



Marine Invasive Alien Species

Recent Progress in Addressing a Growing Threat to Ocean Biodiversity and Ecosystems



Kamchatka crab (*Paralithodes camtschaticus*) (c) M. Degerlund

The invasive alga
Caulerpa taxifolia,
smothering a sponge,
Mediterranean

(c) David Luquet, "Zoom on the invasives:
IUCN-Fuji photo competition"



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Recent progress in addressing a growing threat to ocean biodiversity and ecosystems. A partnership between the International Union for Conservation of Nature and the Total Corporate Foundation.

Why are they a problem?

The spread of marine species beyond their native environment is of increasing concern due to rapid growth in commercial shipping and recreational boating, activities that can help organisms 'hitchhike'. Marine invasive species are currently recognized as one of the major direct causes of biodiversity loss and changes in ecosystem provisioning and supporting services.

There are over 20 international agreements related to the prevention and management of invasive alien species. However, in spite of this it is clear that progress in addressing invasive alien species in marine and aquatic environments is uneven, and overall significantly lagging behind terrestrial systems.

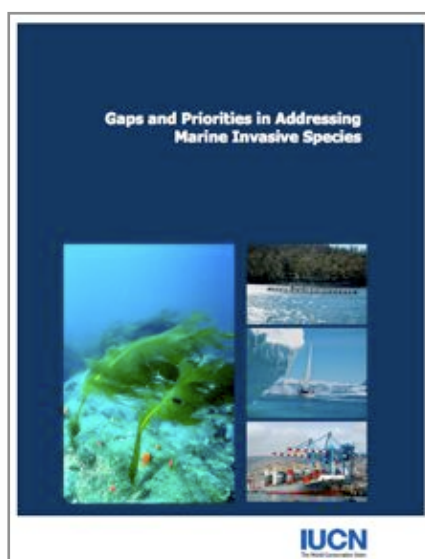
An analysis by IUCN (IUCN 2005, pictured right) identifies the many obstacles to addressing marine invasive alien species, including a lack of understanding of the severity of the threat posed, insufficient information on status and trends, insufficient technical capacity to address the issue as well as limited public awareness.

Tackling the Issues

With the support of the Total Corporate Foundation, IUCN's Global Marine Programme developed and implemented a series of projects addressing different aspects of invasive alien species, current status, means of reducing the risk of species introductions, and management.

These projects, implemented over five years from 2004 to 2009 around the world, have covered the following priority issues and key gaps:

1. Filling critical information gaps through baseline assessments of marine invasive alien species in isolated islands environments;
2. Reducing species introduction risks associated with aquaculture;
3. Enabling Marine Protected Area managers to address the increased risks of species introduction associated with common activities in and around marine protected areas; and
4. Improving knowledge and awareness of invasive alien species among the general public and important stakeholder groups.



Findings and results from the work are presented over the following pages. Further information, along with downloadable versions of publications presented here, is also available on the IUCN Global Marine Programme website:

www.iucn.org/marine

The financial support of Total Corporate Foundation is gratefully acknowledged.

Degraded ecosystems may be more susceptible to invasions

Coral reef in the Seychelles after bleaching, mortality and
break-up of the dead coral (c) J. Tamelander/IUCN



New Knowledge: Good News and Caution

Baseline surveys indicate the isolation of tropical Indian Ocean islands has helped keep them free from marine invasive alien species. However, pathways for introductions exist and trends in environmental health as well as trade, travel and transport constitute an increasing risk.

Baseline Surveys

While marine invasive alien species surveys have been carried out in many ports in temperate environments, and standard protocols for such surveys have been developed, much less attention has been paid to tropical and non-port environments.

In 2005, with the support of Total Corporate Foundation and in collaboration with the Government of the Seychelles, IUCN conducted a baseline survey of Mahé Port, Victoria, the Seychelles. The survey was based on standard port survey methods, but also extended to cover sites outside the port, including coral reefs and areas around reclaimed land.

Building on this survey, and further extending its reach to non-port reefal environments, surveys were also conducted in some of the most biogeographically isolated islands in the Indian Ocean. Areas covered included the Chagos Archipelago, in 2006, as well as the Amirante and Aldabra groups in the Seychelles Outer Islands in 2007. These are considered some of the most pristine environments in the Indian Ocean.

Survey Findings

The surveys of Chagos and the Seychelles Outer Islands recorded no species incursions, and no readily identifiable invasive alien species were present in the samples collected (Tamelander et al 2009, pictured below).

However, the surveys of Mahé Port turned up seven species that are either not native to that environment, or the origins of which are uncertain. This includes bryozoans, amphipods, an ascidian, and a sponge, groups with numerous species that are frequent 'travelers' (Abdulla et al. 2007).

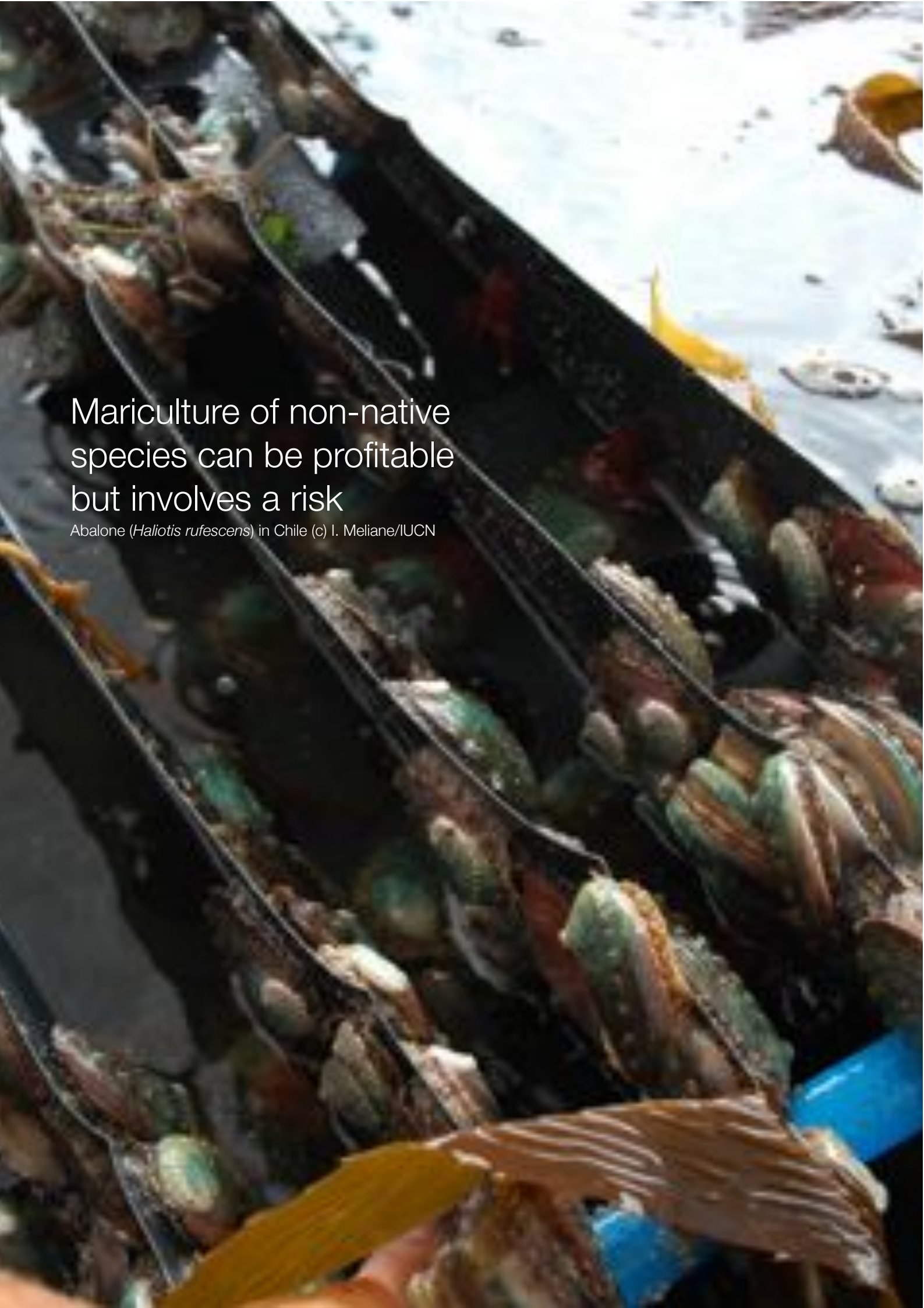


What does this tell us?

The reasons for the patterns observed are manifold. The isolation of the remote locations and the lower levels of ship movement means that fewer species make the journey there. Conversely, the intense traffic to and from the port in Mahé over centuries has provided ample opportunity for species to reach the port.

The fact that the environment of the remote locations is largely in better health than the port and reclaimed land on Mahé may also have made the areas more resistant to alien species, which may simply fail to become established on arrival.

However, the marine environment is threatened both by human activities and climate change. With time this increases the likelihood of species translocation as well as successful establishment. For example, islands in the Pacific with long-established US Naval bases are known to have a very high number of non-indigenous species. This provides an indication of the risk for Diego Garcia in Chagos, where the comparatively young naval port receives much traffic, and illustrates the need for preventive action.



Mariculture of non-native
species can be profitable
but involves a risk

Abalone (Haliotis rufescens) in Chile (c) I. Meliane/IUCN

Reducing the Risk

Aquaculture can be a vector for spread of species as well as pathogens, but the risks can be significantly reduced. Risk screening and vigilance tools are now available to reduce the potential threat of aquaculture, a vital and growing industry.

What is the link?

Aquaculture is an important economic activity in the coastal areas of many countries. It offers opportunities to alleviate poverty, boosts employment, helps community development, reduces over-exploitation of natural coastal resources, and enhances food security, particularly in tropical and subtropical regions. Due to the increasing worldwide demand for aquatic products, aquaculture is one of the most important and fastest growing sectors within fisheries.

Currently most marine aquaculture facilities, particularly in developing countries, use non-native or alien species. This is because it allows utilizing readily-available research and development practices from other locations, thus reducing costs.

However, this also means that there is an inherent element of risk, as non-native species may escape into the wild and become established, potentially with significant negative implications for ecosystems and local species.

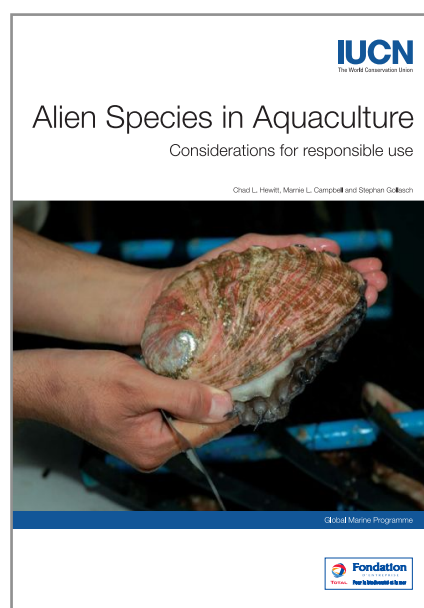
Responsible Risk-taking

Recognizing that alien species are already commonly used in aquaculture, and that they will continue to be used because of many socioeconomic factors, IUCN has sought to guide risk assessment and reduction.

With support from Total Corporate Foundation, global, regional and national codes and regulations for the management of alien species in aquaculture systems were reviewed and evaluated.

Building on this and working with the Government of Chile, practical approaches to analyzing and managing risk with alien species in aquaculture were developed, along with a vigilance campaign targeting the general public. The work is synthesized in a publication entitled 'Alien Species in Aquaculture. Considerations for responsible use' (Hewitt et al. 2006, above left).

This publication provides decision makers and managers with information on international and regional regulations that address the use of alien species in aquaculture, either directly or indirectly, and



examples of national responses to this issue. This includes guidance on factors to be taken into account when using or deciding on the use of alien species for aquaculture purposes, assigning responsibilities, and vetting proposals.

Bearing in mind the challenges faced by decision makers when reconciling conservation and development needs, these very practical solutions will help ensure responsible use of alien species for aquaculture purposes.



Marine Protected
Areas are common first
points of species
introduction

Aldabra Atoll, a World Heritage Site in the Seychelles
(c) J. Tamelander/IUCN

Keeping them out of Paradise

Marine Protected Areas are established to protect and preserve ecosystems and biodiversity, but this also increases the risk of marine invasive alien species introductions. Diagnosis and planning tools can help keep the pests out of paradise.

Protected but not safe

Marine protected areas are not immune to many of the threats facing the marine environment, because they are not and can not be isolated. Similarly, they have no barriers that could prevent invasion of alien species.

Paradoxically, setting up a marine protected area may lead to an increased risk of bioinvasion as this generates a significant attraction to the area for marine tourism, recreational boating, yachting, diving and snorkeling, and, where allowed, fishing. These activities may bring marine species associated with fouling of boats and equipment, ballast water, and live bait for recreational fishing.

A further complication is that designation of protected areas often lacks requirements to establish baseline biodiversity information and to monitor the performance of protection over time, and awareness of the threat of marine invasive species is generally low.

Diagnosing the problem

A survey among marine protected area managers around the world carried out by IUCN provides insight into the problems they face in addressing invasive alien species.

The survey showed that:

- many are not aware that invasive alien species threaten the core values of marine protected areas
- where monitoring is taking place, only a third of the programmes cover invasive alien species;
- while almost all marine protected areas provide educational and outreach materials to visitors, only a quarter of them address invasive alien species

It also again highlighted the fact that addressing invasive alien species in the marine environment lags far behind what happens on land. While one of the seven objectives of the Galapagos National Park is to “reduce the risk of introducing diseases, plagues and exogenous species into the province”, none of the 12 objectives of the Marine Reserve relates to invasive alien species.

Finding Solutions

A workshop organized by IUCN at the third International Tropical Marine Environment Management Symposium in 2006 provided a venue for managers to discuss these findings, and identify what they need to strengthen their work.

Consequently, with support from Total Corporate Foundation, training seminars were organized in 2007 targeting managers around the Pacific. This has empowered participants to tackle invasive species through building capacity for conducting surveys and implementing local-level control and management strategies.





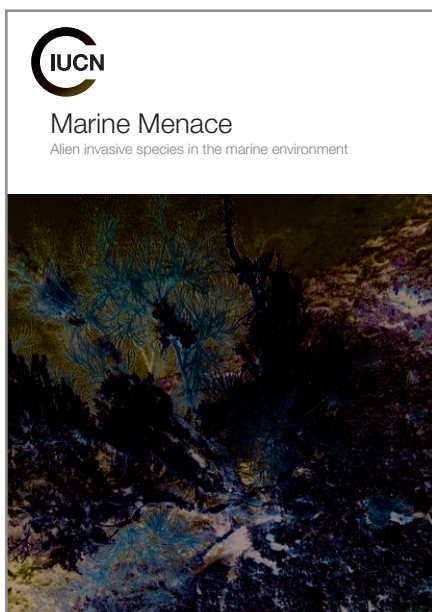
Commercial and navy
ships as well as
recreational yachts can
spread species

(c) J. Tamelander/IUCN

Enhancing Awareness to Enable Action

One of the key constraints to addressing marine invasive alien species is the lack of knowledge and understanding among stakeholders. Successful campaigns help build a consensus for action.

The 'Marine Menace' booklet includes detailed but accessible information on the marine invasive species issue, and 15 case studies of particularly damaging or costly bioinvasions. It has been produced in English, French and Spanish and disseminated broadly.



Reaching Out

Many of the activities described on earlier pages would have been far less effective if they had not been accompanied by efforts to also raise awareness among collaborators and stakeholders. Most importantly, efforts to reduce the potential threat from invasive alien species in the marine environment ultimately depend on an informed public taking informed decisions.

Activities by IUCN and supported by the Total Corporate Foundation include awareness and vigilance tools (pictured left and right), as well as a comprehensive campaign in the Seychelles (below), which used print as well as broadcast media and seminars. Particular effort was made to involve school children and teachers as well as policy makers.



A vigilance campaign in Chile, relying on reports from the general public, improved chances of early detection if non-native species used in aquaculture made it into the wild, helping response strategies and also helping to 'plug the leaks'.



IUCN, International Union for Conservation of Nature

Founded in 1948, IUCN (International Union for Conservation of Nature) brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 1000 members in all, spread across some 160 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

IUCN builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.



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