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Contribution of the Pacific Community (SPC) to Part I to the report of the Secretary-General on oceans and the law of the sea, pursuant to General Assembly draft resolution A/71/L.26, entitled "Oceans and Law of the Sea", focusing on "The effects of climate change on oceans".

The Pacific Community (SPC) plays a major role in assisting its 22 Pacific Island countries and territories (PICTs) members with understanding the potential effects of climate change on the marine environment, both at the country and regional level. A comprehensive assessment was completed in 2011 "Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change" by the SPC, based on the best available science at the time. SPC continues to look for adaptation and mitigation opportunities to address climate change with its PICT members, given their vulnerability to most of the expected climate change effects.

This contribution is made up of two parts: i) the below 400 word summary highlighting the main points for the Director-General's report; and b) the attached Appendix A with a more detailed referenced response against the list of issues provided in the cover letter from the United Nations.

Summary

Ocean warming is projected to have profound effects on the physical environment in the tropical Pacific Ocean. Sea surface temperature (SST) will rise with different projections on the actual level, with increases already recorded since 1900 in the Western Pacific Warm Pool, and this is expected to increase during the 21st century. Increased SST is expected to decrease oxygen concentrations in surface waters as a result of reduced solubility of oxygen in warmer water. Increased SST is also projected to effect atmospheric pressure patterns responsible for wind generation, which will affect the strength and direction of major ocean currents. All of these effects will affect the reproduction, migration, concentration and location of tuna and other pelagic species in the Pacific in the 21st century, limiting sustainable economic development aspirations of PICTs.

Increased carbon dioxide emissions have decreased the pH of the tropical Pacific Ocean (ocean acidification), and this decrease is expected to continue. This decrease will also reduce the aragonite saturation that calcifying organisms such as corals, certain plankton and shellfish use to build calcium carbonate skeletons. This coupled with SST rise will greatly affect coral cover, resulting in coral reef fish production decreasing by an estimated 20% by 2050 in the Pacific, destabilising food security in many countries as populations increase. Extreme weather events add to the dilemma of PICTs, with recent cyclones in Vanuatu (2015) and Fiji (2016) causing severe damage to the marine environment. These extreme weather events are expected to decrease in number, but increase in intensity.

SPC is working with its 22 PICT members to better understand the effects of climate change and work with them to develop adaptation initiatives to build resilience to these effects, with a focus on maintaining food security, sustainable economic development and livelihoods for small-scale fishers. SPC provides technical assistance, scientific support and capacity development assistance in a range of areas to support PICTs sustainably manage their tuna and coastal resources in the face of a changing environment, which includes the effects of climate change.

The lack of data (long-term and short-term) is greatly hindering those in the Pacific and elsewhere to fully understand climate change effects, and have the ability to ground-truth and validate many of the projections that are being made. Donor support is needed to fund ongoing data collection on fisheries and oceans in general if we are to better understand and address climate change impacts in the future.

We look forward to the SPC's contribution being considered for inclusion in the Director-General's report.

Appendix A

SPC response to the list of issues on: "The effects of climate change on oceans"

- **Key interactions between oceans and climate change (drivers)**

1. Ocean warming (based on WOA, IPCC and other scientific info)

Ocean warming is projected to have profound effects on the physical environment in the tropical Pacific Ocean. Under the Special Report on Emissions Scenarios (SRES) A2 scenario, increases in sea surface temperature (SST) of up to 5.4 °C by 2100 are predicted, although the extent and rate of change is expected to vary spatially, with rapid warming of the central equatorial Pacific Ocean and slower warming in the southern subtropics (Lough et al. 2011; Bell et al. 2013). Average SSTs in the Western Pacific Warm Pool (hereafter 'warm pool') has increased by ~0.7 °C since 1900 (Bindoff et al. 2007; Cravatte et al. 2009), and is expected to continue rising and may increase by 1.2–1.6 °C by 2050 and 2.2–2.7 °C by 2100, relative to 1980-1999, under a high emissions scenario (Ganachaud et al. 2011). The size of the warm pool is also projected to increase (Brown et al. 2014). Alterations in rainfall are expected, with the greatest increases in rainfall projected for the equatorial Pacific, while decreases are expected to occur in the southeast of the region (Bell et al. 2013).

A decrease in oxygen (O_2) concentration in surface waters by 2100 is projected, due to the reduced solubility of O_2 in warmer water. A decrease in O_2 transfer from the atmosphere due to reduced ventilation and advection is expected in subsurface waters, resulting in lower O_2 concentrations in the thermocline (Ganachaud et al. 2011). Tropical cyclones are projected to be less frequent with the strongest events potentially becoming more intense (Bell et al. 2011). The extent of sea level rise in the region is predicted to be close to the global average, with estimates for 2100 ranging from 23 to 58 cm (from climate models), to more than 1m (from semi-empirical models).

Increases in SST are also projected to affect the atmospheric pressure patterns responsible for wind generation, which has implications for the strength and direction of major surface currents. In particular, weakening of the equatorial and northeast trade winds, and stronger southeast trade winds, are expected to help drive significant changes in ocean circulation. The strength of the south equatorial current near the equator is projected to weaken by an average of 30% by 2100, whereas the New Guinea coastal undercurrent and equatorial undercurrent are expected to strengthen in the western Pacific. The south equatorial counter current is also likely to weaken and extend less to the east. These circulation changes are expected to have knock-on effects for nutrient delivery to the photic zone (Ganachaud et al. 2011; Bell et al. 2013).

2. Carbon dioxide flux (based on WOA, IPCC and other scientific info)

Increased emissions of CO_2 have decreased the pH of the tropical Pacific Ocean by 0.06 pH units since the beginning of the industrial era (Raven et al. 2005). Based on the SRES A2 emissions scenario that assumes a continuation of the rapid increase in global CO_2 emissions, increasing atmospheric CO_2 concentrations are projected to drive decreases in the pH of surface waters from ~8.1 to ~7.8 by 2100, reducing aragonite saturation (the mineral that calcifying organisms, such as corals, certain plankton and shellfish use to build calcium carbonate skeletons) from 3.9 to an average of 2:4 (Bell et al. 2013).

- **Effects of climate change on the oceans – environmental, social and economic**

1. Ocean warming

i. Effects on marine ecosystems and biodiversity

Environmental

The Pacific Community (SPC) contributed to the Oceans 2015 Initiative, which evaluated and compared the risks of impacts on marine and coastal ecosystems and the services they provide under two potential carbon dioxide (CO_2) emission pathways over this century (RCP 2.6 and RCP 8.5). The research showed that impacts from anthropogenic CO_2 emissions on key marine and coastal organisms, ecosystems and services are already detectable across all latitudes. Looking forward, the project found that there are high risks of impacts for some organisms even on a stringent emissions pathway – one that is consistent with the objectives of the Paris Agreement.

Most at risk are coral reef, mangrove, and seagrass ecosystems, on which Pacific Island countries and territories (PICTs) depend heavily for people's food security and livelihoods. In particular, coral reefs of the Pacific Islands region will be subject to more frequent bleaching events driven by increasing sea surface temperatures (SST), with mass coral bleaching events predicted to occur at least twice as frequently by 2050, and every 1–2 years by 2100 (Bell et al. 2011a). Higher temperatures, increased turbidity, sedimentation and nutrient loads associated with greater rainfall, and more intense tropical cyclones, are likely to have negative effects on mangroves and seagrasses (Bell et al. 2013). However, for most other organisms, the risk of impacts remains moderate throughout the 21st century if we do not exceed this emission pathway. Higher emission pathways, such as the business-as-usual scenario, would significantly aggravate the situation: almost all marine organisms considered by the Oceans 2015 Initiative and all ecosystem services such as coastal protection and capture fisheries, would face very high risks of impact by 2100.

Social and economic

Any change in marine biodiversity and the supporting ecosystem will have significant effects on societies in the PICTs, as much of their culture and heritage revolves around this, especially in low-lying atolls. A change to ecosystem services, such as coastal protection with reduced mangroves, the loss of corals or seagrasses that effect fish and invertebrate production, has the potential to change food chains and the very culture of coastal communities in the Pacific. Many tourists also travel to the Pacific to view the more pristine marine environment and its rich biodiversity, so changes to this has the potential effect to reduce tourism and the economic benefits derived from this.

ii. Effects on marine species

Environmental

Climate change simulations of Pacific tuna populations have been conducted most recently using the RCP8.5 IPCC "business as usual" scenario and driven by a number of alternative environmental forcing projections. For the tropical tunas – skipjack, yellowfin and bigeye – the general pattern predicted is that populations shift from the tropical western to central and eastern Pacific and overall abundance declines, particularly in the second half of the 21st century. These changes are driven primarily by degraded spawning habitat, due mainly to elevated ocean temperature. For South Pacific albacore, overall abundance is predicted to decline, the stock distribution to displace by about 5 degrees of latitude to the south and to contract longitudinally to west of 110°W. These changes are driven primarily by predicted reduction in subsurface dissolved oxygen concentrations, which are not well determined in climate change oceanographic predictions. Some simulations suggest the possibility of a new spawning area developing in the Tasman Sea, which might mitigate population declines to some extent late in the 21st century.

Coastal fishes and invertebrates in the Pacific (i.e. those species caught in coastal habitats – coral reefs to a depth of 100 m, seagrass meadows, mangroves and intertidal flats) are likely to be both directly and indirectly affected by ocean warming. Direct effects include changes in growth, reproductive biology, dispersal, recruitment success, sensory ability and behaviour, particularly in larval and juvenile life history stages, which are expected to result in decreases in local abundance (Pratchett et al. 2011, and references therein). Declines in primary productivity and loss of coral reefs, mangroves and seagrasses will also affect coastal species indirectly (Pratchett et al. 2011, and references therein). Additionally, with projected declines in live coral cover and increases in the cover of dead coral and algae it is expected that incidences of fish poisoning, such as ciguatera and other related diseases, will rise (Pratchett et al. 2011).

Social and economic

PICTs are strongly dependent on tuna resources for their economic development and food security. Therefore, if the predicted changes in abundance and distribution of tuna stocks eventuate, the social and economic impacts on PICTs could be severe. Impacts could be more severe in the more western EEZs, such as Papua New Guinea, Federated States of Micronesia and Solomon Islands, and less so further to the east in Kiribati, for example. Impacts may be mitigated by effective zone-based management systems, such as the Vessel Days Scheme implemented by the Parties to the Nauru Agreement, which allow flexible movement of fishing fleets but with some buffering of economic benefits through transferable zone-based allocations.

PICTs are also highly dependent on coastal fisheries as a source of food security and livelihood. Fish consumption of coastal communities is often 2–4 times the global average and supplies 50–90% of dietary animal protein in rural areas. Additionally, 50% of households in coastal communities earn their first or second incomes from fishing or selling fish (Pinca et al. 2010). Accordingly, PICTs will be significantly affected by the combined effects of global warming and ocean acidification. In the short term (i.e. to 2035), effects of climate change will be minimal and difficult to separate from ongoing effects of fishing and local habitat degradation. However, by 2050 production of coral reef fish is projected to decrease by 20% (Bell et al. 2013). By 2100, the combined direct and indirect effects of climate change are projected to reduce the total production of coastal fisheries by up to 35% in the western Pacific and 30% in the eastern Pacific, with severe social and economic impacts to PICTs likely (Bell et al. 2011).

iii. Sea-level rise

Environmental

Sea-level rise, resulting from both melting of ice in polar regions and thermal expansion of oceans, will create severe problems for low lying coastal areas, namely through increases in coastal erosion and saltwater intrusion (Mimura 1999). Reduction in the area of mangrove, seagrass and intertidal habitats are projected, particularly where land barriers such as steep terrain or coastal infrastructure limit shoreward migration (Bell et al. 2011a).

Social and economic

Declines in the extent and quality of mangrove, seagrass and intertidal areas resulting from sea level rise will have significant deleterious effects on species that use these habitats, with considerable follow-on social and economic impacts on PICTs. In particular, species with specialist habitat requirements, such as many species of commercially important sea cucumbers are likely to be significantly affected (Pratchett et al. 2011), with corresponding impacts to fisheries these species support.

iv. Melting ice in Polar regions

Covered in previous topic

v. Extreme weather events

Environmental

Extreme weather events such as tropical cyclones are particularly devastating on tropical marine ecosystems and the ecosystem services they provide. Tropical cyclones directly impact coral reefs, mangroves, seagrasses and intertidal areas through physical damage, resuspension of sediments, pulses of nutrient enrichment and freshwater inundation, altering their extent and structural complexity, and thus their benefit as fish habitats (Woodley et al. 1991; Harmelin-Vivien 1994; Pratchett et al. 2011). Changes in fish species density and biomass are common after such events (e.g. Wilson et al. 2006; Ceccerelli et al. 2016), and may result in reductions in critical ecosystem functions, potentially leading to regime shifts to less desirable benthic assemblage types (e.g. coral to turf- or macro-algal dominance). Changes in catch rates of certain target species are also likely.

Destruction of coral reefs as a result of cyclones can also lead to increased algal blooms as a result of the upheaval and damage coursed. Droughts have also had the same effect with increase nutrient levels in the lagoon or coastal marine environment being attributed to algal blooms. Algal blooms have been linked to increases in ciguatera fish poison in some PICTs, usually within 6-12 months of an extreme weather event.

Social and economic

Extreme weather events such as tropical cyclones and severe storms can have considerable social economic implications for coastal fisheries in the Pacific Islands by 1) reducing stock size following destruction of key habitats, and 2) reducing fishing time and destroying or damaging fishery assets and infrastructure such as landing sites, boats and gear (Daw et al. 2009; Badjeck et al. 2010).

Typically after an extreme weather event that affects food chains and damage to agriculture crops, communities turn to the marine environment with increased fishing effort to meet their short-term dietary needs. However, this potential leading to overfishing that again affects food security in the longer term. Algal blooms and ciguatera outbreaks compound negative effects on food security and the availability of healthy food choices, which can lead to health issues for the communities.

2. Carbon dioxide flux and ocean acidification

Environment

There is experimental evidence that reduced ambient pH at levels projected to occur under climate change scenarios may adversely impact larval survival and growth and increase egg hatch times, thus increasing exposure to predation. Further work has demonstrated that ocean acidification can potentially damage organs such as kidney, liver, pancreas, eye and muscle in yellowfin tuna larvae. These detrimental effects may negatively impact recruitment and put further pressure on tuna stocks.

Ocean acidification is also projected to significantly affect coral reefs, because reductions in pH result in decreases in aragonite saturation, which is essential for corals and other calcifying organism to build their skeletons and shells (Hoegh-Guldberg et al. 2011). In particular, structurally complex coral species are likely to be most affected, and changes in community structure to more robust species are predicted. The combined effects of increased coral bleaching and ocean acidification are expected to reduce live coral cover (estimated at 20-40% for the Pacific in 2010) by 50% by 2050 under good management, and by 75% under poor management (Hoegh-Guldberg et al. 2011).

Increasing ocean acidification will also directly impact coastal fish and invertebrate species, Experimental studies conducted on a number of larval and juvenile finfish species that occur in the Pacific have demonstrated significant direct effects of elevated CO_2 levels on their behaviour and sensory responses. Increased boldness and activity, altered auditory preferences, loss of lateralisation in movement, and impaired olfactory function have been observed in individuals reared in elevated CO_2. Such changes are projected to significantly impact the homing and settlement behaviour of larvae and predator detection among all life history stages, with potentially serious implications for population replenishment, patterns of connectivity, and survivorship of settled recruits (Pratchett et al. 2011, and references therein). While not expected to affect adult life history stages of fishes, ocean acidification is expected to negatively impact adults of many invertebrate species due to decreases in aragonite saturation, including gastropods, crustaceans, molluscs and echinoderms , with significant impacts to fisheries these species support in the Pacific.

Social and economic

SPC led the effort to review the range of management options available to societies facing ocean warming and acidification. It highlights extensive and promising developments in theory and practice in recent years to: i) mitigate changes; ii) protect coastal and marine ecosystems so as to increase their resilience; iii) adapt societies; and iv) repair damage to the coastal and marine environment once it has occurred. However, the research also warns that however encouraging on-going experiences may be, the range of available options, and experts' confidence in those options, dwindles as the ocean warms and acidifies.

Action undertaken to address the effects of climate change on the oceans and to foster climate resilient sustainable development of oceans and seas

1. Science, data collection and awareness raising

SPC has actively invested in assessing the extent to which increasing greenhouse gas emissions are likely to affect plans to optimise the socio-economic benefits derived from fisheries and aquaculture in PICTs. These investments include a comprehensive assessment of the vulnerability of oceanic, coastal and freshwater fisheries, and coastal and freshwater aquaculture, to climate change by scientists and fisheries managers from a wide range of institutions (Bell et al. 2011a). The results of this assessment were disseminated through summaries for each PICT (Bell et al. 2011b), a regional adaptation-focused workshop (Johnson et al. 2013), and a series of national workshops (see http://www.spc.int/fame/en/meetings for outcomes of workshops).

In the aftermath of COP21, potential post-2030 emission trajectories and their consistency with the +2°C target are a core concern for the ocean scientific community in light of the end-century risks of impact scenarios. Under the Oceans 2015 Initiative, SPC reviewed the aggregated risks of impact to the ocean for selected temperature thresholds, including the below 2°C target and pathways derived from countries' INDCs. SPC investigated the needs and ways for the ocean scientific community and climate talks to better inform each other.

Considering the concerns of climate change and its impacts on coastal fisheries resources, the Coastal Fisheries Programme of the Fisheries, Aquaculture and Marine Ecosystems (FAME) Division of SPC implemented the 'Monitoring the Vulnerability and Adaptation of Coastal Fisheries to Climate Change' project. This project aimed to assist fisheries agencies in five PICTs (Federated States of Micronesia, Kiribati, Papua New Guinea, Republic of the Marshall Islands, and Tuvalu), to design and field-test monitoring pilot projects to determine whether changes are occurring in the productivity of coastal fisheries and, if changes are found, to identify the extent to which such changes could be attributed to climate change, as opposed to other causative factors. Survey techniques were used to assess benthic habitats, invertebrate and finfish populations through in-water surveys, and fishing activities through landing site (creel) surveys. Two surveys, two years apart were undertaken in each pilot site so a comparison of change can be made, however, a longer time series is needed to accurately detect change. This is work that the FAME Division of SPC will continue when new funding is located, so further comparison of results and be made over a longer time period. The reports from this work can be found at (http://www.spc.int/coastfish/en/projects/climate-change.html).

2. Overview of existing legal and policy frameworks

The Coastal Fisheries Programme within SPC's FAME Division is commencing a new project to review and update coastal fisheries and aquaculture legislation and policies at the national and sub-national levels in PICTs. This process will include taking into account climate changes vulnerability concerns in the coastal fisheries and aquaculture sectors on a country by country basis with stakeholder input. In doing this work, other climate change specific legislation and policy will need to be reviewed to ensure that any new or changed coastal fisheries and aquaculture legislation or policy is complementary to existing climate change legislation and policy.

3. Action aimed at fostering climate resilient sustainable development of oceans and seas

In the Pacific, actions to foster climate-resilient sustainable development of oceans and seas often converge to relieve the pressure from non-climate drivers of change such as land-based pollution, overexploitation of renewable resources, invasive species and habitat destruction. Such "no-regret" actions usually turn out to be cost-effective, locally and readily available, while having the advantage of being reversible and adjustable as more scientific knowledge becomes available. SPC supports its members to implement Integrated Coastal Management projects that take holistic approaches to address local development and resilience issues in a changing climate. This is further strengthened through a community-based approach, and SPC actively promotes the Community-based Ecosystem Approach to Fisheries Management (CEAFM).

The CEAFM approach allows communities to take a leadership role in the management of their marine resources and the coastal zone, including any land-based activities that they are involved with that may affect the marine environment. CEAFM also promotes resilience to climate change including the use of adaptation and alternatives to be more prepared for future climate change effects. Legislation and policies mentioned in the previous section will also further support CEAFM and empower communities through these processes to manage and adapt with support from national and sub-national governments.

4. Ocean-based adaptation actions Ocean-based mitigation action

Climate change adaptation activities have been trialled by many governments, NGOs and development partners, mainly through pilot site approach. One of the more successful adaptations is the use of moored fish aggregating devices (FADs) to move fishing pressure away from overfished coastal resources to target the larger and healthier regional tuna or pelagic resource. SPC has been promoting the use of nearshore moored FADs (from 0.5 to 7 km off the reef) for many years in support of food security and small-scale livelihoods, as a complimentary climate change adaptation activity.

5. Capacity building, partnerships and financing

The SPC is involved in a range of capacity development and training activities in support of resilient and sustainable development of oceans and seas, with partners in many instances. This capacity building and partnerships include:

- Implementing and undertaking standardised survey methodologies with fisheries staff, NGOs and other researchers for coastal marine resources (finfish and invertebrates) and their supporting habitats so that a) management advice is based on the best available science and b) possible climate change effects can be detected and recorded;
- Taking the results from resource and habitat surveys, interpreting this and turning this into management advice, and presenting this in a manner that is easily understood by fisheries managers and communities;
- Developing partnerships with NGOs for collaborative project implementation of climate change adaptation initiatives at the and sub-national and community level;
- Strengthening legal and policy development skills at the national and sub-national levels in PICTs with a focus on government staff and fisheries managers;
- Developing and strengthening the skills of staff at the national and sub-national level in monitoring, control, surveillance and enforcement (MCS&E) in support of sustainable management of coastal marine resources;
- Training local fishers and fisheries staff in the rigging and deployment of FADs and appropriate fishing methods used around FADs to reduce fuel consumption as a climate change adaptation activity; and
- Trialling climate change adaptation activities in support of food security and small-scale livelihoods and promoting the successful initiatives with fishers and local communities, often in collaboration with partners and fisheries departments in PICTs.

- **Further action necessary to address the effects of climate change on the oceans**

The main and fundamental need is for financial support for ongoing data collection and research to form long-term data sets to better understand the effects of climate change on the ocean. New data is needed to be able to validate current projections and models to allow these to be refined and updated so that better projections and models can be used in the future. Unfortunately, donors are reluctant to fund necessary research and the collection of time-series data, usually over a long period of time, and this is hindering the understanding of climate change effects now and in the future.

Much of the research needed to improve the projected effects of climate change on tuna in the tropical Pacific centres around strengthening modelled projections of movement. In particular, research is needed to improve the biogeochemical model in SEAPODYM, and the estimates of future fishing effort, which need to be coupled to a global climate model to estimate catches of the four species of tuna under various climate change scenarios. Key areas of research for oceanic fisheries include:

- Assessment of the effects of higher atmospheric concentration of CO_2 on the C:N ratio of organic matter in the ocean and influences on primary production and the carbon cycle.
- Definition of the optimal range and thresholds of temperature and dissolved O_2 concentrations for the different life history stages of the four species of tuna.
- Further evaluation of the potential impacts of increased ocean acidification on tuna, particularly on production of gametes, fertilisation, embryonic development, and hatching and larval behaviour and ecology of tuna.
- Estimation of the energy transfer efficiency between all levels of the food web, but particularly from the lower levels to micronekton to validate the forage population sub-model.
- Evaluation of the spatial and temporal variation in diversity, distribution and abundance of micronekton across the region through increased use of acoustic sounders on scientific, fishing and commercial shipping vessels.
- Increased access to operational fisheries data is also needed - the more closely the resolution of the industrial fisheries catch data matches the resolution of the environmental data, the better the predictive performance of the model.

Much uncertainty also exists regarding the effects of climate change on coastal fisheries in the Pacific Island region. For example, the effects of increasing temperature and declining pH have to date only been tested on a limited range of largely small-site attached species, and it is unknown how these translate to the important fisheries species of the region. Moreover, tests on individual factors (e.g. declines in pH) have largely been conducted in isolation, without regard for stresses caused by other factors and the synergistic effects multiple factors may cause. Further research is needed to increase our understanding of climate changes effects on coastal fisheries and adapt suitable management strategies of mitigating such effects. Priority areas include:

- Improving knowledge of the role of mangroves, seagrasses and intertidal flats in supporting fish and invertebrates harvested by coastal fisheries, and how the juxtaposition of these habitats, and their proximity to coral reefs, affects their value as nursery and feeding areas;
- Examining the effects of increasing ocean acidification, SST and other anthropogenic stressors, individually and together, on the biology and ecology of fish and invertebrates, and the ability of target fisheries species to adapt to these changes;
- Identifying the spatial structure of invertebrate and demersal fish stocks, and how changes in direction and strength of ocean currents under climate change could affect replenishment of these stocks;
- Monitoring shifts in the distributions of species, and the effects of climate-induced changes in species composition on ecosystems; and
- Determining whether there is a link between ciguatera fish poisoning, which renders many demersal fish and some near shore pelagic fish inedible, and climate change.

Dedicated monitoring programs are needed to evaluate the effects of climate change on coastal fisheries resources and their supporting habitats and to provide information for adaptive management. Regional standardisation of methodologies for data collection, storage, analysis and reporting is needed.

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