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GLOBE ACTION PLAN FOR CORAL REEFS: POLICY PROPOSALS FOR LEGISLATORS

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity, a draft document on GLOBE Action Plan for Coral Reefs: Policy Proposals for Legislators.

2. This document was submitted by Global Legislators Organisation (GLOBE) International Commission on Land Use Change & Ecosystems as a contribution to the in-depth review of progress made in the implementation of the programme of work on marine and coastal biodiversity.

3. The document is circulated in the form and language in which it was received by the Secretariat of the Convention on Biological Diversity

* UNEP/CBD/COP/10/1.

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GLOBE Action Plan for Coral Reefs:
Policy Proposals for Legislators

DRAFT – CBD INFORMATION DOCUMENT

INSIDE FRONT COVER

GLOBE Action Plan for Coral Reefs: Policy Proposals for Legislators

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The final version of this document will also include the names and/or logos of all organizations who have contributed to the development of the document.

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Foreword

To be completed by October 4th 2010

Executive Summary

I. Coral reefs are one of the world's most threatened ecosystems, with the effects of global climate change and direct human impacts threatening to alter them irrecoverably. The most effective management approach to safeguard these ecosystems is to significantly reduce all direct human impacts on them in order to build their resilience to the long-term effects of climate change, as well as joining the international calls to significantly reduce 'greenhouse gas' emissions and stabilizing atmospheric CO_2 concentrations at a safe level for coral reefs.

This action plan provides international legislators and policymakers with clear and targeted legislative actions to build resilience in tropical shallow-water coral reef ecosystems and in the people that rely on them.

II. The Global Legislators Organization for a Balanced Environment (GLOBE International), in collaboration with the Zoological Society of London (ZSL) and in consultation with the wider coral reef conservation community, has developed a range of policy proposals to guide legislators in creating and implementing environmental policy for coral reef ecosystems. GLOBE serves as a direct channel for communication between scientists, the conservation community and policymakers, and works with legislators to implement recommended legislation and policies in their countries.

III. A key aim of the initiative is to promote 'win-win' policies that increase the ecological resilience of coral reefs while boosting the social resilience of the communities and stakeholders that depend on them.

IV. The introduction section explains current scientific understanding of why there is a coral reef crisis, the social and economic importance of saving coral reefs, and **the urgent need for political action**.

V. Part one of the coral reef action plan lays out measures to address direct human pressures on the coral reef environment through legislation, policies and implementation. It contains 3 main objectives, to: (1) Enable sustainable fishing; (2) Manage watersheds and water quality to reduce pollution; and (3) Increase marine protected area coverage and effectiveness.

VI. Part two of the action plan proposes measures to increase governance and management capacity, a fundamental requirement for effective implementation of the measures in part one. There are two main objectives, to: (1) Increase effective management and governance; and (2) Increase environmental education and awareness.

VII. Part three suggests ways to finance and coordinate the global action plan for coral reefs, recommending current and emerging funding mechanisms and providing suggestions on how best to coordinate action at the national and regional level

VIII. GLOBE International's action plan for coral reefs provides a framework for smart investment in coral reefs and associated coastal ecosystems by adopting an ecosystem-based adaptation approach that encompasses both social and ecological aspects of the tropical marine and coastal environment. By acting now to reduce our impacts and dependence on coral reef ecosystems we can provide a buffer to some of the long-term effects of climate change, reduce adaptation costs and contribute to achieving poverty reduction and sustainable development goals.

1 Introduction to the Action Plan for Legislators

1.1 Coral reefs in crisis

Tropical shallow-water coral reefs are critically threatened by the synergistic effects of climate change and direct human impacts.

Climate change is recognised as the most serious long-term threat to coral reefs (Maynard et al., 2010). Current atmospheric carbon dioxide (CO_2) concentrations and global temperature changes have already massively damaged coral reefs globally, and these negative impacts are rapidly multiplying as CO_2 emissions rise. Temperature induced mass coral bleaching started when atmospheric CO_2 levels exceeded 320ppm (Veron et al., 2009), and the process of ocean acidification has already begun to affect marine life especially in the deep ocean (Olafsson et al., 2008) and in polar waters (Mayewski et al., 2009). When the global average temperature rise exceeds 2℃ (expect ed to occur when CO_2 concentrations reach 450 ppm in 20 to 30 years time at current projections), mass coral bleaching events will become unsustainably severe and frequent, putting coral reefs at increased risk of widespread mortality (Hoegh-Guldberg et al., 2007; Veron et al., 2009; Hoegh-Guldberg and Bruno 2010,). If atmospheric CO_2 levels reach 500 ppm, ocean acidification will severely reduce the calcification rates of tropical corals and coral reefs will start to structurally collapse as reef erosion exceeds growth (Hoegh-Guldberg et al., 2007). For climate change impacts alone, a CO_2 concentration of **450 ppm is regarded as a critical threshold, beyond which corals will not have the ability to maintain the complex structures we know today as coral reefs**. The majority of coral reef experts consider this is the point of no return for coral reef ecosystems. For coral reefs to survive as a functioning ecosystem, CO_2 levels must be stabilized at or below 450 ppm and then reduced over time to less than 350 ppm, regarded as a safe level for coral reefs (Veron et al., 2009; Hoegh-Guldberg and Bruno 2010). Stabilisation at or below 450 ppm is still technically and politically achievable.

The coral reef crisis is also a crisis of governance (Hughes et al., 2010). Unfortunately, all but the most remote coral reefs are heavily impacted by direct human pressures (Box 1). An estimated 19% of the world's reefs have already been lost through the actions of mankind, with a further 35% predicted to be lost in the next 20 to 40 years if human pressures continue unabated (Wilkinson 2008). In some regions, such as south-east Asia and the Western Pacific, the amount of coral lost over the past 40 years may be even greater (30-50%; Bruno and Selig, 2007). Overfishing, destructive fishing practices, coastal pollution and coastal development account for most of these direct impacts, which not only destroy and degrade coral reefs but also considerably reduce their ability to withstand and recover from the impacts of climate change. **If these direct human impacts are not significantly reduced on a global scale in the next 10 years, the continued loss of ecosystem resilience will create a much greater risk of ecosystem collapse even before the 450 ppm climate-based tipping point is reached.**

Box 1: Direct Human Impacts on Coral Reefs

Overfishing is the harvesting of fishes and invertebrates beyond sustainable yields and the use of damaging practices (e.g. blast and cyanide fishing). Many coral reefs are now overexploited. Overfishing can remove the herbivorous fish critically needed to prevent algae outcompeting corals, which can lead to phase shifts as well as limiting reef recovery after bleaching events.

Sediment pollution results from poor land use, deforestation, and dredging. The rate of sediment release is increasing with growing urban populations, agriculture and aquaculture. Sediments can reduce light availability to photosynthetic corals and increase disease rates, limiting coral growth and reef recovery rates.

Nutrient and chemical pollution results from organic and inorganic chemicals carried with sediments, in untreated sewage, and waste from agriculture and industry, including complex organics and heavy metals. Excess nutrients favour the growth of microorganisms and algae, particularly when herbivorous fish populations are reduced by overfishing.

Development of coastal areas for urban, industrial, transport and tourism use, including land reclamation and the unsustainable mining of coral reef rock and sand, often causes extreme modification or direct destruction of coral reefs. These processes destroy or significantly degrade coral reef habitats.

(Adapted from the top ten threats and stresses to coral reefs in Wilkinson et al. (2004))

At current emission rates, 450 ppm CO_2 will be reached between 2030 and 2040. If emissions are successfully reduced to allow for stabilization at 450 ppm and ecosystem resilience is enhanced by reducing direct impacts, coral reef ecosystems may persist (although in many areas they would be degraded and highly vulnerable) and still be able to support a reduced level of sustainable use. Alternatively, if emissions are not successfully reduced and the 450 ppm threshold is exceeded, coral reef ecosystems will be committed to eventual collapse over the next 30-50 years. In this scenario, drastic reduction of direct human impacts will act as a buffer to climate change effects, slowing coral reef degradation and buying crucial time for dependent communities to adapt. In either situation it is critically important to act now to increase coral reef resilience to the effects of climate change by significantly reducing direct human impacts.

It is clear that coral reefs are in crisis, and saving them will require dramatic reduction of direct human impacts on coral reefs over the next decade, to increase their resilience to the effects of climate change in the 21st century. If we take this choice it will be a significant step to saving coral reefs and providing a chance for ecosystem recovery next century. This step should also go hand-in-hand with mitigation measures to significantly reduce emissions and stabilise anthropogenic climate change.

1.2 The value of coral reefs to humanity

Tropical coral reef ecosystems represent just 0.2% of the oceans in area but are **the world's most diverse marine ecosystems**, harbouring an estimated 1-3 million species, including one third of all described marine species (Reaka-Kudla 1997, 2001) and more than a quarter of all marine fish species (Allsop et al., 2009). Coral reefs are also critically connected to other coastal and marine ecosystems such as mangroves and seagrass beds, which provide nursery grounds for many marine species, nutrient cycling, and the removal or storage of wastes from human activities (Moberg and Folke, 1999).

Table 1: The value of coral reef ecosystem goods and services
Adapted from TEEB (2009) Climate Issues Update

Coral Reef Ecosystem Services	Value (in US$/ha/year)
Provisioning Services	
Food	470
Raw materials	400
Ornamental resources	264
Regulating services	
Climate regulations	648
Moderation of extreme events	25,200
Waste treatment / water purification	42
Biological control	4
Cultural Services	
Aesthetic information	7,425
Recreation and tourism	79,099
Information for cognitive development	2,154

More than 100 countries have coastlines with coral reefs (Moberg and Folke, 1999) and half a billion people depend to some degree on the goods and services provided by them (Wilkinson 2008). Coral reefs have an estimated value of **US$172-375 billion** per annum (Moore and Best 2001, Fischlin et al 2007, Martinez et al 2007, and Conservation International 2008). They provide food and raw materials (e.g. 10% of the world's marine fisheries landings), a physical barrier to protect coasts from extreme weather events, help to regulate climate and generate substantial tourism revenue (Table 1, TEEB, 2009). It should be noted that the estimates provided are average values with wide variation according to factors such as remoteness, reef productivity and existing infrastructure, and should not be extrapolated to estimate a national value according to total reef area.

It will take substantial economic investment to maintain these benefits for humanity over the next fifty years, but the costs of inaction are likely to be even greater. Annual economic losses in fisheries, tourism and shoreline protection resulting from direct human impacts in the Caribbean alone are projected to reach US$350-870 million each year by 2015 (Burke and Maidens 2004). The global 1998 bleaching event caused losses of up to $8 billion in the Indian Ocean alone (Cesar and Chong 2005), while the total cost of coral bleaching to 2050 is projected to be more than $100 billion worldwide (Cesar et al., 2003). The economic

cost of ocean acidification is estimated to reach $870 billon annually by 2100 if emissions are not stabilized (Brander et al., 2009).

The consequences of inaction for food security, human health and well-being will be immense. For example, in the Coral Triangle region of the Indo-Pacific, failure to address climate change and direct impacts is projected to increase human vulnerability, decrease food security, cause social disruption and threaten security (Hoegh-Guldberg et al., 2009). Damage to coastal community infrastructure caused by decreased coastal protection, a 50% decline in fish provision, subsequent migration inland and loss of livelihoods all threaten to destabilize the Coral Triangle region by mid-century (Hoegh-Guldberg et al., 2009).

At least 30 million of the world's poorest and most vulnerable people in coastal communities are completely dependent on coral reefs as their primary means of food production, income and livelihood (Wilkinson, 2008). For these people, coral reef ecosystem collapse will be truly catastrophic for their way of life.

1.3 The benefits of action now to increase resilience

It is clear that for humanity to continue to benefit from the essential ecosystem services that coral reefs provide we must significantly invest now in measures that will enhance their resilience to climate change. A degraded environment, whether natural or human-induced, has a strong influence on reef resilience (Veron et al., 2009) Resilience refers to the ability of an ecosystem to absorb, resist or recover from disturbances while maintaining key functions and processes (Nystrom and Folke, 2001).

Without action, the cumulative and synergistic effects of climate change and direct human impacts will turn coral reef ecosystems into a highly degraded state. These shifts have already occurred on coral reefs exposed to chronically high levels of human pressure (Hughes et al., 2003, Bellwood et al., 2004, and Wilkinson et al., 2004). However, there is evidence that reducing the effects of overfishing and pollution can prevent this shift and **reefs with fewer direct threats are more able to cope with the effects of climate change** (Sheppard et al., 2008). For example, research has shown that coral reefs with healthy fish communities have significantly better rates of coral recovery after bleaching events (Hughes et al., 2007). Water quality along coastlines is also a critical factor in coral recovery (Wilkinson 2004). Specific measures to improve coral reef resilience must address direct human pressures as well as governance, awareness and political will (Wilkinson 2004). Sufficient and appropriate management is lacking in many coral reef nations, making it imperative to build capacity to implement the management interventions required to improve coral reef resilience (Wilkinson 2004). Existing national plans for coral reef and coastal zone management need to be supported to enable effective implementation involving all relevant government departments. Where these plans are inadequate or do not address particular issues, emphasis must be put on revising and updating them to take into account the urgent need for action. The importance of local plans to improve management must also be fully recognised and supported at the sub-national or national level.

Investment now to increase coral reef resilience will provide long-term benefits to society through the continued provision of marine resources and ecosystem services in perpetuity. Communities most vulnerable to climate change impacts are those whose livelihoods and survival depend on the integrity of marine and coastal ecosystems. Coastal ecosystems, including tropical coral reefs, protect coastal communities from extreme natural events such as storms and tsunamis and provide coastal communities with critical resources for livelihoods, income and food. Effective management of coastal resources will slow and minimize the decline of these resources resulting from climate change impacts (Hoegh-Guldberg et al., 2009).

The long-term benefits of the successful conservation of ecosystem services will be complemented by investing in win-win social adaptation measures to reduce both dependence and impacts. For example, **developing alternative livelihoods and food sources will help reduce dependence on coral reefs while simultaneously reducing direct human impact on reefs.** Substantially increasing coral reef resilience coupled with reducing emissions will have profound social benefits such as stabilized food security, fewer social challenges and strengthened regional security (Hoegh-Guldberg et al., 2009). **As climate change threatens to undermine development progress, effectively managed coral reef ecosystems will be essential to attaining agreed poverty reduction and sustainable Millennium Development Goals.**

1.4 Current initiatives and programmes addressing the crisis

The great biological, social and economic value of coral reefs has ensured that they have already received considerable attention from governments and many non-governmental organizations (NGOs). Major international NGOs as well as smaller local and regional ones have implemented comprehensive assessment, communication and action programmes to improve coral reef conservation and management. Global networks and regional initiatives have been established to coordinate, fund and implement conservation measures. Key international environmental law, such as the Convention on Biological Diversity (CBD), is also incorporating coral reef resilience as a fundamental aspect that needs to be considered as integral to successful ecosystem conservation and management. A number of national and local governments have implemented exemplary coastal and coral reef management (see case studies in Appendix 1) and legislation (case studies in Appendix 2). While these programmes have achieved much, there is still a great need to drastically scale up successful initiatives and fill the gaps in management and governance. **By engaging with and encouraging support for these existing programmes and initiatives** (see below), **GLOBE legislators can make a highly significant contribution to the protection of coral reef ecosystems and the services they provide for humanity**.

The management of tropical coral reefs are addressed in several areas within the CBD. Within the Programme of Work on Marine and Coastal Biodiversity, there is a detailed Specific Work Plan on Coral Bleaching, which was agreed at CBD COP7 in 2004. The 2010 review of the implementation of the Programme of Work on Marine and Coastal Biodiversity noted the threat posed to the survival of coral reefs by climate change, ocean acidification, and degradation. Another major Programme of Work relevant to coral reefs is that on Island Biodiversity, which was adopted in 2006. Implementation activities for this programme are channelled primarily through the Global Island Partnership (GLISPA). Two further work programmes are also relevant, namely Protected Areas and Biodiversity and Climate Change. The next Strategic Plan for the CBD, which will be agreed at CBD COP10, includes coral reefs under 'Target 10', which is to "By 2020, to have minimized the multiple pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning". Appendix 3 provides further detail on CBD decisions relating to coral reefs.

Founded at the CBD First Conference of the Parties in 1994, **the International Coral Reef Initiative (ICRI) is an informal partnership** among governments, international organizations, and non-government organizations which promotes implementation of relevant international conventions and agreements and mobilizes governments **to improve management, capacity and political support.** A number of ICRI subsidiary organizations, such as the Global Coral Reef Monitoring Network (GCRMN) and the International Coral Reef Action Network (ICRAN), provide further support for specific activities, namely reporting on the status of coral reefs and enabling action to effectively manage them. ICRI is currently updating its Framework for Action as a basis to achieve the sustainable management of coral reefs and sustainable ecosystems. The recommendations provided by the ICRI Call to Action and Framework for Action provide a sound platform that the current initiative is looking to build on and is a key part of national and regional actions that legislators should support.

Major international organisations (e.g. The Nature Conservancy, Conservation International, WWF, Wildlife Conservation Society, World Resources Institute, WorldFish Center) regional marine NGOs (e.g., Coastal Oceans Research and Development in the Indian Ocean (CORDIO)) and smaller mainly coral reef-focused NGOs (e.g. Coral Cay Conservation, Blue Ventures, Coral Reef Alliance, Locally Managed Marine Area (LMMA) networks) are engaged in a wide range of coral reef research and management activities such as the designation and implementation of Marine Protected Area networks, long-term monitoring, research-for-development, and community-based natural resource management. **These organizations are pioneering conservation and management measures to improve coral reef resilience to climate change.**

A number of global and regional initiatives (e.g. GEF/World Bank Coral Reef Targeted Research and Capacity Building for Management Programme, the Global Islands Partnership, ReefBase, Coral Reef Initiatives for the Pacific, UNEP Regional Seas Programme) promote critical research, communication, capacity-building, and coordination activities in coral reef countries. **Partnerships between governments and NGOs have prompted significant commitments to regional coral reef conservation initiatives**,

namely the Micronesia Challenge, Caribbean Challenge, Coral Triangle Initiative and Western Indian Ocean Challenge.

Research to improve the understanding and management of coral reefs is conducted at many universities and institutes around the world. The principle conduit for the dissemination of this information to the public is through the International Society for Reef Studies (ISRS). The Society also produces expert briefing papers on relevant topics that provide a useful synopsis of current understanding and recommendations for management.

Despite these extensive efforts, there are still significant gaps in coral reef knowledge, monitoring and management (summarised in Appendix 4). There is a particular need for better measurement and reporting of management success, particularly through long-term environmental and socio-economic monitoring programmes. Technical and logistical capacity for effective management is severely lacking in many coral reef countries, and long-term financing to build and maintain adequate capacity is critical to success.

Although there have been many significant steps taken that require continued and increased support, coral reefs are still in crisis and require a great increase in political action to rapidly accelerate the process of protecting this valuable ecosystem.

1.5 The urgent need for political action

Coral reefs are in crisis, and ensuring their survival within this century will require dramatic and bold steps and strong leadership. The loss of coral reefs would have serious consequences for the biosphere and humanity. The benefits of swift and effective action now to increase coral reef resilience to climate change are clear and significant steps have already been taken, but major barriers to successful ecosystem management still remain. Legislators have a crucial role to play in removing these barriers, providing leadership and ensuring that coral reefs remain for the use of future generations.

At present, one of the most significant barriers to achieving effective coral reef management is a lack of commitment by policymakers. Although the initiatives and programmes summarized above have made significant efforts towards protecting coral reef ecosystems from the direct human impacts, a major barrier to further success is a lack of awareness at the higher levels of government of the important social and economic benefits that these ecosystems provide. For example, establishment of national level funding for the Caribbean Challenge regional initiative is significantly hindered by the need for greater legislator involvement in passing legislation to establish sustainable financing mechanisms. Although healthy coral reefs are vital to the economies of Caribbean nations through fisheries and tourism, political commitment to protecting coral reefs is still weak in many places due this lack of awareness and understanding. In addition, major capacity gaps in government departments, particularly those dealing with the environment or fisheries, often means that right advice is not reaching the decision makers.

Lack of communication between government departments and a fragmented approach to legislation for the coastal zone is also a major issue in many coral reef nations. A more integrated approach to coastal zone management is required to prevent clashes between legislation at different levels. One example is the granting of fishing licences at the national level to fish in community-based marine reserves which are covered by local legislation.

The streamlining of national legislation to remove redundant and overlapping laws is also required in many nations for the coastal zone. Governments should also recognise that they do not have the human capacity required in all the different sectors of government and attempts at more integrated management are necessary

Political action is urgently required at all levels of government. National parliaments must act to quickly fill legislative gaps and ensure implementation of existing legislation. Many coral reef countries will require significant political action to build capacity and improve governance to ensure that legislation on specific coral reef management issues is effectively implemented. It is the responsibility of legislators to provide government agencies with the mandate to protect coral reef ecosystems and communities. International collaboration between coral reef nations, neighbouring countries, and the rest of the international community is essential for capacity building, knowledge dissemination and coordination of management activities.

Additionally, policymakers must begin planning now for social adaptation to climate change, particularly through win-win measures that reduce both human dependence and impacts on coral reef ecosystems. Our planet is on an irreversible path to a high level of climate change impacts on coral reefs which will have serious consequences for the ecosystem and the services it provides for humanity, irrespective of future emission levels. The socio-economic consequences of these impacts will need further consideration and fall outside of the remit of this initiative. However, we can ensure that coral reefs are in the healthiest, most resilient condition possible to face the effects of climate change by following the course of action laid out in this document.

An increase in policymakers' awareness, engagement and support for effective coral reef conservation and management will be critical for financing and implementing the measures required to save coral reefs. Around the world, the momentum is building to address the serious human impacts on this valuable ecosystem upon which millions depend. **Legislators have a key role in supporting and expanding efforts to reduce direct human impacts on coral reefs to make them – and humanity – more resilient to the impacts of global climate change.**

2 Coral Reef Action Plan for Legislators

This section provides specific policy recommendations that will collectively act to reduce direct impacts on coral reef ecosystems. Implementation measures are also provided. The recommendations are focussed on five core objectives to increase coral reef resilience: sustainable fishing, managing land-based activities to reduce coastal pollution and habitat loss, increasing the coverage and effectiveness of marine protected areas, improving coral reef management and governance and increasing environmental education and awareness of coral reefs.

The first part (2.1) of the action plan lays out measures to address direct human pressures on the coral reef environment through legislation, policies and implementation. Part two (2.2) proposes measures to increase governance, management capacity and awareness, all fundamental requirements for effective implementation of the measures in part one. Part three (2.3) suggests ways to finance and coordinate the coral reef action plan.

Policy and implementation recommendations are categorised according to a phased approach of implementation over the ten year period (2011-2020). In addition the first two years should be regarded as a preparatory phase for particular aspects of the strategy that require assessment at the national and regional level prior to implementation. The recommendations are also provided as a strategic plan (Appendix 5) with specific actions alongside suggested indicators of success for each action.

The recommendations listed in this section are a global list of actions needed and do not necessarily apply to all nations containing coral reefs. We encourage nations currently lacking comprehensive management plans for their coral reefs to use the strategic plan in Appendix 5 as a template to produce a national action plan according to the requirements of that particular nation. In this way local and national customs and requirements can be incorporated into the plan while other aspects already well managed can be omitted. The phased approach also enables nations to pick up policy recommendations at different stages depending on existing national progress.

The majority of the recommendations can also be regarded as a part of a coastal ecosystem-based adaptation approach to climate change integrating both biological and social resilience, and achieved by managing and protecting coastal ecosystems such as coral reefs so that they continue providing both livelihood resources and protection from extreme events for coastal communities and stakeholders. There is growing evidence that ecosystem-based adaptation (EBA) may be a cost-effective method for climate change adaptation (Hale et al., 2009; World Bank, 2010). The use of frameworks for assessing ecological (Maynard et al., 2010) and social (Marshall et al., 2009) systems and their resilience will form a key part of any EBA approach.

An Assessment of Global Priorities

At the global level there are number of reef types, regions or scenarios that are considered to be priorities for effective coral reef conservation and management. These should be prioritised for action within each national or regional plan:

- Source reefs important for re-populating ‘downstream’ reef systems, especially major reef fish spawning aggregation sites.
- Resilient reefs with highest ecological functionality or value of ecosystem services
- Uninhabited/remote (near pristine) islands and atolls
- Reefs on the edges of their geographic range – most able to adapt to new conditions
- Areas or communities particularly vulnerable to climate change effects such as rising sea levels or temperatures or increased storm damage

- Regions with high predicted coastal population growth and reef dependence combined with poor management and low adaptive capacity
- Areas of limited habitat associated with specific ecological communities. These to include outer reef/shelf drop-off areas, home to unique deepwater fish assemblages and increasingly exploited as shallow waters become overfished.

2.1 Addressing Direct Human Pressures

Key policy recommendations required to increase coral reef resilience to climate change through reducing direct impacts are provided under three objectives. Many direct impacts are related and can have a synergistic effect on reef condition. For example, overfishing of herbivorous fish coupled with eutrophication of coastal waters provides ideal conditions for algae to outcompete and smother corals on reefs. It is therefore important that all three objectives are tackled for each coral reef region or nation as required. It is also important to tackle these impacts both at the local, sub-national and national level, but particularly through community-based management approaches with stakeholder buy-in.

Objective 1: Enable sustainable fishing

Target: By 2020 half of all fishing / resource extraction on coral reefs are conducted at biologically sustainable levels based on clearly defined indicators and with regular monitoring of key target commercial species.

Policy Recommendations:

Phase 1:

- Implement national stock assessments of keystone species and key reef fish and invertebrate species targeted by commercial and artisanal fisheries, and by the aquarium and curio trades
- Remove harmful subsidies to fisheries and reduce fishing effort on over-exploited stocks
- Adopt and implement the FAO Code of Conduct for Sustainable Fisheries at the national level
- Conduct socio-economic analyses to determine the value of commercial and artisanal reef fisheries to local economies and society as well as wider stakeholders and identify vulnerable groups.
- Identify viable alternative livelihoods at the national and sub-national level in reef dependent regions

Phase 2:

- Ban all destructive fishing practices and ensure there is sufficient management capacity to effectively enforce bans through local and national legislation
- Revise existing or develop new regulations to implement sustainable ecosystem-based fisheries management plans locally (using community-based approaches) and nationally (following FAO guidelines (FAO 2003) with effective enforcement
- Develop and implement regulations to address threatened species of fishes and invertebrates and plan for their recovery using specific national action plans for each species
- As part of sustainable ecosystem-based management, set targets and identify indicators for sustainable fishery operations, and establish a monitoring programme to track fishery condition and management outcomes with reference to these targets
- Implement sustainable (ecologically, socially, economically) livelihoods (both reef-based and other alternatives) in reef dependent regions through microfinance and capacity building
- Where necessary, implement policies to support local reef fish food security through market and trade measures

Objective 2: Manage watersheds, water quality and reduce pollution

Target: Implement comprehensive watershed and coastal water quality management plans that reduce pollution levels to 50% of their 2010 levels by 2020 for all major pollutants especially those that cause eutrophication, have sublethal effects on corals (e.g. affect reproduction), lower seawater pH or have other negative impacts (including Persistent Organic Pollutants).

Policy Recommendations:

Phase 1:

- For all major watersheds linked to coral reefs identify the management needs required to implement integrated watershed management policies
- Identify natural and legal watershed boundaries and determine what nations, sectors or communities have legal jurisdiction over these areas
- Identify the main point and diffuse sources of all pollutants on coral reefs
- Develop legislation to reduce pollution levels to at least 50% of 2010 levels by 2020
- Set up comprehensive national monitoring programmes for water quality
- Redefine international shipping lanes to avoid coral reef areas and improve the monitoring of merchant vessels in national waters
- Develop national management strategies for large-scale marine pollution incidents such as oil leaks
- Support the establishment and implementation of polluter pays legislation for coral reefs
- Establish best practice for mariculture operations conducted in or adjacent to coral reefs
- Ratify and adopt robust implementing legislation for the Stockholm Convention on Persistent Organic Pollutants, the Global Program of Action for the Protection of the Marine Environment from Land-based Activities (non-binding global agreement), and the International Convention for the Prevention of Marine Pollution from Ships (MARPOL)
- Ratify regional Conventions and Protocols for the protection of the marine environment against land-based pollution

Phase 2:

- Implement watershed management policies involving afforestation, runoff-reduction, sustainable agriculture methods, reduction of pesticides, herbicides, fertiliser and other agrochemical use
- Set up trans-boundary watershed management bodies
- Ensure that water quality control and the regulation of building and industry in the coastal zone are integral parts of sustainable coastal planning legislation both locally and nationally
- Declare, through the International Maritime Organisation, coral reef ecoregions of outstanding ecological value as Specially Sensitive Areas, prohibiting transport of hazardous cargo through these waters
- Encourage all coral reef states to ratify and implement the IMO Ballast Water Convention with support from the GloBallast Partnership
- Implement national management strategies for large-scale marine pollution incidents
- Implement best practice for mariculture operations conducted in coral reef or adjacent environments

Objective 3: Increase marine protected areas coverage and effectiveness

Target: 30% of the world's coral reefs are under effective management in marine protected areas by 2020 using a range of management techniques including no-take zones and restricted access.

Policy Recommendations:

Phase 1:

- Conduct a global assessment of tropical MPA management effectiveness, coordinated through existing projects and in areas that are currently unmonitored
- Implement existing national legislation that support MPAs, and improve MPA management so that marine paper parks are converted into effective MPAs (relies on increasing national capacity to enable effective management)
- Identify the increase in MPA coverage required at the national level to meet the 30% target
- Ratify regional Conventions and Protocols concerning protected areas and protection of marine natural resources
- Ensure existing legislation that supports MPAs is understood and supported by user communities and stakeholders

Phase 2:

- Support collaboration between existing regional coral reef initiatives to help meet the 30% target
- Implement national and sub-national plans to increase MPA coverage to 30% of coral reef area
- Ensure MPAs and MPA Networks protect biologically meaningful regions of known value to fisheries (such as spawning aggregation sites), conservation and communities
- Integrate ecological and social resilience factors into MPA network designation and management to help 'future proof' them against climate change effects
- Ensure that national legislative frameworks recognise the legitimacy of community-based marine protected areas and their management systems and devolve sufficient authority for effective community co-management of resources
- Increase coverage of no-entry and no-take MPAs globally through national efforts to 10 and 25% of coral reef area respectively for each country

2.2 Increasing Governance and Management Capacity

There is a clear and pressing need for substantial capacity building and increasing both governance and environmental awareness at all levels for many coral reef nations. In particular, community-based management at the local level must play a key role in enabling the objectives in the previous section to be met, and this needs to be officially recognised both at the sub-national and national level

Objective 4: Increase Effective Management and Governance

Target: Effective management strategies are designed and implemented at the national level by 2015 and at the regional level by 2020.

Policy Recommendations for Building Capacity:

Phase 1:

- Synthesise existing knowledge to complete an assessment of current national capacity and the increase in logistical and technical capacity required for effective management and enforcement that will achieve objectives 1-3
- Review existing national management structures for fisheries and conservation management to identify areas where management could be improved
- Compile and disseminate existing training manuals, guidance materials and other "how to" knowledge products addressing priority management issues through a 'one-stop shop' website for coral reef management agencies (e.g. ICRI Forum, ICRAN, or Reef Resilience)
- Initiate and support efforts to translate key coral reef management training literature into 9 languages to increase accessibility to local resource managers and government agencies (English, French, Spanish, Portuguese, Chinese Mandarin, Philippine, Indonesian, Thai, Arabic)

- Provide and increase support to existing national, regional and international networks and mechanisms for knowledge management and information exchange for improved intra-national and trans-boundary cooperation

Phase 2:

- Implement an international training programme in priority management tools and interventions, incorporating existing regional or international initiatives, that will conduct regional workshops biannually in regional nodes and train enough local resource managers by 2020 to meet the management and enforcement needs of each region.
- Increase national technical capacity to manage coral reefs through degree level training in multidisciplinary studies (e.g., ecosystem-based management, marine and social sciences) and, recruitment of matriculated staff into management positions and on the job training
- Increase logistical capacity (monitoring and communication infrastructure, equipment, etc.) to meet national needs and the type of management and enforcement required (top-down or bottom-up)
- Scale up, support and build upon programmes of regional cross-visits for local resource managers and government agencies
- Facilitate the participation of resource and conservation managers in cross-discipline training at the local and national level
- Enable and increase levels of community-based management in areas with minimal capacity and infrastructure, backed by co-management agreements with local government and enforcement

<u>Policy Recommendations for Improving Governance:</u>

- Implement effective enforcement systems for MPA and fisheries management locally, nationally and regionally with appropriate penalties to deter further infringements and full stakeholder involvement at the local level to ensure community support and ownership.
- Establish international collaboration and regional agreements to reduce IUU fishing in the EEZ's of coral reef nations by:
    - eliminating markets for illegally caught fish through strengthening market-based measures to effectively control the trans-boundary movement of products
    - coordinating Monitoring Control and Surveillance activities including intelligence gathering on illegal fishers (also see GLOBE Marine Ecosystems Recovery Strategy Part I: Marine Fisheries)
- Establish personnel and review mechanisms within government agencies that have coral reef and fisheries specific mandates, in order to eliminate barriers to progression
- Hold local, provincial and national, governments or leaders accountable for commitments to local, regional and global initiatives
- Support the establishment of regional web-based monitoring and reporting systems to assess coral reef ecosystem health and make governance more accountable
- Increase devolution of management responsibility to local communities using existing or new local legislation, particularly for fisheries and MPAs , especially for remote regions and where capacity is low, within national guidelines and under national supervision
- Increase federal cohesion for fragmented nation states (politically and geographically) to facilitate the development of national management plans
- Establish regional commissions to support management of discrete but trans-boundary coral reef ecosystems
- Clarify legislation and responsibilities for management of marine resources and MPAs between different sectors and levels of government to avoid overlaps and inter-sectoral disputes

Objective 5: Increase environmental education and awareness

Target: Environmental education and awareness programmes are implemented within both national education systems and through outreach programmes for all coral reef and neighbouring nations by 2020.

Policy Recommendations:

Phase 1:

- Identify and fill gaps in environmental educational materials - develop an international meta database of existing coral reef education materials and awareness raising material
- Assess local knowledge and levels of school attendance prior to development of environmental education and awareness programmes
- Develop and implement teaching training programmes to ensure practioners are able to deliver the revised curricula
- Investigate ways to increase the take up of national curricula for children of tropical coastal communities e.g. subsidising education for the poorest members of society

Phase 2:

- Integrate information about coral reefs, environmental conservation and sustainable ecosystem-based management into existing curricula at all levels of national education systems
- Ensure universities and research institutes in coral reef nations offer undergraduate courses in tropical marine biology and conservation and fisheries management
- Establish national scholarships for students to pursue undergraduate degrees or shorter applied training courses in tropical marine biology, and conservation and fisheries management
- Develop and implement targeted education and awareness campaigns for both children and adults on how communities and stakeholders can increase coral reef resilience by reducing direct threats

2.3 Strategy Finance and Coordination

Securing Long-term Funding

Securing long-term funding for national or regional action is crucial if countries are to effectively reduce direct human impacts on coral reef ecosystems and increase resilience to climate change. Funding needs at the national level to meet the five key objectives above will vary greatly between coral reef nations depending on their specific requirements. Therefore we recommend that these financial needs are estimated by governments within the preparatory phase of the action plan whilst suitable funds and financing mechanisms are simultaneously explored and identified. A large range of funding sources is potentially available to coral reef countries, many of which are linked to climate change. These include:

- Climate change funds:
    - The UNFCCC Adaptation Fund, the German Government's International Climate Initiative (ICI), the Climate Investment Fund's Pilot Programme for Climate Resilience (PPCR) and the European Union's Global Climate Change Alliance (GCCA)
    - Funds from the Global Environment Facility, namely the GEF Small Grants Programme (SGP) as part of the Strategic Priority on Adaptation (SPA). This supports community-based adaptation (CBA) interventions that increase resilience to the adverse impacts of climate change of vulnerable countries, sectors, and communities. CBA interventions are also funded by the two funds managed by GEF that are part of the UNFCCC — the Least Developed Countries Fund and the Special Climate Change Fund
- Payments for ecosystem services (PES) schemes for tropical coastal ecosystems including REDD-type approaches for coastal carbon sink ecosystems associated with coral reefs such as mangrove

forests and sea-grass beds. These marine PES and 'blue carbon' initiatives are still in development but are likely to be a significant source of funds in the near future.

- Revenue through direct user fees for access to on-site benefits in marine parks and reserves or through stakeholder taxes for coastal zone access
- The use of Environmental bonds for climate resilience and adaptation projects such as the World Bank Green Bond
- Private sector partnerships such as Marine Conservation Agreements (MCAs) including private marine parks or self-financing Marine Protected Areas,
- Polluter pays principle (PPP) for both chronic and acute pollution of coral reef ecosystems, incorporating upstream polluters in watersheds or in neighbouring coastal countries
- The use of match funding by governments where feasible
- Development funding primarily for capacity building and environmental education

Of the above the Adaptation Fund will be a key target for enhancing coral reef resilience and enabling social adaptation. Other forms of funding such as PES or blue carbon schemes are currently in their infancy but are also expected to provide significant funding within the next decade.

New, innovative funding mechanisms will also be needed to ensure sufficient funds are available to meet the scale of the proposed action. An area that can be further explored is the involvement of the private sector in tropical coastal ecosystem management through direct funds or user fees, particularly tourism but also other marine resource extraction industries such as fishing, oil and gas or mining. Bilateral or unilateral funding mechanisms are also options for raising revenue for sustainable development and adaptation.

Existing bottlenecks to funding including institutional, governance, economic challenges must be removed to ensure the funds reach their target user groups in a timely manner. Many of these bottlenecks will be addressed through capacity building within national government departments but assistance from external partners such as non-government organisations may be required in the initial stages to ensure funding is firstly secured and then maintained through adequate reporting and administration in country. Raising 'match funding' in country to meet a particular fund's criteria can also be an issue for developing countries that delays action.

<u>Policy Recommendations:</u>

- Establish a cross-cutting governmental working group to estimate the cost of the action plan at the national level
- Ensure all coral reef states have the technical and logistical capacity to secure and maintain long-term sources of funding such as climate change adaptation funds
- Strongly support the implementation of comprehensive financing schemes for coral reefs such as environmental bonds and PES where appropriate along with the development of financial mechanisms and markets to enable the schemes to function effectively
- Remove key bottlenecks and improve access to funding throughout the length of the action plan through capacity building and streamlining of funding processes
- Encourage smaller states to join forces to apply for funds and implement management projects
- Establish funding for fishery management implementation and fishery monitoring for the long-term
- Demonstrate the economic importance of coastal fisheries to communities and government and work towards encouraging countries to recognize the high value of their marine resources to the local economy and local population
- Improve the communications and management capability of government departments to ensure funding timelines are followed and deadlines are met

Coordination of Coral Reef Management

The coordination and implementation of national and regional action should be responsive to emerging science and follow the principles of adaptive management within an Ecosystem-based Adaptation framework with continued review, joint learning and exchange of ideas between science, policy and management. Setting up of national and regional systems for information exchange and timely reporting is a key aspect of ensuring plans are working well and that targets can be met.

Target: Effective coordination for coral reef management is in place at the national and regional level by 2020.

Policy Recommendations:

- Integrate national coral reef management plans into existing national mechanisms such as National Adaption Programmes of Action (NAPAs), National Biodiversity Strategies and Action Plans (NBSAPs) and broader national priorities such as poverty reduction and sustainable development strategies including those for population and health, coastal development and food security (for example, NBSAPs should include coral reef plans and specific coral reef targets)
- Increase national representation and active participation of coral reef countries in the UNEP Regional Seas Programme and ICRI so that all relevant nations are ICRI members and take an active role in ICRI
- Use existing international and regional conservation programmes and initiatives to implement the strategy where cross-over occurs
- Ratify all relevant regional Conventions and Protocols related to the protection of the marine environment. For most coral reef regions there are a number of Conventions and Protocols related to environmental protection, pollution (including land-based sources), protected areas and wildlife.
- Review fishery management plans, identify where shortfalls could be addressed and why fishery regulations are often ignored or poorly implemented
- Identify elements of the action plan that are not currently covered by ongoing conservation programmes and initiate new collaborative projects to address or incorporate them into existing programmes
- Designate an organisation, initiative or new steering group to provide technical support to national focal points to integrate the GLOBE recommendations into existing or new national coral reef management plans as appropriate, and to provide global coordination support to manage and track the process from 2011.
- Establish strong networks to share best practise at a range of scales including between large-scale regional initiatives and between different disciplines in research (e.g. climate, environment, development), management and policy
- Develop a clustered approach to co-ordination for implementation and management involving governments, all relevant regional management bodies and main research and management organisations involved in coral reef conservation
- For each coral reef nation and region identify and prioritise the actions needed to meet the objectives and targets by the end of 2012
- Provide sufficient support to ensure national and later regional coral reef task forces are in place and are maintained subsequently
- Support the World Commission on Protected Areas to record all MPAs and their effectiveness in Google Oceans

- Create an online global database of MPA monitoring data building on existing programmes such as the CI's Marine Management Area Science program or ReefBase.
- Establish national and regional reporting programmes for the exchange of coral reef datasets to encourage timely reporting to key global assessment processes supported by international conventions

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Appendix 1: Best Practice Case Studies – Management

National Level Resilience: Great Barrier Reef, Australia

National parliaments have an important role to play in investing in coral reef resilience. In 2004, the Parliament of Australia declared highly protected status for 33% of the Great Barrier Reef, and this protected area network is now recognized as the world's best practice in coral reef management. Implementation of the protected areas has already shown significant ecosystem benefits, with good recovery from disturbances indicating strong biological resilience. Prior to the establishment of highly protected areas, multiple-use pressures were resulting in major population declines of key protected and commercial marine species. The new marine protected area system was designed to preserve the biodiversity of the entire coastal zone including seagrass beds, sandy and muddy bottoms, and deep continental shelf slopes in addition to the coral reefs. The zoning process included comprehensive environmental assessment and stakeholder involvement, and the government is providing assistance for commercial fishers affected by the increase in areas closed to fishing. Management activities are supported by good central planning, legislation, enforcement, and research and monitoring. However, although this is the best coral reef protected area network in the world, some areas of the Great Barrier Reef still show signs of decline and decreased resilience mainly due to land-based activities leading to sediment, nutrient and other chemical pollution.

Wilkinson, C. (2008). *Status of coral reefs of the world: 2008*. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia, 296 p.

Local Level Resilience: Kimbe Bay, Papua New Guinea

The Protected Area Network of Kimbe Bay, Papua New Guinea, is the first in the world to incorporate both human needs and the principles of coral reef resilience to withstand impacts from climate change. The incredible biodiversity and ecosystem services of Kimbe Bay are threatened by climate change and direct impacts (mainly forest and mangrove clearance for plantation agriculture, which results in chemical and sediment runoff pollution). 100,000 people live in the Kimbe Bay watershed and these coastal communities rely on both land and marine resources to meet subsistence and income needs. An international NGO, The Nature Conservancy (TNC), is working with local communities and government to reduce the direct impacts and implement a marine protected area network designed for climate change resilience. The scientific design of the network was based on the principles of resilience:

- Spreading the risk through representation and replication of major habitats
- Protecting critical habitats, particularly those more resilient to climate change
- Connectivity to ensure coral larvae from healthy reefs can replenish those affected by bleaching
- Reducing other threats and implementing effective management

A community-based planning process is now underway with the local communities that own and manage the Kimbe Bay resources. These local communities will manage the Protected Area Network through legally-binding Locally Managed Marine Areas. (Green et al. 2009)

Green, A., S.E. Smith, G. Lipsett-Moore, C. Groves, N. Peterson, S. Sheppard, P. Lokani, R. Hamilton, J. Almany, J. Aitsi, and L. Bualia. (2009). Designing *a resilient network of marine protected areas for Kimbe Bay, Papua New Guinea*. Oryx 43(4): 488-498.

Appendix 2: Best Practice Case Studies – Legislation

Coral Reef Conservation Act 2000 (USA)

This legislation exists to provide co-ordinated funding for coral reef conservation projects and emergency assistance to state and local governments managing coral reef ecosystems. Through this Act, four major national programs have been established to address coral reef conservation and management. The Act requires the submission of an 'effectiveness report' every 2 years to analyse the progress made and if necessary, feed back into its objectives. Achievements of this legislation includes awareness raising of American citizens regarding the coral reef crisis, research conducted documenting the threats to coral reefs and large areas such as the Northwest Hawaiian Islands have been protected under this Act.

ICRAN Recommendations for Coral Reef Conservation to the Obama Administration and the 111th Congress [Online] available: www.icran.org/pdf/Coral%20Recommendations.pdf [Accessed: 01/10/10]

NOAA (2000) National Coral Reef Action Strategy: Coral Reef Conservation Act of 2000 [Online] available: www.response.restoration.noaa.gov/book_shelf/146_coral_consv_act_2000.pdf [Accessed: 01/10/10]

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The Coastal Zone Management Act (USA)

This Act enhanced and empowered the National Coastal Zone Management Program and National Estuary Research Reserves through a federal-state partnership to restore economically important coastal areas. A unique feature of this Act is that participation by states is voluntary, however, monetary incentives including financial and technical assistance are provided through federal funding for those states that develop and implement a comprehensive coastal management program (CMP). In response to this, 34 out of 35 coastal states have implemented CMPs, through methods including Integrated Coastal Zone Management legislation, framework acts and non-statutory co-ordination schemes. This empowerment of states has resulted in strong local participation and compliance in addition to affording coastal states the opportunity to tailor individual programs that address their own specific needs. Furthermore, the inclusion of a Performance Measurement System is used to monitor the success of the management programs at a national level. However there is no widely accepted method to measure coastal resilience and this may require further co-ordination to establish suitable criteria.

Collini, K. (2008) Coastal Community Resilience: An Evaluation of Resilience as a Potential Performance Measure of the Coastal Zone Management Act. Coastal States Organisation.

Davis, B. (2004) Regional planning in the US coastal zone: A comparative analysis of 15 special area plans. *Ocean and Coastal Management.* **47** (1-2): 79-94.

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United States Environmental Protection Agency (2007) Summary of Coastal Zone Management Act and Amendments. [Online] available: http://www.epa.gov/agriculture/lzma.html [Accessed: 31/09/10]

Protected Areas Network Act 2003 (Palau)

This legislation provided a comprehensive framework for Palau's national and State governments to collaborate with non-governmental organisations to build upon the existing suite of protected areas and establish a nationwide network of MPAs. The legislation places a strong emphasis on biophysical criteria, incorporating ecosystem based principles into its designation process. To date, 28 MPAs have been designated, 24 of which contain coral reefs. The success of this Act has not yet been documented through scientific analysis, due to the recent establishment of many of the MPAs; however, it has provided a model for other island nations to pursue through its strong political support, ranging from indigenous communities to the highest level of national government in addition to stakeholder involvement and flexibility within its

planning process. This legislation has fuelled commitments by several other Micronesian governments including the Federated States of Micronesia, the Republic of the Marshall Islands, the U.S. Territory of Guam and the Commonwealth of the Northern Mariana Islands, to protect their own resources through the establishment of the Micronesia Challenge, launched in 2006. This project covers 5% of the Pacific Ocean and 61% of the world's coral species.

Hinchley, D., Lipsett-Moore, G., Sheppard, S., Sengebau, U., Verheij, E., Austin, S. (2007) Biodiversity Planning for Palau's Protected *Areas* Network*:* An Ecoregional Assessment TNC Pacific Island Countries Report No. 1/07

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Great Barrier Reef Marine Park Act 1975 (Australia)

Australia is recognised as a world leader in coral reef management through its Great Barrier Reef Marine Park. This Act provides important management tools including zoning plans, permits, education and management plans to regulate access and control and mitigate impacts associated with human uses of the GBR. Significantly, a single organisation has the principal authority over the entire Marine Park, therefore reducing conflicting interests from multiple governing agencies as has often been the case in many other countries. The establishment of the Great Barrier Reef Marine Park Authority has provided important leadership in its protection. Additionally, there have been dramatic improvements in the development of the catchment, since the Acts implementation, including improved agricultural practices, which has reduced the level of ex situ threats from terrestrial land uses.

The variety of zones set within a multiple use framework such as in the GBR allows a range of reasonable uses to occur in a co-ordinated way and provides for a broad scale integrated approach to management. The most noteworthy success of this legislation in relation to the establishment of the GBR Marine Park was the level of public consultation and support for its implementation. Initially resource intensive and time consuming, this planning process was considered worthwhile and cost effective in the long term. By allowing for alterations in zoning plans provides an adaptive and flexible management regime and this has been primarily responsible for the increase in no-take zones from 4.5% to 33% after re-zoning occurred in 2004. Each zone has a specific written objective clarifying its purpose and in all cases, each zone has 'conservation' or 'protection' as an overriding aspect. A review of the Act in 2006 provided significant amendments to better integrate other legislation to provide an effective framework for the protection and management of the GBR.

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Appendix 3: Reference to Coral Reefs in the Convention on Biological Diversity

Convention on Biological Diversity Coral Reef Decisions

Table 1: Explicit Coral Reef Decisions

This table outlines the CBD Decisions that deal explicitly with coral reefs. Organized by Programme of Work, the table provides information about the meeting and year of the decision, the decision code, decision name, and the section of the decision in which coral reefs are addressed.

Programme of Work	Meeting	Year	Decision code	Decision name	Coral reef sections
Island Biodiversity	COP-9	2008	COP Decision IX/21	Island Biodiversity	Paragraph 2
Island Biodiversity	COP-8	2006	COP Decision VIII/1, Annex A	Programme of Work on Island Biodiversity	Paragraph 4
					Paragraph 6
					Paragraph 7
Island Biodiversity	COP-8	2006	COP Decision VIII/1, Appendix	Programme of Work on Island Biodiversity: List of suggested supporting actions for parties	Priority action 1.2.2.4.
					Priority action 1.1.3.4.
					Priority action 2.2.1.11.
					Priority action 5.1.1.6.
					Priority action 7.1.1.6.
					Priority action 7.1.1.7.
					Priority action 8.1.1.2.
Island Biodiversity	SBSTTA-10	2005	SBSTTA Recommendation X/I	Island Biodiversity, Annex A	Paragraph 4
Marine and Coastal Biodiversity	COP-2	1995	Decision II/10 B	Conservation and sustainable use of marine and coastal biological diversity	Paragraph 5
					Paragraph 13
Marine and Coastal Biodiversity	COP-4	1998	Decision IV/5	Conservation and sustainable use of marine and coastal biological diversity, including a programme of work	Section II: Coral Reefs

					Programme element - operational objective 1.3
Marine and Coastal Biodiversity	COP-5	2000	Decision V/3 Implementation of decision IV/5	Progress report on the implementation of the programme of work on marine and coastal biological diversity (implementation of decision IV/5)	Paragraph 1
					Paragraph 2
					Paragraph 3
					Paragraph 4
					Paragraph 5
					Paragraph 6
					Paragraph 7
					Paragraph 8: Priority Areas for Coral Bleaching
Marine and Coastal Biodiversity	COP-6	2002	Decision VI/3	Marine and coastal biological diversity	Paragraph 1
					Paragraph 2
					Paragraph 3
					Paragraph 5
Marine and Coastal Biodiversity	COP-7	2004	Decision VII/5	Marine and coastal biodiversity	Paragraph 8
					Paragraph 15

Marine and Coastal Biodiversity	COP-7	2004	Decision VII/5	Marine and coastal biodiversity	Appendix 1 SPECIFIC WORK PLAN ON CORAL BLEACHING
					Appendix 2 ELEMENTS OF A WORK PLAN ON PHYSICAL DEGRADATION AND DESTRUCTION OF CORAL REEFS, INCLUDING COLD WATER CORALS
					Appendix 3 ELEMENTS OF A MARINE AND COASTAL BIODIVERSITY MANAGEMENT FRAMEWORK
					Annex III IMPROVEMENT OF AVAILABLE DATA FOR ASSESSMENT OF PROGRESS TOWARDS THE GLOBAL GOAL
Biodiversity and climate change	COP-5	2002	Decision V/3	Risks, in particular, to coral reefs	Paragraphs 4, 5, Annex Paragraph A, C

Table 2: Implicit Coral Reef Decisions

This table outlines the CBD Decisions that would necessarily impact or deal with coral reefs in their implementation but which do not mention coral reefs in the text directly. Organized by Programme of Work, the table provides information about the meeting and year of the decision, the decision code, and decision name.

Programme of Work	Meeting	Year	Decision code	Decision name
Island Biodiversity	COP-8	2006	COP Decision VIII/1	Programme of Work on Island Biodiversity
Island Biodiversity	COP-8	2006	COP Decision VIII/1, Annex E	Programme of Work on Island Biodiversity: E. Goals, targets and timeframes
Island Biodiversity	COP-8	2006	COP Decision VII/31	Request to develop a preparatory process for the work of the Subsidiary Body on Scientific Technical and Technological Advice on island biodiversity / Decision to establish a new thematic programme of work on island biodiversity
Island Biodiversity	COP-8	2006	COP Decision VII/31, Annex II	Terms of reference of the Ad Hoc Technical Expert Group on Island Biodiversity
Marine and Coastal Biodiversity	COP-8	2006	Decision VIII/22	Marine and coastal biological diversity: enhancing the implementation of integrated marine and coastal area management
Marine and Coastal Biodiversity	COP-8	2006	Decision VIII/24	Protected areas: Options for cooperation for the establishment of marine protected areas in marine areas beyond the limits of national jurisdiction
Marine and Coastal Biodiversity	COP-9	2008	Decision IX/20	Marine and coastal biodiversity
Protected Areas	COP-9	2008	Decision IX/18	Protected areas
Protected Areas	COP-8	2006	Decision VIII/24	Protected areas
Protected Areas	COP-7	2004	Decision VII/28	Protected Areas (Articles 8 (A) to (E))
Protected Areas	COP-3	1996	Decision III/9	Implementation of Articles 6 and 8 of the Convention
Protected Areas	COP-2	1995	Decision II/7	Consideration of Articles 6 and 8 of the Convention
Protected Areas	COP-2	1995	Decision II/8	Preliminary consideration of components of biological diversity particularly under threat and action which could be taken under the Convention

Biodiversity and climate change	COP-7	2004	Decision VII/15	Measures to manage ecosystems so as to maintain their resilience to extreme climate events and to help mitigate and adapt to climate change
Biodiversity and climate change	COP-8	2006	Decision VIII/30	Importance of integrating biodiversity considerations into all relevant national policies, programmes and plans, in response to climate change, and need to identify mutually supportive activities to be conducted by the secretariats of the three Rio Conventions (UNFCCC, UNCCD, and CBD), parties and relevant organizations
Biodiversity and climate change	COP-9	2008	Decision IX/16	Biodiversity and Climate Change

Appendix 4: Gaps in Coral Reef Management

Gaps in our understanding of coral reef ecosystems and communities

Socioeconomic Knowledge Gaps

- Artisanal and subsistence fisheries: levels and importance of employment
- Effective alternative livelihoods: which can reduce reef dependence and benefit communities?
- Socioeconomic drivers of coral reef degradation, both local and global scale: community dependence on reefs, drivers of effects originating far from reefs such as nutrient pollution, and the political economy
    - Socio-economic effects of direct impacts and climate change: food security, poverty, health, migration, conflict, markets and trade

Ecological Knowledge Gaps

- Artisanal and subsistence fisheries: sustainability of catches and stock status
- Effects of MPAs on ecological communities and fisheries yields
- Effects of resource overexploitation on coral reef ecosystems
- Effects of climate change and ocean acidification on coral reef organisms, biodiversity and ecosystem functioning

Gaps in measuring the impacts of our actions / assessment

Long term monitoring programmes

- Environmental variables such as watershed and coastal zone pollutants, bleaching events and other effects of climate change
- Socioeconomic variables such as the effects of coral reef degradation and conservation measures on local communities and societies
    - Coral reef fisheries data on stock status and trade

Other types of monitoring

- Effectiveness of conservation measures such as MPAs, fisheries management, and uptake of alternative livelihoods
- Meta-monitoring: spatial and temporal coverage of monitoring programmes
- Communication and coordination of information obtained through monitoring: making the data available and comparable

Management gaps

- Technical and logistical capacity for coral reef monitoring and enforcement of conservation measures
- Long-term consistency of management approaches at each spatial scale
- Environmental education and awareness (formal and informal education)
- Epistemology – understanding the needs of local communities
- Use of and access to ecosystem-based management approaches
- Effective management of Marine Protected Areas especially raising awareness of designated MPAs and the management plans and the willingness and capacity to enforce MPA rules
- Efficiency of standard fisheries management

Legislative Gaps

Coral Reef Fisheries Management

- Much of the legislation in relation to fisheries is contained within vintage Acts and should be updated or suitably amended to reflect the threats of modern times.
- Fisheries laws tend to provide the main legislative framework for marine management, however, the focus shifts predominantly towards the management of harvesting activities in addition to single species protection and away from ecosystem based approaches.

Marine Conservation Measures

- Few laws exist for the sole purpose of coral reef conservation and management.
- Monitoring procedures to ensure the effective implementation of Marine Protected Areas is not a strict requirement under most laws.
- Legislation to protect coral reefs is often fragmented over various policies and administrative bodies causing confusion in its interpretation and enforcement.
- Community-based management of MPAs is not an integrated part of legislation. In addition, many MPAs are established without prior public consultation and participation, result in non-compliance and consequently, ineffective protection. Legislative mechanisms need to be identified in order to meet protected area management whilst also meeting the needs of indigenous people.
- Much of the existing legislation is reactive, in response to natural and anthropogenic pressures on coral reefs. However, management needs to be more proactive by adopting the precautionary principle to ensure effective mechanisms are in place to adjust to changing pressures or level of threat.
- Legislative and policy fragmentation exists, where MPAs should be integrated with policies for integrated land and marine resource management.
- Many national laws tend to be a centralised approach for resource management and discourage any existing community based systems, however an increasing number of new laws have been designed to be more supportive of community initiatives.

Coastal Zone Planning and Development

Integrated Coastal Zone Management which seeks to ensure sustainable coastal development is not incorporated into national legislation, even though the most of the population of these countries is in coastal communities.

Pollution Control

- Many small island nations are not a party to MARPOL, and so cannot benefit from the financial assistance provided by the IMO in relation to marine pollution.
- A lack of national legislation currently exists to address marine litter (only the Wider Caribbean and Northwest Pacific Regions have legislation implemented).
- Inadequate regulations exist to address the issue of cruise ship pollution (in one week, a 3,000 passenger ship can release 210,000 gallons of raw sewage into coastal waters).

Integrated land/ocean/watershed management

- Much of the current conservation of adjacent land and sea areas remains under the control of uncoordinated government agencies with conflicting priorities. Coral reefs extend into adjacent watersheds and should be managed as an integrated component.
- There is a lack of explicit legislative definitions for coral, coral reefs and coral reef ecosystems which limits the capacity of environmental legislation to support important conservation efforts.
- Within many countries there is a critical lack of data management systems and coral reef data storage capacity which would help coordinate and monitor the status of coral reef ecosystems which could further influence future legislative proposals.

Appendix 5: Strategic Plan for Coral Reefs 2010 – 2020

Five core Objectives with Targets, Activities and Indicators of Success

OBJECTIVE 1: Enable Sustainable Fishing

Overall target: By 2020 half of all fishing / resource extraction on coral reefs are conducted at sustainable levels.

Activities	Indicators
Phase 1	
Implement national stock assessments of keystone species and for key commercial reef fish species	• Species data for commercial fisheries – biometrics, maturity, independent CPUE
Remove harmful subsidies to fisheries and reduce fishing effort on overexploited stocks.	• (reduction in the) number of fishers and total number of fishing gears • (decreasing) catch per unit effort/landings over time
Adopt and implement the FAO Code of Conduct for Sustainable Fisheries at the national level.	• Number of countries following FAO Code of Conduct • Degree to which the FAO code is followed
Revise/develop national legislation for sustainable fisheries and good aquaculture practices	• National and local legislation revised or put in place
Phase 2	
Ban all destructive fishing practises and ensure there is sufficient management capacity to effectively implement bans.	• National and local legislation put in place • MCS reports on destructive fishing practises / infringements • Habitat complexity and benthic (coral) cover
Revise existing or develop new regulations to implement sustainable ecosystem-based fisheries management plans nationally following FAO guidelines.	• Finalised Plans are in place for coral reef ecosystems • Commercial species stock assessments - CPUE values, fish biometrics • Management effectiveness – quotas, enforcement
Develop and implement regulations to enable the recovery of threatened species of fishes and invertebrates	• Regulations at the sub-national and national level • (increase) in population size of threatened spp.
As part of sustainable ecosystem-based management, set targets and identify indicators for sustainable fishery operations, and establish a monitoring programme to track fishery condition and management outcomes with reference to these targets.	• National and local legislation put in place • Recorded catches of large predatory and key herbivorous reef fish • Abundance of large reef predatory and key herbivorous reef fish
Implement sustainable (ecologically, socially, economically) livelihoods (both reef-based and other alternatives) in reef dependent regions through microfinance and capacity building.	• Socio-economic status – household income / expenditure and occupational structure • Number of cross visits, micro-finance loans, • Number of training courses and their effectiveness
Where necessary, implement policies to support local reef fish food security through market and trade measures.	• Commercial species stock assessments • Loss of value / benefits to local economies and communities

OBJECTIVE 2: Manage watersheds, water quality and reduce pollution

Main target: Implement comprehensive watershed and water quality management plans by 2016 that reduce coastal pollution levels to 50% of their 2010 levels by 2020 for all major pollutants especially those that cause eutrophication, have sublethal effects on corals (e.g. affect reproduction), lower seawater pH or have other negative impacts

Targets / Activities	**Indicators**
Phase 1	
Identify management needs for all major watersheds linked to coral reefs	Number of major watersheds with identified management needs in each coral reef nation
Identify the main sources of all pollutants on coral reefs; Develop legislation to reduce pollution levels to at least 50% of 2010 levels by 2020	• Legislation in place and enforced • Compliance with legislation (prosecutions / fines for pollution) • Water quality data and recorded reduction in pollutant levels
Set up comprehensive national monitoring programmes for water quality	• Number of national monitoring programmes in place and operating • Water quality data-sets from national programmes
Redefine international shipping lanes to avoid coral reef areas and improve the monitoring of merchant vessels in national waters	• Number of countries that have redefined shipping lanes near coral reefs • Number of vessel groundings on coral reefs • Monitoring records for merchant vessels around coral reefs
Develop, implement or improve national management strategies for large-scale marine pollution incidents such as oil leaks	Number of nations with appropriate strategies in place and functional
Establish best practice for mariculture operations conducted in or adjacent to coral reefs	• National regulations for good practise mariculture in place and effective • Water quality assessments
Phase 2	
Implement watershed management policies involving afforestation, runoff-reduction, sustainable agriculture methods, reduction of pesticides, herbicides, fertiliser and other agrochemical use	• Number of watershed management policies in place • Scope of each policy to tackle all management needs for major watersheds
Set up trans-boundary watershed management bodies	• Number of trans-boundary bodies in place
Ensure that water quality control and the regulation of building and industry in the coastal zone integral parts of sustainable coastal planning legislation	• Number of sustainable coastal planning policies enacted • Effectiveness of 2015 legislation in regulating water quality and building in the coastal zone
Declare, through the IMO, coral reef ecoregions of outstanding ecological value as Specially Sensitive Areas, prohibiting transport of hazardous cargo through these waters.	• Number and coverage of Specially Sensitive Areas declared • Effectiveness of SSAs – number of infringements for each one declared
Encourage all coral reef states to ratify and implement the IMO Ballast Water Convention with support from the GloBallast Partnership	• Number of coral reef states that have ratified and implemented the Ballast Water Convention • Number of states with national legislation specifically for ballast water management • Number of recorded invasive species attributable to ballast water
Implement national management strategies for large-scale marine pollution incidents	Number of national management strategies in place and operational
Implement best practice standards for mariculture operations conducted in coral reef or adjacent environments	Number of mariculture standards in place and operational

OBJECTIVE 3: Increase marine protected areas coverage and effectiveness

Target: **30% of the world's coral reefs are effectively managed in marine protected areas by 2020 using a range of management approaches including no-take zones and restricted access**

Targets / Activities	Indicators
Phase 1	
Implement a global assessment of tropical MPA management effectiveness, coordinated through existing projects and in areas that are currently unmonitored	• Proportion of MPA assessed for effectiveness at the national level • Number of nations with effectiveness assessments completed
Implement existing national legislation that support MPAs, and improve MPA management so that marine paper parks are converted into effective MPAs.	• Number of communication/training programmes for MPA legislation
Identify the increase in MPA coverage required at the national level to meet the 30% target	% coverage of MPAs at the national and regional level
Phase 2	
Support collaboration between existing regional coral reef initiatives to increase MPA coverage to help meet the 30% target	Measures of collaboration – inter-initiative meetings; formation of an inter-regional initiative working group / committee
Implement national and sub-national plans to increase MPA coverage to 30% of coral reef area	% coverage of MPAs at the sub-national and national level
Ensure MPAs and MPA Networks protect biologically meaningful regions of known value to fisheries, conservation and communities	Presence of biologically valuable regions in MPA networks
Integrate ecological and social resilience factors into MPA network designation and management to help 'future proof' them against climate change effects	Number of MPA networks designed according to resilience criteria
Ensure that national legislative frameworks recognise the legitimacy of community-based marine protected areas and their management systems	Inclusion of community-based management systems in existing or new legislation
Increase coverage of no-entry and no-take MPAs globally to meet national targets	Number of national targets met for no-take and/or no-entry MPAs
Ensure there is consistency between national legislative frameworks so that loopholes are closed regarding infringements in MPAs	• Number of reports of infringements directly linked to legislative loopholes • Number of loopholes
MPA management is improved so that marine paper parks are converted into effective MPAs	Measures of MPA management effectiveness

OBJECTIVE 4: Increasing Governance and Management Capacity

Target: **Effective management strategies are implemented at the national level by 2015 and at the regional level by 2020.**

Targets / Activities	**Indicators**
Phase 1	
Synthesise existing knowledge to complete an assessment of current national capacity and the increase in logistical and technical capacity required for effective management that will achieve objectives 1-3.	• National capacity assessment completed • Increase in capacity identified
Review existing national management structures for fisheries and conservation management to identify areas where management could be improved	Reviews of management structures completed and areas for improvement identified
Compile and disseminate existing training manuals, guidance materials and other "how to" knowledge products addressing priority management issues through a 'one-stop shop' website for coral reef management agencies	Educational materials available through a designated website
Initiate and support efforts to translate key coral reef management training literature into 9 languages to increase accessibility to local resource managers and government agencies (English, French, Spanish, Portuguese, Chinese Mandarin, Philippine, Indonesian, Thai, Arabic)	National targets for translation and distribution – number of key training documents translated and at the local level
Provide and increase support to existing national, regional and international networks and mechanisms for knowledge management and information exchange for improved intra-national and trans-boundary cooperation	Sub-national, national and regional networks in place and operating
National technical capacity to manage coral reefs is increased through recruitment and training	Number of national capacity building targets met – recruitment,/staff levels, training programmes (success of training)
Phase 2	
Implement an international training programme incorporating existing regional or international initiatives to conduct X regional workshops per year in X countries and trains X local resource managers/local government by 2020.	• Regional targets for workshops and training programmes – number completed • Number of local managers trained (effectiveness of training?)
Increase national technical capacity to manage coral reefs through degree level training in multidisciplinary studies (e.g., ecosystem-based management, marine and social sciences) and, recruitment of matriculated staff into management positions and on the job training.	National targets for capacity building met Departmental recruitment targets met
Increase logistical capacity (infrastructure etc.) to meet national needs and the type of management required (top-down or bottom-up)	Number of logistical targets met (sub-nationally / nationally) – infrastructure in place and working
Scale up, support and build upon programmes of regional cross-visits for local resource managers and government agencies.	Regional targets for cross-visits -
Facilitate the participation of X managers in cross-discipline training at the local and national level	Sub-national and national targets for cross –discipline training - proportion achieved

Enable and increase levels of community-based management (CBM) in areas with minimal capacity and infrastructure	• Number of CBM programmes in place • Measures of CBM effectiveness
Governance Focus	
Implement effective governance systems for MPA and fisheries management nationally and regionally	National / Regional governance systems
Establish personnel and review mechanisms within government agencies that have coral reef and fisheries specific mandates, in order to eliminate barriers to progression	Review process reports – staff assessments
Hold national and provincial and local governments or leaders accountable for commitments to local, regional and global initiatives	Number of commitments met by leaders for initiatives at their level of governance/responsibility
Support the establishment of regional web-based monitoring and reporting systems to assess coral reef ecosystem health and make governance more accountable	Regional monitoring and reporting systems in place and functional
Increase devolution of management responsibility to local communities using existing or new local legislation, especially for remote regions and where capacity is low	Number of local laws in place and number of remaining legislative gaps Measure of community buy-in to local laws
Fragmented nation states (politically and geographically) need federal cohesion to allow national plans to be developed	Targets for improved federal cohesion met
Establish regional commissions to support management of discrete but trans-boundary coral reef ecosystems	Regional trans-boundary commissions in place and operational

OBJECTIVE 5: Increase environmental education and awareness

Target: **Environmental and Awareness programmes are implemented within the education systems of all coral reef and neighbouring nations by 2020**

Targets / Activities	**Indicators**
Phase 1	
Identify and fill gaps in environmental educational materials	
Assess local knowledge and levels of school attendance prior to development of environmental education and awareness programmes	
Develop and implement teaching training programmes to ensure practioners are able to deliver the revised curricula	• National targets for teacher training programmes
Investigate ways to increase the take up of national curricula for children of tropical coastal communities	10 news ways to increase curricula use recommended
Phase 2	
Integrate information about coral reefs, environmental conservation and sustainable ecosystem-based management into existing curricula at all levels of national education systems	National targets for education systems – presence of coastal ecosystems conservation and management in curricula
Ensure universities and research institutes in coral reef nations offer undergraduate and postgraduate courses in tropical marine biology and conservation and fisheries management	• Number of courses available at the national and regional level for each discipline
Establish national scholarships for students to pursue undergraduate degrees in tropical marine biology and conservation and fisheries management	• National scholarship programmes – in place and operating • Number of scholars who graduate • Number of scholars employed in relevant management/conservation posts (post 2020)
Develop and implement targeted adult education and awareness campaigns about how communities and stakeholders can increase coral reef resilience by reducing direct threats	• Number of EEA campaigns completed at the sub-national / national level • Proportion of communities / stakeholder groups involved in the EEA campaigns • Record of local efforts to reduce impacts – e.g. pollution / coastal development