre Network could be appropriate for joint research and that ASEAN funding could also be accessed if an appropriate funding proposal is put forward.

Theme 2: Capacity Building

The working groups discussed the importance of capacity building at all operational levels, from field staff, regional officers to senior decision makers, and considered a range of training targets and subjects

The workshop recommended:

- that APEC support an analysis of training needs and existing training opportunities for IMPs management at the regional and economy levels.

The workshop noted that:

- Substantial expertise exists and is available within the region's economies with AMETEC, based in the Republic of Korea, being a good example. There is good potential to develop further similar capacity building initiatives.

- Inventory of training capacities, programs and specialized equipment at institutions such as universities and maritime training colleges, universities is absent.
- GloBallast has produced a modular training course on ballast water management that will be made available to APEC economies.
- Training should, as far as practicable, be standardized to compensate for the differences in a region's technologies and budgets. Approaches discussed included:
    - train the trainer approach with the standardized curricula and qualifications,
    - Learning the lessons from Economies with similar ecosystems Economies with similar ecosystems should collaborate, and work together on management of IMP risks.

The workshop recommended:

- evaluation of the IMO training module for application to APEC economies (evaluation including the need for additional information/elements such as the inclusion of biofouling;
- that APEC economies develop collaborative approaches to training
- development of new regional training programmes and approaches including:
    - AMETEC itself, or an AMETEC-type model
    - e-learning / distance learning (internet, CDs) rather than workshops (cheaper)
    - training of the trainers and national replications
    - open libraries, an easy way to exchange literature (journals, articles, books etc)
    - public awareness to ensure public support
    - Regional workshops to share experiences

The workshop noted the need to collaborate with and not duplicate the work of other organizations such as relevant programs of SPREP, IMO, CPPS, CBD and SEAFDEC, and that information could be transmitted to other regional organisations if appropriate, to further transmission.

Priorities noted include:

6. taxonomy (the basic element for successful identification, and could utilize CBD), including a definition of which species are introduced,
7. baseline evaluations, including port surveys adopting standardized methodologies, noting that substantial examples currently exist as outlined in the Consultants' Report.
8. management and treatment of ballast water;
9. Countermeasures for new IMPs, which is linked to vector management
10. Sharing technology and data (equipment sharing occurs now through SPREP) in a way that is easy, accessible, and transparent;

Training targets identified included (not in priority order):

- Scientific: taxonomy and risk assessment analysis.
- Decision makers and government: awareness.
- Industry and stakeholders (both shipping and aquaculture, aquaria, research institutes): awareness.
- Customs inspectors.

- Marine Protected Area managers.

Theme 3: Options for funding IMPs management

The working groups discussed a range of options for start-up funding of IMP management including government appropriations, bilateral aid foundations, organizations such as IOC, NGOs, and the GEF. They also considered options for longer term and sustainable funding including activity-related economic instruments such as fees and fines for industry users (shipowners, aquaculturalists, aquarium industry).

The working groups noted that development of acceptable options typically involves complex discussions with a wide range of stakeholders. Funding from the private sector is an important consideration. A substantial study would be needed to develop accurate costings for initiatives addressing a range of issues including:

- Inventory and Baseline Information
- Vectors Management Database Development
- Risk Assessment Demonstration Projects
- Research Survey to locate the IMP experts and institutions in each economy
- Monitoring of IMPs
- Equipment for management
- Public education and information materials
- Training
- Performance evaluation of management
- Socio-economic and trade implications of IMPs

The workshop recommended that:

- APEC support an expert study of costings for a program on IMPs at the regional level (which could involve partnerships with existing international bodies), and as required, in member economies.
- The US and Russia continue discussing their proposed project on high-latitude introductions, noting that draft areas for such cooperation have been submitted by SakhNIRO.

Glossary

This glossary has been adapted from: Williamson, A.T., Bax, N.J., Gonzalez, E. & Geeves, W. (Editors) (2002). Development of a Regional Risk Management Framework for APEC Economies for Use in the Control and Prevention of Introduced Marine Pests, APEC Marine Resource Conservation Working Group, Final Report.

APEC	Asia Pacific Economic Cooperation
Ballast water	Any water and associated sediments used to manipulate the trim and stability of a vessel.
Baseline port survey	Biological surveys that determine the baseline level of introduced marine species in a port.
Biocontrol	Refers to the release of one species to control another.
Bioinvasions	A broad based term that refers to both human-assisted introductions and natural range expansions.
Border	The first entrance point into an economy's jurisdiction.
Contracting Party	Countries, Customs Union or Economic Union that have signed, ratified or acceded to a convention and therefore has accepted the legal obligations set out in the convention.
Cost benefit analysis	Analysis of the cost and benefits of a course of action to determine whether it should be undertaken.
Convention	An international treaty.
Cryptogenic	A species that is not demonstrably native or introduced.
Disease	Clinical or nonclinical infection with an aetiological agent.
FAO	United Nations Food and Agricultural Organisation
Fouling organism	Animals and plants, such as barnacles, mussels, and seaweeds that attach to human-made substrates, such as piers, navigation buoys, and the bottom of ships.
Gap Analysis	A technique that can be used to determine whether a country is compliant with a convention, guidelines, strategy, plan of action or other initiatives.
Governance	Implementing contractual relationships between individuals within an institutional environment. The process of making binding decisions for some collective.
Hazard	A situation that in particular circumstance could lead to harm. The measure of the likelihood of these circumstances and the magnitude of the subsequent harm is a measure of risk.
Hazard assessment	An assessment of associated hazards to qualitatively evaluate the likely risks posed to an environment on the basis of past

	activities.
IMO	International Maritime Organization.
Indigenous or native	Species that would be present without human interventions.
Intentional introduction	The knowing import or introduction of nonindigenous species into, or transplant through, an area or ecosystem where it was not previously established.
Introduction or translocation	The human assisted movement of an animal to an area outside its natural range.
Introduced marine pest	An introduced marine species that threatens human health, economic or environmental values.
Introduced marine species	A marine species that's movement has been assisted by human activities to an area outside its range.
Invasive	An alien species that becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity.
Marine pathogen	A disease causing marine agent.
National legislation	The laws, regulations and other measures imposed by an authority and applicable throughout the territory.
Naturalised or established	A non-indigenous species that produces self-sustaining populations.
Non-indigenous, alien, exotic, introduced or adventive	Species that have been transported by human activities – intentionally or unintentionally – into a region in which they did not occur in historical time and are now reproducing in the wild.
Non-invasive	A non-indigenous species that does not spread but remains localised within its new environment.
Native invasive	Species that get into modified habitats by their own means and then go through population explosions.
Pathway	The route (the geographic corridor from point A to point B).
Pest	A non-indigenous species that threatens human health, economic or environmental values.
Pre-border	Prior to introduction into an economy's jurisdiction.
Post-border	Within the economy's jurisdiction.
Quarantine	The holding of organisms under conditions that restrict their escape or the escape of organisms associated with them into the open natural environment.

Risk	The likelihood and magnitude of an event.
Risk analysis	Risk analysis is made up of three components: risk assessment, risk management and risk communication. The process seeks to identify the relevant risks associated with a proposed introduction and to assess each of those risks.
Risk assessment	The means by which the frequency and consequences of such events (risks) are determined.
Risk management	The culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects.
Risk management framework	An overview of the culture, processes and structures of risk management.
Source	An umbrella term for a pathway. Examples are shipping, aquaculture.
SPREP	South Pacific Regional Environment Programme.
Unintentional introduction	An introduction of nonindigenous species that occurs as a result of activities other than the purposeful or intentional introduction of the species involved, such as the transport of nonindigenous species in ballast or in water used to transport fish, molluscs or crustaceans for aquaculture or other purpose. Involved is the release, often unknowingly, of non-indigenous organisms without any specific purpose.
Vector	The physical means or agent by which a species is transported. Ballast water, ships' hulls, and the movements of commercial oysters are examples of vectors.

APEC 2nd WORKSHOP
Participant List

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PART C
Appendices

Appendix 1 First Workshop outcomes

Appendix 1

ASIA PACIFIC ECONOMIC COOPERATION
Summary Record of Marine Resource Conservation Working Group (MRCWG) Workshop on Introduced Marine Pests
12-15 November 2001, Hobart, Australia

A workshop to develop a Draft Risk Management Framework for Introduced Marine Pests (IMP) in APEC Economies was held from 12-15 November 2001 in Hobart, Australia. The workshop was attended by delegates from Australia, Brunei Darussalam, Canada, Chile, Chinese Taipei, People's Republic of China, Indonesia, Korea, New Zealand, the Philippines, Peru, Russia, Thailand, the United States of America, and Viet Nam, the International Maritime Organisation (IMO), the South Pacific Regional Environment Programme (SPREP), the shipping, port management and aquaculture industries, and representatives from the APEC Fisheries and Transport Working Groups.

Mr Philip Burgess, Environment Australia and Dr Alex Brown, Undersecretariat of Fisheries, Chile, were Joint Chairs of the workshop. Mr Warren Geeves and Mr Andrew Brooke (Australia) were appointed rapporteurs.

Opening Remarks and Introduction to the Workshop
Mr Burgess, Australia, welcomed delegates and thanked the workshop sponsors, noting that this workshop provides a valuable opportunity to raise the profile of the IMP issue throughout APEC and globally. The workshop sponsors were APEC; Environment Australia; the Natural Heritage Trust (Australia); Agriculture Fisheries and Forestry - Australia; AusAid; National Oceans Office (Australia); the Association of Australian Ports and Marine Authorities (AAPMA), and the Department of Natural Resources and the Environment, Victoria.

Dr Brown, Chile, welcomed delegates and expressed his hope that the sharing of information and ideas would lead to a productive workshop. It was noted that the development of a proposal useful for reducing the threats posed by marine pests to the environment should also protect and enhance human well being and long term economic sustainability in our region.

Agenda
The Workshop Agenda is attached.

Workshop Synopsis

Keynote Address
Mr. Steve Raaymakers (IMO) gave the keynote address summarising the threats posed by marine pests to environmental quality, human health and economic growth. It was noted that many resources have been spent on combating oil pollution and a relatively small amount on combating IMP. IMP are one of the four major threats to the world's oceans, and also have human health implications. Mr Raaymakers also reported on progress on the International Maritime Organisation's GloBallast Programme and the

development of an international convention on ballast water. The value of the GloBallast Programme demonstration sites for raising awareness of ballast water management issues was also highlighted.

It was noted that IMP management is at different stages in different economies, and it is difficult to identify focal contact points for the issue in some economies.

Lead Shepherd

Ms Alison Russell French, Lead Shepherd, Marine Resource Conservation Working Group, thanked Chile for co-hosting the workshop and welcomed all participants to Hobart, noting that fifteen economies were represented. Ms Russell French reiterated the importance of IMP as an international problem, and noted the opportunities the issue offers for joint action from the APEC Marine Conservation Working Group, the Fisheries Working Group and the Transport Working Group.

Case studies on the management of IMP

Case studies on current management of IMP were given by Mr Don Hough (Australia), Dr Alex Brown (Chile), Ms Melissa Haltuch (USA), Ms Camilla Cox (New Zealand) and Mr Jhin Kyoo Chae (Korea).

The development of Australia's approach to IMP management accelerated following at least two recent, damaging marine pest incursions (the Black Striped Mussel and the Northern Pacific Seastar) and while much progress remains to be made, Australia's approach can offer some positive learning experiences for other economies. In particular the advantages of preventing incursions, rather than waiting until outbreaks have occurred, were emphasised.

The Chilean approach focuses on aquaculture pests and pathogens and uses quarantine instruments and formal environmental impact assessments to regulate introductions based on sanitary and environmental criteria and certification.

The US emphasised the value of regional and international approaches to addressing IMP issues, and commended APEC for developing the concept of a regional framework. The US shares characteristics with many APEC economies in identifying national cohesion and funding as areas that require improvement in order for effective progress to be made.

New Zealand is in the process of developing a risk management framework for marine biosecurity. This risk management framework is seen as a particularly valuable tool for making decisions when risk-minimising actions must be prioritised notwithstanding limited resources and information.

Korea emphasised that APEC economies need to develop a system to identify and classify risks from marine pests and that collating and sharing any available information is a high priority. APEC and its specific ocean related working groups could be more involved to protect indigenous species and protect each economy's socio-economic welfare. The opportunity to advance

IMP management issues at the First APEC Ocean Related Ministerial meeting in Seoul, April 2002, was also noted.

Industry and research perspectives

Industry and research perspectives on IMP management issues were presented by Mr John Hirst (Association of Australian Ports and Marine Authorities, Australia); Mr Ross Finlay (Australian Shipping Federation); Mr. Sefania Nawadra - SPREP (PACPOL - shipping programme); and Dr. Ron Thresher (CSIRO Centre for Research on Introduced Marine Pests (CRIMP), Australia).

Mr Hirst offered the expertise gained by Australian ports management authorities to assist other economies in implementing policies to control and manage marine incursions from ballast water. Mr Hirst emphasised that port management authorities are only one of several parties responsible for ballast water management, and that a uniform multilateral approach was needed in planning such management.

It was noted that there are potential economic costs associated with a lack of knowledge of marine pest incursions, such as when it is perceived internationally that a particular economy harbours marine pests in its ports. Research to establish which species are present in port waters can help overcome this risk.

Mr Finlay noted that ballast water was only one of several IMP vectors, and encouraged all APEC member economies to work with the IMO towards the completion and early ratification of the international convention on ballast water. He recommended a unified, international approach as the best method of ensuring safe and efficient protection from IMP.

Mr Nawadra spoke on SPREP's PACPOL programme to maintain, protect and enhance the quality of coastal and marine environments in the Pacific Islands region by minimising ship-related marine pollution, including introduced marine pests. Current plans to address IMPs in the region include an IMP Risk Assessment of the Pacific Islands Region, and surveys for IMP in Pacific Island Ports. SPREP was also concerned with the potential impact of mid-ocean ballast water exchange on Pacific island economies.

Consultant's reports - synopsis of management operations across APEC

Dr. Exequiel González - APEC Group A (Brunei Darussalam, Canada, Chile, Chinese Taipei, People's Republic of China, Japan, Mexico, Peru, Russia, USA) – Report on approaches to IMP management. A Draft Report is at Annex 3.

Dr. Nic Bax - APEC Group B (Australia, Indonesia, Republic of Korea, Malaysia, New Zealand, Papua New Guinea, Philippines, Singapore, Thailand, Viet Nam) – Report on approaches to IMP management. A Draft Report is at Annex 4.

An updated final consultants' report will be made available early in 2002. It will consolidate all economies' contributions.

Practical approaches and other issues on management of IMP

Reports were given on:

- Regional Marine Planning under an Oceans Policy - Mr Campbell Davies, National Oceans Office, Australia;
- Marine pest management protocols - Mr Michael Drynan, Department of Agriculture Fisheries and Forestry, Australia;
- Technical fixes and issues (ballast water/hull fouling) - Mr Steve Raaymakers, IMO;
- Best practice - conservation/aquaculture - Dr Gustav Haellegraff, University of Tasmania, Australia;
- Institutional arrangements - Dr Marcus Haward, University of Tasmania, Australia;
- Trade in live or frozen products - Dr Vicki Wadley, Tasmanian Salmonid Growers Association, Australia.

Mr Davies urged a regional approach to marine management and shared some lessons from the Australian experience of coordinating a range of government and stakeholder interests into development of a regional marine plan.

Mr Drynan reported on Australia's mandatory Ballast Water Management Scheme, commended the IMO's efforts to develop an international convention on ballast water, and urged APEC member economies to include input from industry, science, regulatory bodies and government when developing their own domestic ballast water arrangements.

Mr Raaymakers outlined a number of technical issues relating to ballast water, and also noted the need for a global system of port surveys linked to a global database. Mr Raaymakers emphasised that APEC includes some of the world's largest economies, encompasses the world's largest ocean, and has the potential to act as an effective lobby in fora such as the IMO.

Dr Gustav Haellegraaf spoke on toxic dinoflagellates and recommended that global standards for permissible dinoflagellate levels in discharged ballast water be developed, along with options for higher level treatment of ballast water to further reduce dinoflagellate levels in vulnerable areas.

Dr Marcus Haward emphasised that developing appropriate institutional arrangements is required for effective management of introduced marine pests. Effectiveness will be enhanced by arrangements that provide strong 'vertical' governance and that link national objectives to local responses. At the same time attention needs to be given to maximising 'horizontal' governance and links in order to increase policy capacity and harness all appropriate resources.

Dr Vicki Wadley outlined the value of pest-free aquaculture and fisheries industries to member economies. Dr Wadley recommended the adoption of a

uniform, transparent risk assessment approach to IMP management, including good levels of stakeholder involvement, communication and participation.

Introduction of a Draft IMP Management Framework
Working Groups were formed to discuss the risks and elements to be included in a draft risk management framework for IMP in the APEC region. Dr Nic Bax introduced the session.

Each Working Group was composed of delegates from a range of economies and industries in order to enhance broad information-sharing and to build a common understanding and appreciation of the issues faced by different economies.

Working Group Exercise 1 - Ranking of hazards
Groups worked on a questionnaire prepared by CRIMP researchers on IMP hazards. Working Group Facilitators reported to the plenary session that:

- the key vectors were perceived to be ship ballast water, hull fouling, and aquaculture;
- additional vectors for potential IMP transport were identified, including military vessels, mobile drilling platforms, dredging equipment and spoils, and accidental escapes from aquaculture;
- additional impacts from IMP incursions were identified, including impacts on sport fisheries, subsistence or indigenous fisheries, the fish trade, intrinsic environmental and aesthetic values, customary social values associated with coasts and oceans, and human health;
- a distinction was also drawn between commercial near-shore and ocean fisheries. Sport fisheries and subsistence fisheries were distinguished from commercial or industrial fisheries;
- clarification of terminology is required through an agreed IMP glossary;
- baseline data is lacking in some economies and addressing this issue should be a crucial element of a regional approach to IMP management.

Working Group Exercise 2 – IMP management
Groups discussed a range of issues including
- existing IMP management arrangements;
- existing institutions for hazard identification and data collection;
- practical IMP management options;
- what should be in an APEC IMP management framework?

Working groups reported that necessary aspects to a regional approach should include urgent, unified action on IMP - facilitated by

- coordinated research, information sharing, training and education within the region;
- a regional stocktake of marine biodiversity, including the establishment of the necessary capacity within economies;

- sharing of research and databases on native biodiversity and introduced pests, including the potential development of a regional equivalent of the Australian NIMPIS database;
- cooperating to develop capacity building mechanisms, including methods for developed economies to assist developing economies;
- clear identification of focal contact points for IMP issues within each member economy;
- advice from APEC on the applicability to member economies and the APEC region in general, of existing guidelines on IMP and related issues;
- research and cost/benefit analysis of intentional introduction of species, particularly in aquaculture;
- effective institutional arrangements within member economies on both a scientific / technical level, and an administrative level;
- high levels of communication and education between economies, within communities and within governments in order to raise the profile and develop a culture of IMP awareness;
- common procedures for industries to achieve cooperation on measures to manage IMP;
- APEC support for international Conventions on Ships' Anti-Fouling Systems and Ballast Water;
- a strong APEC statement at the First APEC Ocean Related Ministerial Meeting in Korea encouraging the adoption of the recommendations of the Workshop Statement of this IMP Workshop;
- establishment of an IMP Taskforce within APEC;
- development of a regional risk assessment for IMP in APEC economies;
- a regional replication of the IMO GloBallast programme;
- an IMP web page within the APEC website structure, listing resources, documents, existing legislation and contacts for IMP information;
- the need for guidelines on mid-ocean ballast water exchange sites;
- a role for APEC in regional, protocols and standards throughout the region;
- engagement of private sector interests including the shipping, aquaculture and bulk commodity arbitration on IMP issues;
- a study of measures to combat existing IMP incursions;
- a study and evaluation of introductions of transgenic or genetically modified organisms as potential threats similar to introductions of IMP;
- a strong call to action from APEC for member economies to address the above recommendations urgently and together; and
- the opportunity for economies to commit to timeframes for collective action.

Discussion of outcomes and development of a workshop statement
The Draft Workshop Statement is attached as Annex 5.

Summary of Plenary Discussions
(See also Draft Workshop Statement)

- The meeting reiterated the concern within APEC economies over the threats to economic growth, expansion of regional trade, human health, aquatic organism

health and environmental quality posed by introduced marine pests. The meeting affirmed the need to adopt a regional approach to combat marine pests in the APEC region.

- The meeting agreed that it is crucial to encourage marine pest information sharing and links on a regional scale. An openly available, science-based database of marine pest information is essential to controlling known marine pests, preventing further incursions and enabling any new introductions to be managed. Australia's National Introduced Marine Pests Information System (NIMPIS) provides an example of a national database that may be suitable for expansion to the regional level. The meeting agreed that a glossary of IMP terminology is necessary to achieve common understanding between economies both on a scientific and a policy level.
- Capacity building and the establishment of effective institutional arrangements were noted as crucial preconditions to effective IMP management.
- Clear identification of focal contact points for IMP issues within each member economy is necessary.
- It was further agreed that awareness raising at senior levels of government is required to accelerate progress on the IMP issue. It was pointed out that risk assessment and cost/benefit analysis can provide the basis for such awareness raising.
- The meeting recommended the elements for a draft APEC Risk Management Framework to address IMP (at Annex 6), and urged all member economies to cooperate within APEC to pursue expansion and finalisation of a draft Framework. The meeting recommended that the APEC Marine Resource Conservation Working Group lead the establishment of the Risk Management Framework, and urged the Fisheries Working Group and Transport Working Group to engage on the issue. It was noted that introduced marine pests is a priority issue for a joint agenda, especially given the attention that it was paid in the last joint meeting of the Fisheries and Marine Resource Conservation Working Groups.
- The meeting emphasised that successful risk management operates as a culture rather than merely a document. APEC's efforts to address the issue of Introduced Marine Pests must therefore be continuous, persistent and must raise awareness and educate on all levels in order to be effective.
- The meeting agreed that the issue of IMP should be pursued at subsequent APEC and international fora including the First APEC Ocean Related Ministerial Meeting (Seoul, April 2002), Oceans and Coasts at Rio +10 (Paris, December 2001) and the World Summit on Sustainable Development (Johannesburg, 2002).
- The meeting encouraged member economies to participate with the IMO to finalise the draft Convention for the Control and Management of Ships' Ballast Water and Sediments, and to consider domestic arrangements for early ratification and adoption of the Convention.
- The meeting encouraged close coordination with other relevant international instruments and processes, such as the Guidelines on a Precautionary Approach to Capture Fisheries and Species Introduction, from the FAO Code of Conduct for Responsible Fisheries; the Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species, from the Convention on Biological Diversity; and the prevention of introduction of aquatic animal pathogens and the spread of diseases, from the FAO / Network of Aquaculture Centres in the Asia-Pacific's Regional Guidelines on Responsible Movement of Live Aquatic Animals.
- The meeting noted the recent IMO Convention on the Control of Harmful Anti-Fouling Systems on Ships, 2001 as a positive step towards the environmentally benign control of the spread of marine pests through hull fouling, and

encouraged member economies to consider its signature, ratification and early entry into force.

Conclusion

The workshop Joint Chairs thanked delegates for their contributions during the meeting, stressed that this workshop represents the beginning rather than the end of APEC efforts to address IMP issues, and they also emphasised the need to translate these discussions and meetings into practical action.

Delegates thanked the Joint Chairs for their efforts, and thanked Australia, Chile and the Lead Shepherd of the Marine Resource Conservation Working Group for hosting the workshop. They also thanked workshop sponsors for their generous assistance.

The workshop recommends the results of this meeting be considered by economies, senior officials and APEC Leaders prior to the next Leaders' meeting.

Elements for a Draft Risk Management Framework

APEC economies recognise that the impacts of Introduced Marine Pests (IMP) are a serious threat to their economic growth, expansion of regional trade, aquaculture, fisheries, human health and environmental quality. They agreed that a regional risk management framework will be an effective instrument to address the threat by encouraging the development of appropriate action, processes and structures to respond to the IMP threat.

APEC economies should reduce and control the impacts of IMP, using science–based analysis and decision making, recognising that:

- the risks of adverse impacts could be substantially reduced;
- human and financial resources for prevention and control of IMP should be used effectively, since they are limited and subject to conflicting demands;
- there is a need to increase scientific knowledge and improve its use and availability;
- there is sufficient scientific knowledge to establish that action on IMP is a high priority.

Risk Assessment and Cost Benefit Analysis

Risk assessment of the threats of IMP in the APEC region needs to consider:

A. environmental aspects (for example dominant marine currents, geographical location, native and endemic biodiversity) at the species and ecosystem levels;
B. institutional frameworks (for example regulatory regimes and capacity building);
C. human activities as vectors (for example commercial shipping, recreational shipping and boating, commercial fishing, aquaculture and marine ranching, oil drilling and mining, the aquarium trade, and trade in live and processed food products);
D. costs to the marine related industries and activities (for example shipping, the ports industry, fishing, aquaculture and marine ranching).

Merging of risk assessment and cost benefit analysis can provide valuable information for timely and efficient decision making in a context of uncertainty and scarce economic resources.

Risk Management

In the short term, economies should work collectively in the design of common requirements, protocols and procedures for the reduction of the spread and further introduction of IMP, including microorganisms and pathogens, across national boundaries. In view of the urgent need to act quickly and jointly, economies should be encouraged to establish and apply an agreed timeframe for the implementation of these requirements.

There is also a need for appropriate management frameworks for specific risks. It is recommended that existing frameworks are considered, for example the UN Convention on the Law of the Sea; the IMO Guidelines for the Control and Management of Ships' Ballast Water; the FAO Code of

Conduct for Responsible Fisheries, in particular the Guidelines on a Precautionary Approach to Capture Fisheries and Species Introduction; and the Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species from the Convention on Biological Diversity.

As an immediate priority, each economy should undertake an analysis to prioritise those aspects of the IMP problem that should be addressed. A comprehensive analysis for the APEC region should also be carried out in order to identify regional priorities for cooperation which may be additional to economies' most immediate priorities.

Economies should establish an information centre, including an APEC database containing the most up to date information on threats posed by marine pests from all vectors and options for their prevention and control.

A regional task force should be created to work with economies in capacity building and to advise economies on the development and implementation of prevention and control options.

Consideration needs to be given to establishment of a regional technology and extension centre to develop and disseminate prevention and control options, noting that current technologies are in many cases inadequate.

Development of Cooperative Projects

Co-operative joint projects should be established to enhance:

- the level of awareness of IMP among the policy-makers, relevant government agencies, scientists, marine industries and general populations of economies;
- the capacity of government, scientists and industries to address the threat of IMP, including training and exchange programs;
- the extent of shared information on IMP, including data bases on species identification, vectors, impacts, prevention options, treatment options, etc;
- the level of information on marine biodiversity in APEC, particularly in ports, making use of rapid assessment protocols;
- the development of marine biological diversity inventories;
- methodologies and techniques for the application of risk assessment and cost benefit analysis.

Developing economies in APEC should be assisted scientifically, technologically and financially in the formulation and implementation of this framework.

Regional Communication

Introduced marine pests are a problem for the region that requires improved regional communication. To assist with this communication there is a need to identify a focal point in each economy to facilitate information exchange.

Options for establishing an electronic communications network utilising the World Wide Web should be considered. The purpose of the network could be to provide:

- warning of all known IMP outbreaks in any APEC economy to all other APEC economies;
- rapid dissemination of information on development of scientific knowledge that is useful for IMP prevention and management, including current information on the state of development of relevant data bases;
- information on developments within economies of legislation, policy and practices related to IMP.

International

It should be recognised that IMP are also a global issue that require inter-regional cooperation.

APEC economies should be encouraged to adopt and implement relevant international conventions and develop implementing legislation and other measures to the extent each considers appropriate.

APEC Workshop on Introduced Marine Pests
12-15 November 2001, Hobart, Australia
Workshop Statement

A workshop to develop a Draft Risk Management Framework for Introduced Marine Pests (IMP) in APEC Economies was held from 12-15 November 2001 in Hobart, Australia. The workshop was attended by representatives from 15 economies, the International Maritime Organisation, the South Pacific Regional Environment Program, the shipping, port management and aquaculture industries and representatives from the APEC Marine Resource Conservation Working Group, Fisheries Working Group and Transport Working Group.

Introduced Marine Pests are a shared problem and require shared solutions. The meeting noted that the translocation of marine organisms and micro-organisms beyond their natural environment is a serious and escalating problem in the region, particularly given the environmental, economic, cultural and social impacts of marine pest species and the reliance of many APEC economies on their marine and coastal resources. Once a marine pest is established remediation is often not possible or extremely costly. Given the rapid spread of marine pests, urgent action is essential.

There are substantial regional differences in the environmental vulnerability and in the capacity to react to and manage pest organisms. Once a marine pest becomes established in the region it increases the risk to other economies. Accordingly, there is an urgent need to build capacity within many economies to enable effective management of this problem. The workshop suggested APEC consider the establishment of a task force, comprising members of the Marine Resource Conservation, Fisheries and Transport Working Groups to develop and promote integrated approaches on the IMP issue.

This will need to include, but not be limited to, project development to assist with training and education, development of common regional standards consistent with other international processes, awareness raising including the general community, improved scientific capacity, sharing information and experiences, and identification of tools for control. Risk assessment and cost benefit analysis are tools that can assist decision makers to apportion limited resources and information. The elements for a Draft Risk Management Framework developed by this Workshop outline such integrated approaches and priority actions for addressing the IMP issue.

Mindful of the forthcoming APEC Ocean Related Ministerial Meeting in Korea in 2002, participants requested that APEC Ministers place the issue of IMP on their agenda. We strongly recommend a presentation be given to Ministers on the urgency of addressing this issue. A strong statement from that meeting on the importance of dealing with this issue at the regional level and the need for a common and cooperative approach would assist raising awareness within economies and across the region. It is also potentially a matter for the region to raise in the processes leading up to, and at, the World Summit on Sustainable Development in Johannesburg in 2002.

There is already a range of actions underway nationally, regionally and internationally which economies should use to develop their own responses. Effective implementation of existing regulations is a priority. The workshop stressed the need not to duplicate current efforts. APEC economies are also well placed to encourage the early entry into force of the IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001.

Implementation and regional replication of the IMO GloBallast programme should be actively supported in order to assist APEC economies to adopt the IMO Guidelines for the Control and Management of Ships' Ballast Water, and to prepare for the rapid adoption and entry into force of the draft Convention for the Control and Management of Ships' Ballast Water and Sediments. There should be close co-ordination with other relevant international instruments and processes such as the UN Convention on the Law of the Sea; the Guidelines on a Precautionary Approach to Capture Fisheries and Species Introduction from the FAO Code of Conduct for Responsible Fisheries; the Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species from the Convention on Biological Diversity; and the Network of Aquaculture Centres in the Asia-Pacific.

Noting the many different government and industry interests relevant to harmful aquatic organisms and pathogens, there is a need for economies to identify focal points for communication and information exchange, both internally and with their trading partners and regional neighbours. Engagement of industry and local communities is essential.