

October 2013



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WESTERN CENTRAL ATLANTIC FISHERY COMMISSION (WECAFC)

SIXTH SESSION OF THE SCIENTIFIC ADVISORY GROUP (SAG)

Corpus Christi, Texas, USA, 3 November 2013

Draft Review of fisheries management and conservation in the WECAFC Region

Note

The following draft Review has been kindly prepared by experts from the Caribbean Regional Fisheries Mechanism (CRFM) under a contract with FAO.

The WECAFC Secretariat expresses its particular appreciation to Ms. Susan Singh-Renton and Ms. Elizabeth Mohammed for preparing this high quality draft and to the experts from the countries who have dedicated precious time to complete the extensive survey that formed the base of this review.

The first findings of this review were presented and discussed at a Workshop to validate the outcomes of the review of current fisheries management performance and conservation measures in the WECAFC region, held in Kingston, Jamaica, 8 December 2012.

The SAG is invited to:

- **Technically review this draft review, providing comments and suggestions for further improvement.**
- **Review and clear the Summary and Conclusions (adding/removing conclusions as necessary) for forwarding to the 15th session of WECAFC.**

The final version of this Review will be published as FAO Fisheries and Aquaculture Technical Paper in 2014. As this is not yet the final version of the review, we would be grateful if you could contact the WECAFC-Secretariat at WECAFC-Secretariat@fao.org for permission if you would like to use this document, make reference to it or replicate it. Thank you.

Introduction

Fish is a renewable but finite resource. Global understanding of this concept improved only after the excessive capitalization of the fishing industry following on the heels of the Second World War of the 20th century, and after the popular target species of some fisheries suffered sufficient depletion to impact the economic returns likewise, e.g. North Sea herring. Such experiences provided valuable lessons to some, but broader appreciation of the concept of sustainable fisheries management, and its relation to environmental and ecosystem conservation, only unfolded gradually, as did its acceptance and incorporation into international law. The adoption of the United Nations Convention on the Law of the Sea in 1982 marked an important development in the history of fisheries management, conferring rights and responsibilities to countries for the maritime spaces under their jurisdictions.

As understanding of the impacts of fishing activities on the environment and ecosystems improved, this led to the formulation of additional related and supporting international agreements, with the following agreements being among the more important fundamental ones: the United Nations Convention on the Law of the Sea (hereinafter referred to as UNCLOS) (UN, 1982); the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, (hereinafter referred to as the 'UN Fish Stocks Agreement') adopted in 1995 (UN, 1995); the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas adopted in 1993 (hereinafter referred to as the 'FAO Compliance Agreement') (FAO, 1993); The Code of Conduct for Responsible Fisheries adopted in 1995 (FAO, 1995); and the UN Conference on Environment and Sustainable Development Agenda 21, adopted in 1992 (UN, 1992). Despite these developments, there continues to be widespread concern about the state of the world's fisheries, based on the scientific evidence (e.g. FAO, 2010, Ye and Cochrane, 2011; Pauly et al., 2004), and recent efforts to strengthen the global legislation, e.g. the recent formulation and adoption of the Agreement on Port State Measures to prevent, deter and eliminate IUU fishing adopted in 2009 (hereinafter referred to as the 'Port State Measures Agreement') (FAO, 2009).

In an effort to improve understanding of the present level of fisheries management performance actually being achieved in practice, a detailed questionnaire, the State of World Marine Capture Fisheries Management (SOWMCFM), has been developed to facilitate fisheries management performance studies that have since been completed for the Indian and Pacific Oceans (De Young, 2006, 2007). For the present study, the original SOWMCFM questionnaire was updated and expanded for application in the Western Central Atlantic Region to take into account the characteristics of fisheries in that region, as well as recent developments in fisheries management expectations. As in the case of the Indian and Pacific Ocean studies, the questionnaire for the present study allowed country correspondents to organize their information on the fisheries management situation as it pertains to: legislation (direct and indirect), costs and funding, stakeholder involvement, transparency and conflict, compliance and enforcement. Additionally, the questionnaire facilitated the organization of this information firstly at the level of the country or territory, and then for major fishery sub-sectors.

The questionnaire facilitating country reviews contained 4 major sections. Section 1 sought to obtain a general country overview of the fisheries management mechanism in place. Sections 2-4 then facilitated closer examination of current fisheries management tools and trends for the following three major sub-sectors: (1) commercial/ industrial (large-scale); (2) small-scale, artisanal, lifestyle, subsistence, indigenous, customary fisheries; (3) recreational, including non-consumptive use such as catch and release fishing, ecotourism and diving. For the purposes of administering the questionnaire, the definitions of each fishery type were provided as a guide (Table 1), but country correspondents were requested to indicate where these definitions differed from what was applied within their respective countries.

Specifically, the questions were organized according to the following format:

POLICY FRAMEWORK

- Is there specific legislation for marine capture fisheries management? When was it first adopted, and if and when has it been revised?
- Does the legislation provide a framework for management, and where are these set forth (national, regional, local)?
- Does the legislation list the objectives of fisheries management, are these prioritized and also included in fisheries management plans?
- If the legislation has been recently revised, were changes made to specifically incorporate recent international fisheries management norms/ mandates, e.g. the FAO Compliance Agreement and the FAO Code of Conduct for Responsible Fisheries?
- Is there non-fishery specific legislation that supports the objectives of fisheries management?

LEGAL FRAMEWORK

- Who is responsible for fisheries management at national, regional and local levels?
- Are the administrative, scientific monitoring, and enforcement responsibilities for management formally divided and how so?
- Does the legislation provide specific guidance to shape fisheries management plans, e.g. specific guidance on management tools and approaches, a formal process and fixed timeframe for implementation?
- Does the legislation require specific information to guide decision-making?
- Is the legislation informed by the work of RFBs or RFMOs in the case of shared resources?
- Does the legislation support the fulfillment of national obligations to international legislation? List major conventions, and regional/ international organizations to which the country is a party.
- Does the legislation allow for management to occur in other ways, e.g. alternative sources of information and associated decisions, external decisions?
- What provisions are made for handling prosecutions and also illegal fishing by foreign vessels?
- Is the legislation influenced/ supported by other, non-fishery specific legislation and how?

DESCRIPTION AND STATUS OF FISHERIES IN THE COUNTRY

- What are the characteristics of the different types of fisheries carried out within the three major sub-sectors?
- Which are the major fisheries in terms of landings, value, and how have these changed over the past 10 years?
- Where are these fisheries located?
- What is the level of fishing effort and how has this changed in the past 10 years?
- How does the fishery contribute to food security and employment?
- What is the extent of overfishing occurring in formally managed fisheries and believed to be occurring in all of the sector considered altogether
- For each sub-sector, what has been the trend in catch and effort and is overfishing currently taking place?
- Is fishing capacity monitored and if there is overcapacity, has management sought to reduce fishing effort?

MANAGEMENT ACTIVITY

- In practice, what percentage of marine capture fisheries is managed in some way?
- Has the management process been informed by the legislation, management plans and regulations, and for what percentage of fisheries?
- How has the management process been affected by international legislation?
- How has the number of managed fisheries changed over the last 10 years?
- Which major fisheries, if any, are not currently managed?
- What is the extent of overfishing occurring in formally managed fisheries and believed to be occurring in all of the sector considered altogether
- For each subsector, indicate if there are management plans in effect for the major fisheries and what are the management objectives?
- For each sub-sector, are any major fisheries multi-species in nature, and how is this taken into account, if at all, by the management process?
- Does the management process include specific ways of applying the Ecosystem Approach to Fisheries (EAF) management and the precautionary approach, and how is this achieved?
- Which management tools are applied in the main sub-sectors, are these unique to the fisheries concerned, and how have the application of these tools changed in the past 10 years?
- Are the applied management tools linked to established international performance standards, and/or regional or internationally agreed management measures?
- Do any existing marine protected areas/ marine reserves include fisheries management as one of the aims? If not, is fisheries management affected by these protected areas/ reserves and how?
- What is the nature (formal and organized versus ad hoc), quality and extent of stakeholder involvement in management, and how has this contributed to improved management?
- What efforts are made to ensure transparency of the management process?
- If there is conflict within the sector, why does it exist and how has this changed over the past 10 years?

- Does the management process include formal steps for resolving conflicts, and if so, what does this involve?
- For each sub-sector, what has been the trend in catch and effort and is overfishing currently taking place?
- Is fishing capacity monitored and if there is overcapacity, has management sought to reduce fishing effort? What constraints exist to delay monitoring and measurement of fishing capacity?
- What capacity-reduction programs have been implemented, for what aims, and to what extent have these been successful in reducing and maintaining a reduced fishing capacity? Who has paid for the program, and what has been its cost, relative to the value of the fishery?
- Which agencies support enforcement activities and what are their specific roles and responsibilities?
- What monitoring systems are used to support compliance? Have the number of offences changed over the past 10 years?
- Has the enforcement budget changed in the past 10 years, and how has this affected the success of enforcement?
- Are penalties applied for non-compliance with fisheries regulations, and if so, what penalties are applied? Have these been effective at deterring actions of non-compliance and cheating?

COSTS AND FUNDING OF FISHERIES MANAGEMENT

- What level of financial support is provided by the government, if required? Is such funding provided for activities at the national, regional and local level?
- Are there provisions in the legislation for recovering the costs of fisheries management, e.g. fees, resource rentals?
- How have the budgets and costs changed over the past 10 years and why?
- Where the costs have increased, how are these costs being met?

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

- List major conventions, and regional/ international organizations to which the country is a party
- If the country has signed, ratified, or acceded to the United Nations Fish Stocks Agreement, the FAO Compliance Agreement, and other key Agreements, please describe the provisions in domestic fisheries.
- If the country has taken steps to implement agreed International Plans of Action relating to reducing incidental catch of seabirds, shark conservation and management, fishing capacity management and others, please describe the actions taken to date.
- If the country has taken steps to implement agreed FAO Technical/International Guidelines on EAF, deep sea fisheries management and bycatch and discard reduction, please describe the actions taken to date.

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBs)

- To what extent does the country participate in the activities of Regional Fishery Bodies, and list any constraints affecting active participation
- List the main ways in which the national legislation supports implementation of agreed regional/ international measures that may be adopted by RFBs in which the country is a member or participant.
- What statistical data and management contributions are made in accordance with agreed RFB requirements? What constraints, if any, affect these contributions?

Country reviews were prepared, guided by the above format. It should be noted that these reviews were not official government reviews, but national correspondents were selected based on their expert knowledge and experience. Hopefully, this has helped to guarantee an overview that is fairly representative at the time of writing this report.

Overview –WECAFC Region

INTRODUCTION

The management of fish as a renewable resource has received increasing attention since the adoption of UNCLOS in 1982, improved understanding of the ecosystem concept, notable declines in several major fish resources, and the corresponding related challenges posed by overcapitalization of the fishing industry, illegal fishing and the need to guarantee food and nutrition security for the world's increasing population. Though several international legal instruments have been adopted and are in force, real progress in securing sustainable fisheries can only be measured by the actions and achievements that become incorporated into routine fisheries management and conservation practices for those concerned. In view of this, current fisheries management and conservation measures are being reviewed in several regions of the world, with reviews completed so far for the Indian and Pacific Oceans. These reviews are intended to shed light on the level of application and success of internationally agreed fisheries management paradigms, and to foster appreciation for the advantages and disadvantages associated with the strategies applied.

The present regional review covers countries that are located in the Western Central Atlantic region (FAO Statistical Area 31), as well as Brazil in the southwest Atlantic Ocean (northern portion of FAO Statistical Area 41). Consequently, this is a large area with a notable diversity of oceanic habitat, including continental shelves receiving outflows from large rivers, island platforms often in close proximity to each other, offshore banks and deep ocean trenches (Stevenson, 1981, Bahri, 2011). Primary productivity varies spatially and temporally within the area covered by this study, but generally with highest productivity recorded along the Brazil-Guianas shelf (Heileman, 2009). As such, the fisheries of the region are also very diverse, with higher levels of production occurring in coastal waters particularly off the northeast coast of South America and in the Gulf of Mexico that are influenced by both upwelling and river plumes, and also on island platforms and offshore banks harbouring richly diverse coral reef and seagrass ecosystems (CARSEA, 2007).

A total of 26 independent countries and several overseas territories belonging to the UK, France, the USA, and the Netherlands are located in this region, and so there is a complex myriad of claimed maritime jurisdictions. Moreover, the region is home to some of the world's richest and poorest countries in terms of economic development. The variety of oceanic habitat and conditions, diverse nature and extent of fishery production, the network of national jurisdictions, and country development status have all influenced the evolution of fishing operations, and in so doing, have also contributed to the characteristics of management and conservation measures applied in practice.

The present review affords examination of the existing fisheries management situation in the region, with emphasis on the governance and management frameworks in place in the various

countries studied, and determination of how these national frameworks have so far contributed to achieving sustainable fisheries management as prescribed by international agreed standards.

METHODS

A detailed questionnaire, the State of World Marine Capture Fisheries Management (SOWMCFM), which had been developed for use in similar studies that have since been completed for the Indian and Pacific Oceans (De Young, 2006, 2007), was updated and expanded for application in the Western Central Atlantic Region to take into account the characteristics of fisheries in that region, as well as recent developments in fisheries management expectations. As in the case of the Indian and Pacific Ocean studies, the questionnaire for the present study allowed country correspondents to organize their information on the fisheries management situation as it pertains to: legislation (direct and indirect), costs and funding, stakeholder involvement, transparency and conflict, compliance and enforcement. Additionally, the questionnaire facilitated the organization of this information firstly at the level of the country or territory, and then for major fishery sub-sectors.

The questionnaire therefore contained 4 major sections. Section 1 sought to obtain a general country overview of the fisheries management framework and mechanism in place. Sections 2-4 then facilitated closer examination of current fisheries management tools and trends for the following three major sub-sectors: (1) commercial/ industrial (large-scale); (2) small-scale, artisanal, lifestyle, subsistence, indigenous, customary fisheries; (3) recreational, including non-consumptive use such as catch and release fishing, ecotourism and diving. Country correspondents were selected based on their expert knowledge and experience, and this hopefully has helped to guarantee an overview that is fairly representative of the current situation.

Definitions and Sampling Coverage

For the purposes of administering the questionnaire, the definitions of each fishery type were provided as a guide (Table 1), but country correspondents were requested to indicate where these definitions differed from what was applied within their own countries. Table 2 lists the countries which participated in the questionnaire survey.

Table 1. Definitions of fishery types included as a guide on the questionnaire survey form

Term	Definition
Commercial/ industrial fishery	Fishery conducted for the purpose of wide marketing
Small-scale fishery	A term of English origin with a technological foundation. It tends to imply the use of a relatively small size gear and vessel. The term has sometimes the added connotation of low levels of technology and capital investment per

	fisher although that may not always be the case.
Artisanal fishery	A term of Latin origin with a socio-economic foundation. It tends to imply a simple, individual (self-employed) or family type of enterprise (as opposed to an industrial company), most often operated by the owner (even though the vessels may sometimes belong to the fishmonger or some external investor), with the support of the household. The term has no obvious reference to size but tends to have the same connotation of relatively low levels of technology and this may not always be the case.
Lifestyle, subsistence, indigenous and customary fishery	Variations of small-scale or artisanal fishery operations, i.e. associated with relatively small-sized gear and vessel, and the use of relatively low levels of technology.
Recreational fishery	Fishery conducted for reasons other than to satisfy essential nutritional needs and where fishing products are generally not sold or otherwise traded on markets.

Table 2. Countries that participated fully in the questionnaire survey, listed according to the sub-regions represented.

Central and northeast (NE) Insular WECAFC region	Southern WECAFC region	Western WECAFC region
Anguilla Antigua and Barbuda Aruba Dominica Dominican Republic Netherland Antilles St. Kitts and Nevis St. Lucia	Venezuela Trinidad and Tobago Suriname Brazil	Colombia Mexico Nicaragua Panama

NATIONAL MARINE FISHERIES FRAMEWORKS

Basic legislative frameworks

At the national level, all of the 16 responding countries had specific instruments of legislation in place for the management of marine capture fisheries, which included both legal and administrative frameworks. At the regional and local levels, legislation existed in 86% and 77% of the countries respectively. While only 23% of responding countries explicitly defined the term ‘fisheries management’ in their national legislation, 50% had legislation that provided specific guidance on the application of management approaches and tools. In 47% of the cases, the responding countries had legislation that listed the objectives of fisheries management (47%) but considerably fewer countries (25%) had legislation in place that outlined a stepwise process for establishing effective fisheries management (Figure 1).

In the Central and northeast (NE) Insular sub-region, it should be noted that in those instances where overall objectives were indicated, there was no prioritization, and legislated objectives appeared to seldom form a part of management plans or guiding documents. In fact, the legislated objectives of fisheries management were indicated for only two countries: Antigua & Barbuda and Dominican Republic. In these two cases, the objectives incorporated paradigms of ecologically sustainable development and scientific understanding alongside economic development goals. Interestingly, these two countries were also those with the newest legislation in place: Antigua & Barbuda enacted a new fisheries act in 2006 and The Dominican Republic in 2004.

In the Southern sub-region, despite the recent efforts to update legislation in the 4 responding countries, only Suriname and Brazil had legislative frameworks which listed the objectives of fisheries management. In these instances, the objectives addressed the sustainable development of fisheries, the preservation of the resource and the need for enforcement, but did not address the need for scientific understanding of fisheries. Although neither of these 2 countries had prioritized their established objectives, the objectives were included in fisheries management plans.

In the case of the Western sub-region, the legislation of all 4 responding countries listed fisheries management objectives. Apart from Colombia which listed only a single general management objective, the other western countries noted that management objectives were prioritized. In all cases, management objectives were also incorporated into fisheries management plans. Details of specific management objectives for Panama were unavailable, but for the other 3 responding countries, sustainable use was included in the formulation of at least the first/ only management objective. Additionally, except for Panama for which the response was unavailable, management objectives of the other 3 countries had been informed by the work of RFBs/ RFMOs.

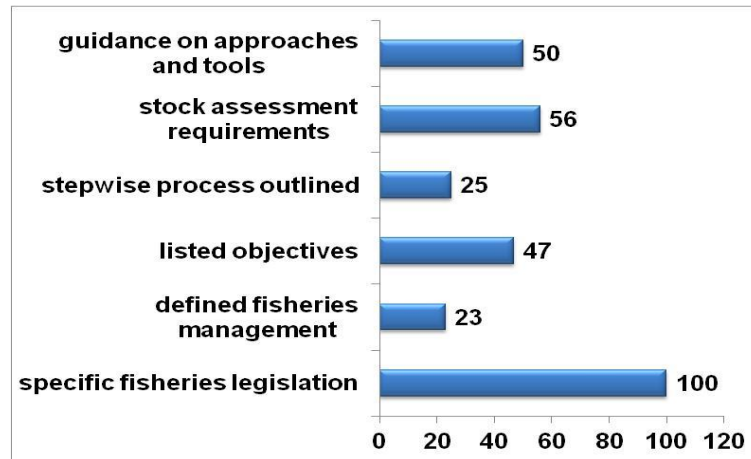


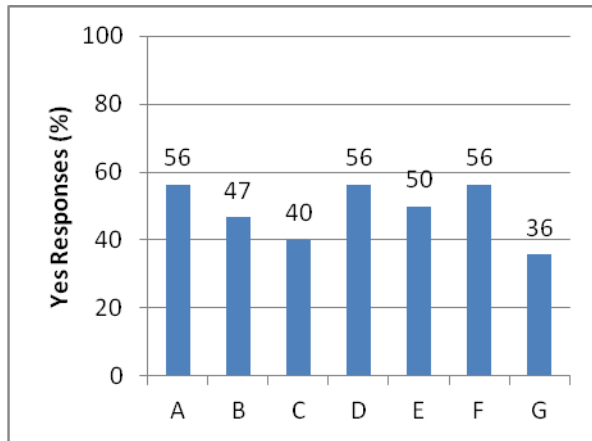
Figure 1. Chart of general characteristics of the fisheries legislation in responding countries.

Overall, 56% of responding countries indicated national legislation required that fisheries management decisions be based on information generated by at least one of the following analyses: biological analyses/stock assessments, social impact analyses, economic analyses, monitoring and enforcement analyses, analysis by regional fisheries bodies (Figure 2a). In contrast, only 38% of the responding countries in the central and insular sub-region indicated that the legislative framework included provisions for biological stock assessments and environmental analyses (Figure 2b). That noted, a quarter of the responding countries confirmed that their legislation made provisions also for use of information from ecosystem analyses and from monitoring and enforcement activities. However, legislation in none of the responding countries of this sub-region apparently made provisions for use of information obtained from regional fisheries bodies, and social and economic analyses were required in only 13% of cases.

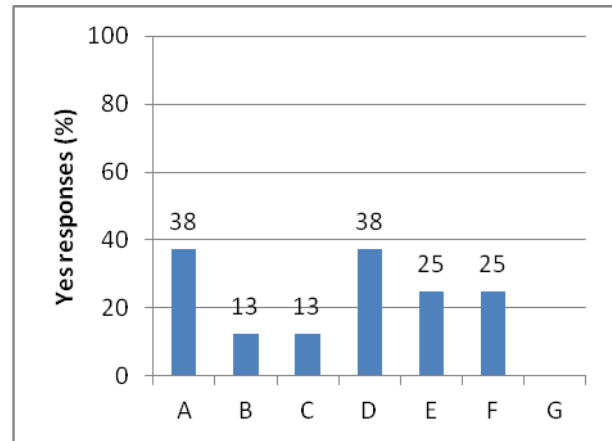
In comparison, of information requirements stipulated in the fisheries legislation for responding countries in the southern sub-region, monitoring and enforcement information was prevalent (75%), with the full range of biological, social, economic, ecological and environmental analyses each receiving equal but less attention (50%) (Figure 2c). However, only 1 country’s legislation in the southern sub-region appeared to make provisions for consideration of information from regional fisheries bodies. Finally, in the western sub-region, the legislative framework included provisions for a broad range of scientific information to be used in all 4 responding countries (Figure 2d). The 4 responding western countries indicated that management decision-making was also influenced by external players and factors, such as other parts of government, other countries’ experiences, RFMOs, and non-RFBs such as CITES.

Overall, among the 16 countries surveyed, 56% of these had incorporated stock assessment requirements into their legislation. However, social impact analyses, analysis by regional fisheries bodies, and economic analyses were among those types of analyses least required by the national legislation (40, 36, and 47% responding “yes” respectively of 14 countries answering this question). These responses suggest that the legal framework for the

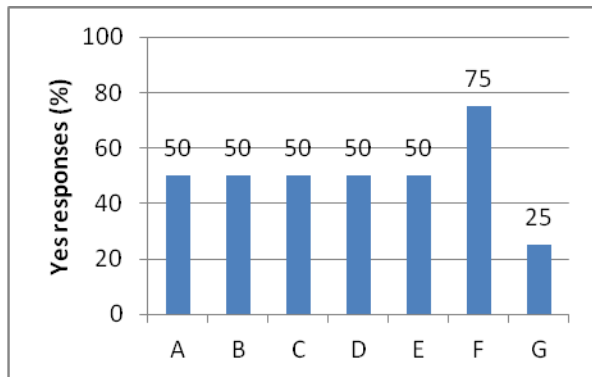
implementation of fisheries management and conservation measures appears to be limited and non-specific in many instances. This is at variance with various international instruments of fisheries legislation that make comprehensive, structured and specific provisions regarding preservation of resource health, biodiversity and the associated ecosystems.



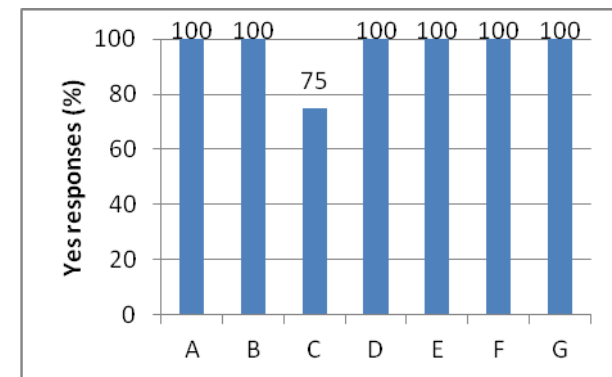
(a) All countries surveyed



(b) Central & NE Insular sub- region



(c) Southern sub-region

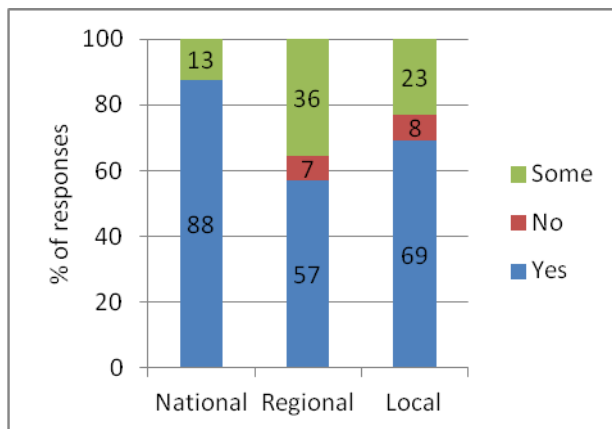


(d) Western sub- region

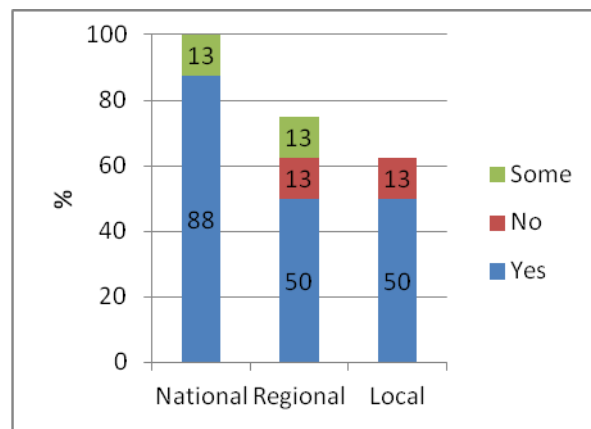
Figure 2. The percentage of countries which legally require the following information for management decisions: A - biological analyses/ stock assessments; B - economic analysis; C - social impact analyses; D - environmental analysis; E - ecosystem analysis; F - monitoring & enforcement options; G - analysis by regional fisheries bodies. The information is illustrated for: (a) the entire group of countries surveyed (see Table 2); (b) surveyed countries comprising the Central and Northeast (NE) Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

Costs and funding of fisheries management

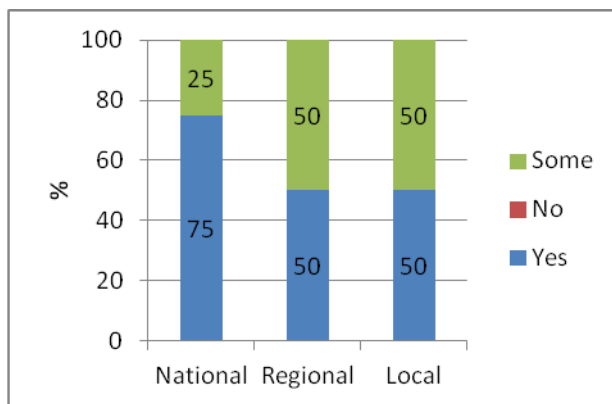
Generally, in all of the responding countries, the costs of fisheries management at the national level were covered, for the most part, by government funding (Figure 3a). Government funding continued to predominate for local level activities, but in the case of regional level activities, 57% of countries indicated that their governments provided funding support. Such outlays included funding for research and development, monitoring and enforcement, and daily administrative management. In the central and northeast insular sub-region, all countries confirmed government funding support for national level activities, with 88% depending solely on government funding (Figure 3b). Fifty percent of the countries in this sub-region also relied solely on government funds for regional and local-level activities. In comparison, all the countries in the southern sub-region generally depended mostly on government support for national-level activities (Figure 3c). Government funds were also being used to support 50% of management activities at the regional and local levels. The dependence on government funds to support management activities was highest overall for countries in the Western sub-region (Figure 3d).



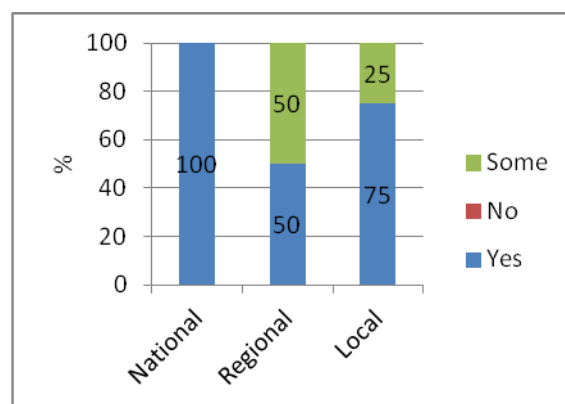
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

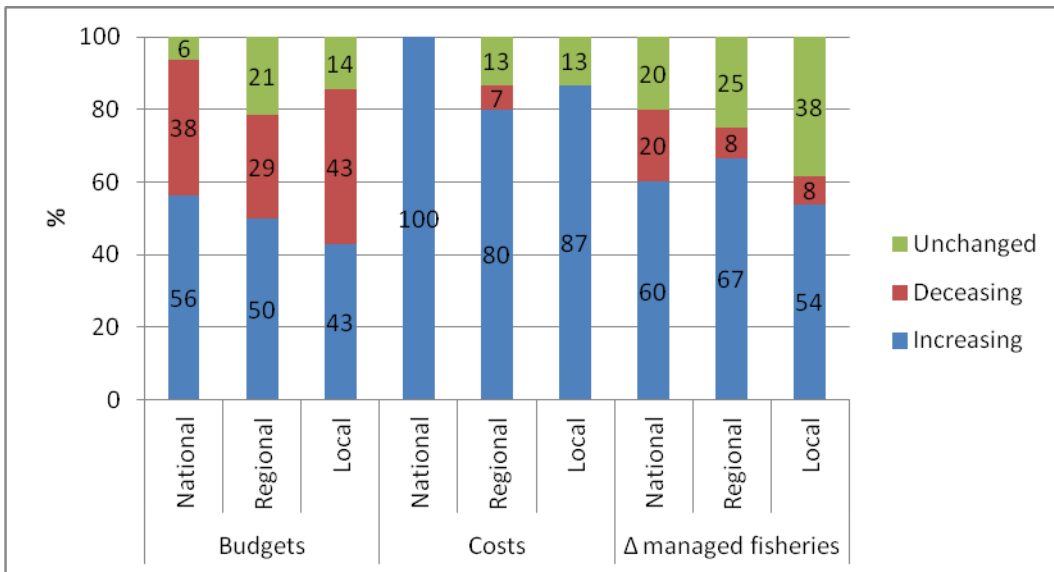
Figure 3. Frequency, by percentage, of allocation of national fisheries management budgets to activities at the national, regional and local levels of management. The information is illustrated for: (a) the entire group of countries surveyed (see Table 2 for explanation); (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

All country correspondents agreed that the costs of national fisheries management had increased over the past 10 years. At the regional and local levels, costs were also primarily perceived to be increasing in 80% and 87% of cases respectively. Despite increasing costs, budgets for fisheries management had not increased to the same extent; rather, a high percentage had either decreased or remained unchanged (national-44%, regional-50%, local-57%). Furthermore, over the same time span, the number of fisheries requiring attention by managing bodies had increased and by a comparatively greater percentage compared to perceived budget increases (national-60%, regional-67, local-54%) (Figure 4a). A minority of country correspondents indicated that the number of managed fisheries was decreasing, and this would be an issue for concern, especially as it appears to reflect a deteriorating situation in respect of fisheries management in the instances identified.

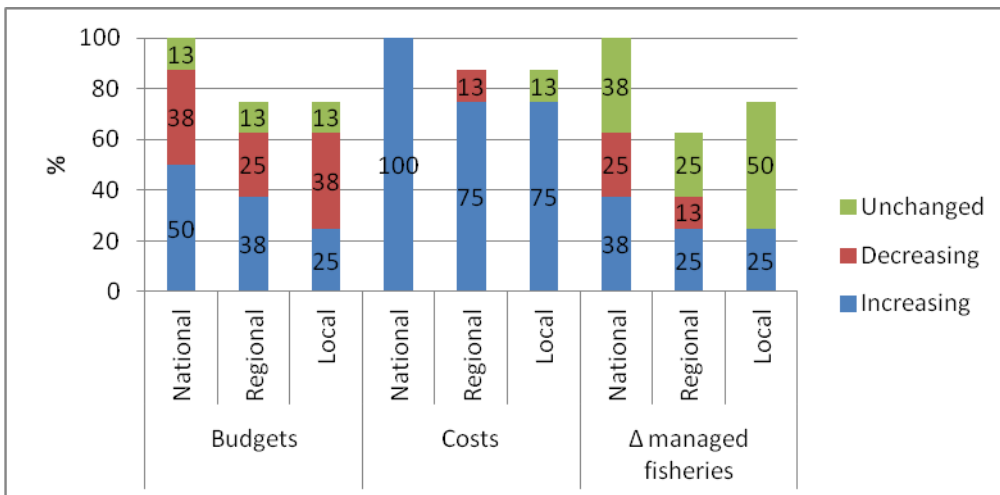
This general pattern in correspondent perceptions was again observed for the Central and northeast (NE) Insular WECAFC region, with the exception that regional and local level costs had increased more or less equally, and management responsibilities for new fisheries were the least for the whole region (Figure 4b). This is perhaps not an unexpected result, in view of the small size of the countries involved and the comparatively greater multi-species nature of their fisheries, in which many species and fishing methods would have been taken into account throughout their development.

In the southern sub-region, while the management costs increased at the national and local level in all responding countries, and also at the regional level in 3 out of 4 of these countries (unchanged in 1 country), budgets were considered to have increased in only half the cases at all levels (national, regional, local). The number of managed fisheries also increased in 75% of the responding countries at the national and regional level, and in 50% of countries at the local level (Figure 4c), with a small percentage of responding countries indicating a decrease in the number of fisheries managed at the national and local levels.

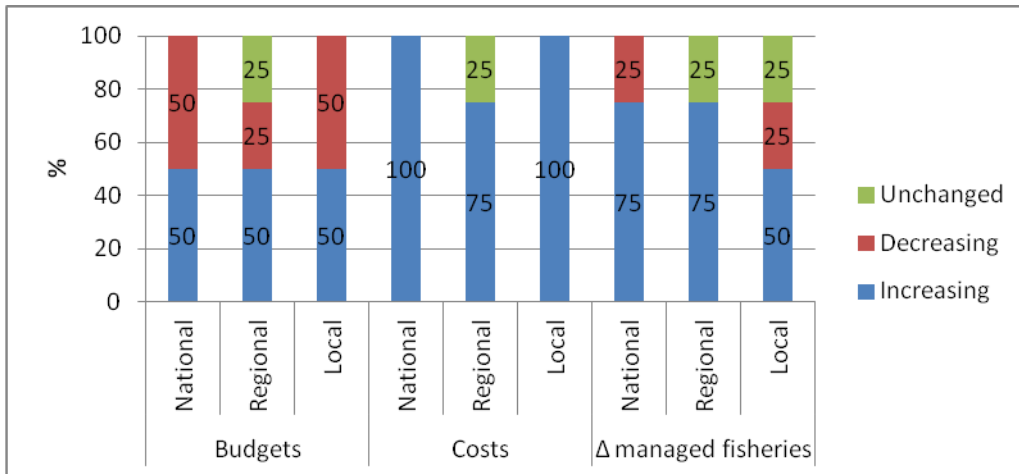
On the other hand, in the Western sub-region, management costs had increased at the national level in all 4 responding countries, and in 70% of the cases at the regional and local levels (Figure 4d). Management costs were believed to have increased in 75% of responding countries at the national level, with half of the countries noting budgetary increases also at the regional and local levels of management. That noted, 3 out of the 4 responding countries confirmed that the number of managed fisheries had increased at all levels (national, regional, local). Furthermore, in this sub-region, no country indicated that there had been a decrease in the number of managed fisheries



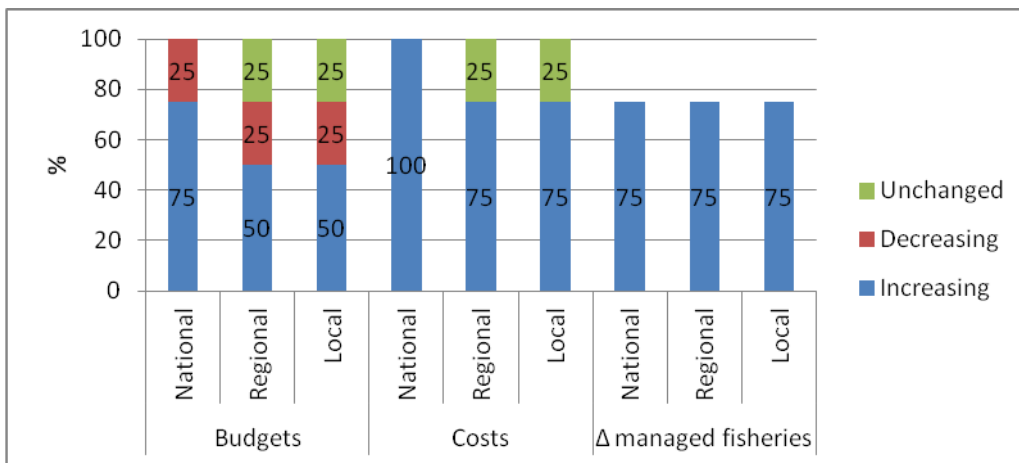
(a) All countries surveyed



(b) Central and NE Insular sub-region



(c) Southern sub- region



(d) Western sub-region

Figure 4. Perceived changes to budgets and costs for fisheries management over the last ten years, along with the number of fisheries managed in the 16 countries examined: (a) the entire group of countries surveyed (see Table 2 for explanation); (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

When asked about the causes of increasing costs for fisheries management, all respondents agreed that enforcement activities in the previous ten years had increased the expenditures. A majority (81%) also felt that increased monitoring requirements were responsible for higher costs, with the third most important contributor being obligations to regional initiatives (Figure 5a). Increased litigation was identified as the component that least contributed to increasing costs. Regarding ‘other’ reasons for higher costs, four countries specifically sighted increasing fuel costs, increasing salaries, and costs associated with the expansion and updating of data collection and management systems (Figure 5a). In all sub-

regions examined, the link of increasing costs to monitoring and enforcement needs was equally apparent. Apart from these 2 activities, comparable contributions to increased management costs were believed to result from increased conflict management in the central and northeast insular sub-region (Figure 5b), increased activity in amending regulations in the southern sub-region (Figure 5c), and increased stakeholder consultation and obligations to regional initiatives in the case of the western sub-region (Figure 5d).

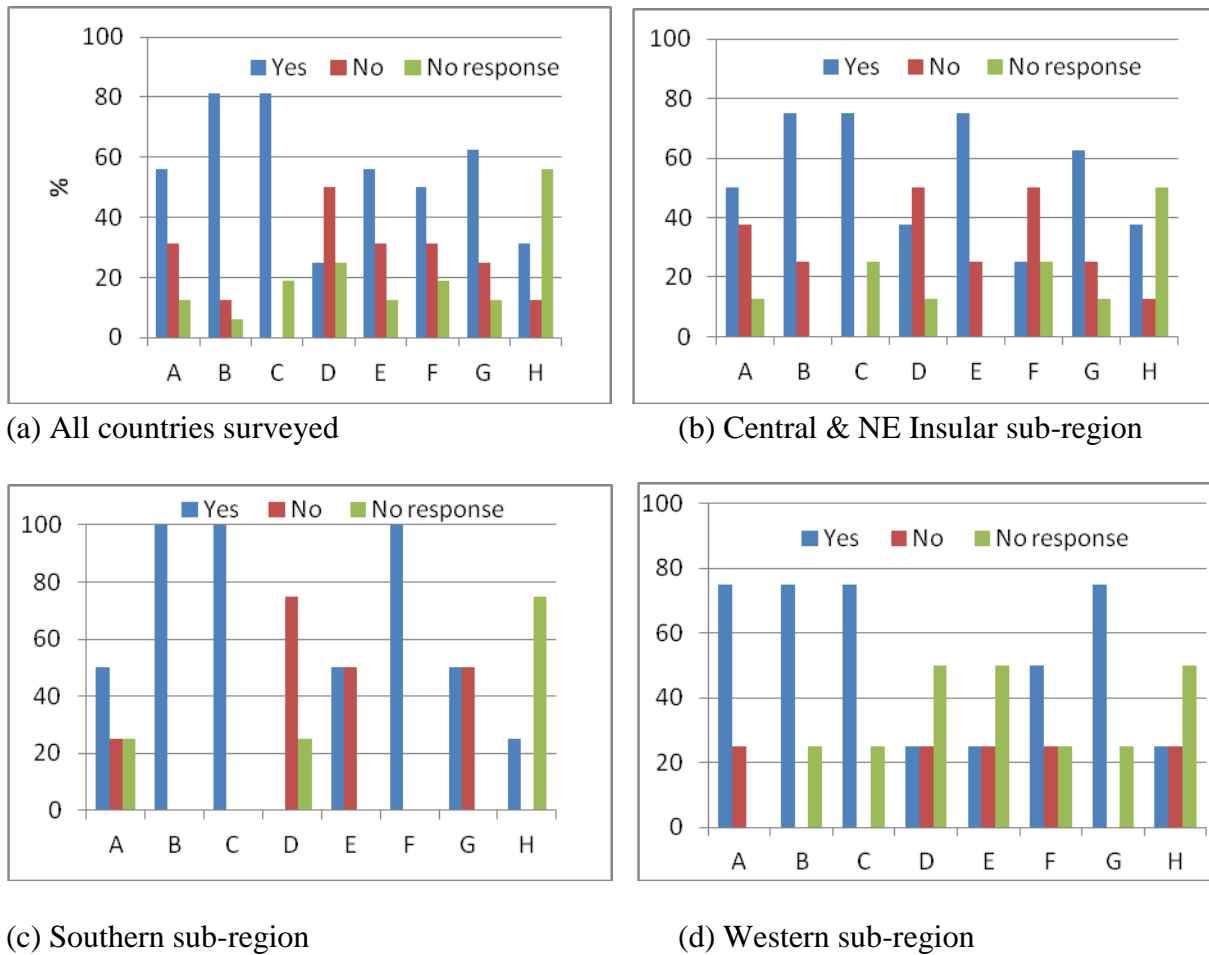


Figure 5. Sources of increased costs in fisheries management: A - stakeholder consultation; B - monitoring requirements; C - enforcement activities; D – litigation; E - conflict management; F - modification of regulations; G - member country obligations to regional fisheries initiatives; H - other. The information is illustrated for: (a) the entire group of countries surveyed (see Table 2 for explanation); (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

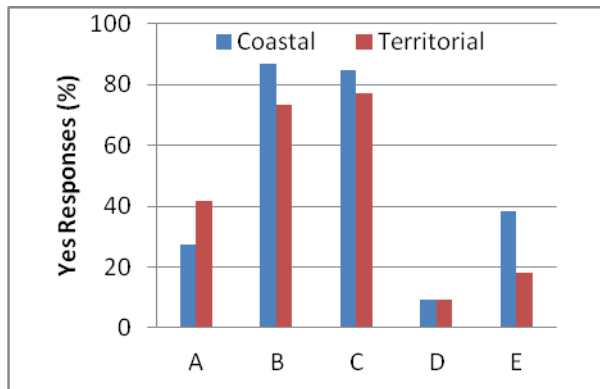
Regarding cost recovery options employed, the charging of licence fees was the most common one applied. In the Central and northeast (NE) Insular WECAFC region, governments receive

revenues from licences and to a much smaller extent, resource rentals. However, licence fee revenues were generally small and did not really cover the costs of managing fisheries. When asked where the funding for increasing costs in fisheries management comes from, fisheries participants were indicated in less than 20% of the responding countries. Although fisheries controlled primarily by stakeholders exist, fisheries in the central and northeast insular sub-region still appeared to rely on government funding. In comparison in the southern sub-region, the use of legislation to recover the costs of fisheries management was very limited. Half of the 4 responding countries indicated that some cost recovery was conducted through licensing fees, but such fees were normally received as general government revenues.

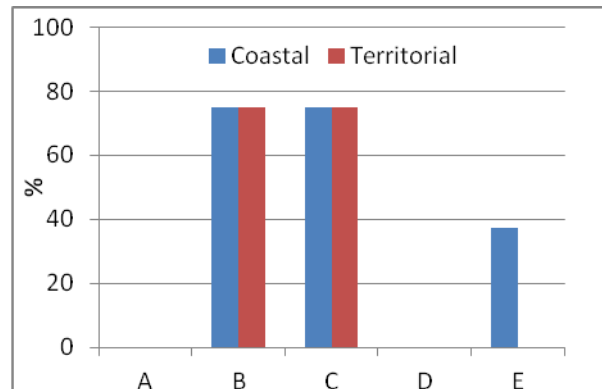
Similarly, the legislation in all 4 responding countries in the western sub-region allowed for recovery of management costs using licence fees. Except for Mexico, the increased costs for marine capture fisheries management in the western countries examined were being funded partly by increased government funding, increased fishery participant contributions, and also financial contributions obtained via donor-funded projects. In the case of Mexico, the additional fisheries management costs were being funded by increased government contributions only.

Compliance and enforcement for fisheries management

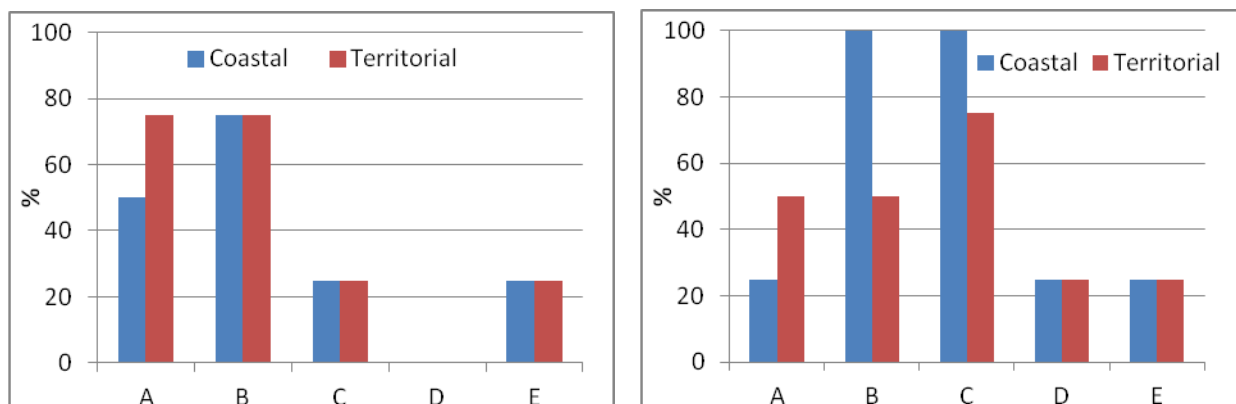
Throughout the 16 countries that participated in the survey, it was most common for the coast guard (territorial waters: 73%; coastal waters: 87%) and the national fisheries agency (territorial waters: 77%; coastal waters: 85%) to conduct fisheries patrols, monitoring and enforcement in territorial and coastal waters (Figure 6a). Other patrol/ monitoring groups were also important, particularly in the central and northeast insular sub-region, and included scientific institutes and non-governmental organizations (NGOs) (Figure 6b). However, in the southern sub-region, the navy was actually more important than the national fisheries agency in respect of compliance and enforcement responsibilities (Figure 6c). On the other hand, for the responding countries in the western sub-region, the coast guard and the national fisheries agency were used equally frequently for compliance and enforcement in the coastal waters For activities in territorial waters, but the national fisheries agency was supported equally by the navy and coast guard for countries in the western sub-region (Figure 6d).



(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region

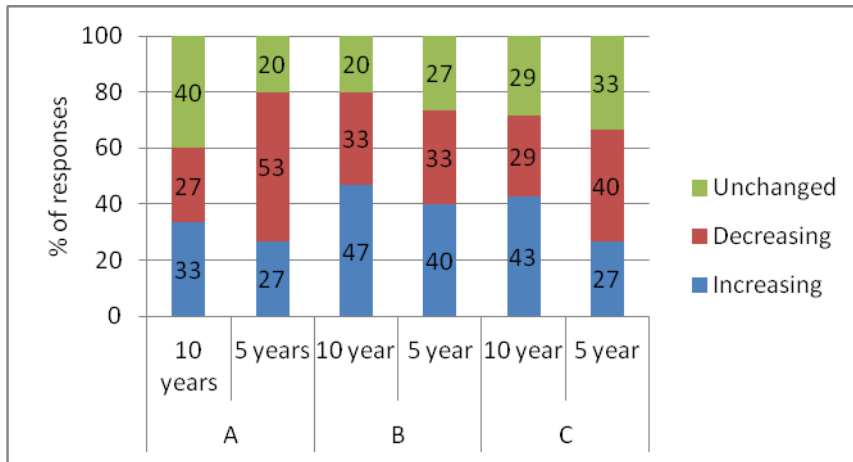
(d) Western sub-region

Figure 6. The frequency (by %) with which agencies/authorities are responsible for at-sea fisheries patrols, monitoring, and enforcement work in coastal and territorial waters (0-3 and 0-12 nautical miles offshore respectively): A – navy; B - coast guard; C - fisheries agency; D - marine transport agency; E - other patrol, monitoring or enforcement groups. The information is illustrated for: (a) the entire group of countries surveyed (see Table 2 for explanation); (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

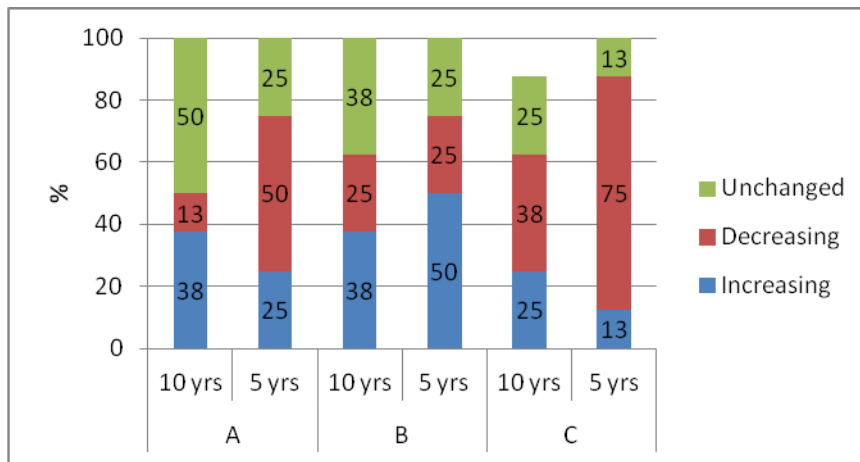
As already explained, the increased costs of monitoring and enforcement appeared not to match corresponding increases in budgets. In fact, the majority of country correspondents believed that budgets for monitoring and enforcement had diminished or remained unchanged over the past five years (Figure 7a). Linked to costs and budget outlays, was the perception that over the last five years the level of detection effort had predominantly decreased or remained unchanged (only 40% of respondents felt that detection efforts had increased). As a result, the relatively high frequency of a perception of a drop in the number of marine fisheries offences (previous five years: 53%) may be suggestive of failures in fisheries management, rather than improved compliance outcomes.

In considering the sub-regional trends, perceived trends for the central and northeast insular sub-region were similar to the summary trends for the entire region, except that only in very few cases compliance and enforcement budgets were noted to have increased especially over the past 5 years (13%), despite the perception that detection efforts had increased in 50% of responding countries in the same time period (Figure 7b). While the compliance and enforcement budget for the responding countries in the southern sub-region either increased or remained unchanged, all countries noted that detection effort had decreased (Figure 7c). This suggests that offences are not always being detected, and so the perceived trends in number of offences for the sub-region should be interpreted with this in mind (Figure 7c). In the case of the western sub-

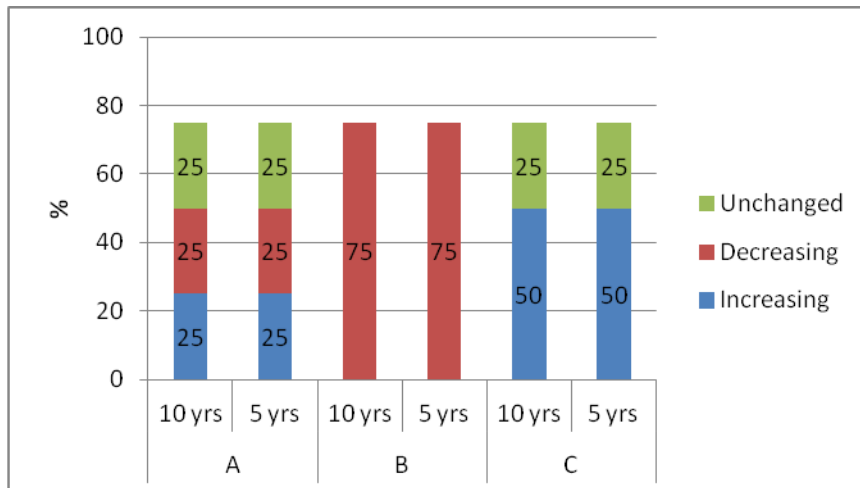
region, increases in both the compliance and enforcement budget and in detection efforts have been occurring over the past 10 and 5 years, with more countries noting increases for the earlier part of the 10 year time period (Figure 7d). This appears to support the observation by 50% of the responding countries that the number of offences had decreased over the past 10 years, with 75% of cases reporting decreases in offences in the last 5 years.



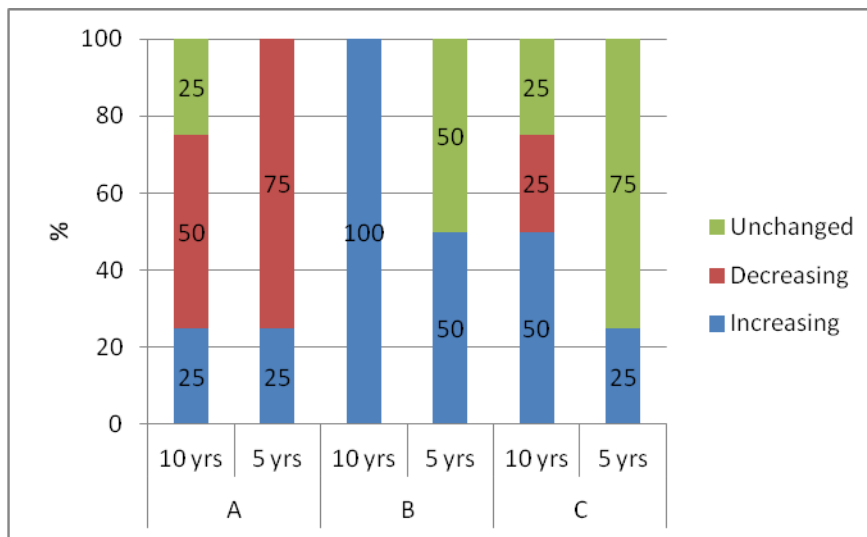
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

Figure 7. Frequency of responses, by %, indicating the: A - change in the number of marine fisheries offences over the previous 10 and 5 years; B - the level of detection effort over the previous 10 and 5 years; C - the budget for monitoring and enforcement over the previous 10 and 5 years. This information is shown for: (a) the entire group of countries surveyed; (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

This picture was made clearer by the responses to three questions measuring the effectiveness of enforcement on fisher compliance (Figure 8a). In this instance, 87% of countries felt that funding was insufficient to support the enforcement of all regulations. In addition, 67%

of respondents felt that penalties were not severe enough to be an effective deterrence for non-compliance and as a compounding factor, 88% felt that the risk of detection was not high enough to encourage compliance with fisheries regulations. This trend was commonly perceived at the sub-regional level as well, with the most pessimistic situation reflected in the perceptions noted by correspondents for the southern sub-region. While responding countries in the western sub-region indicated concerns about budget and detection capacity levels, they were more confident about the severity of the penalties applied for acts of non-compliance.

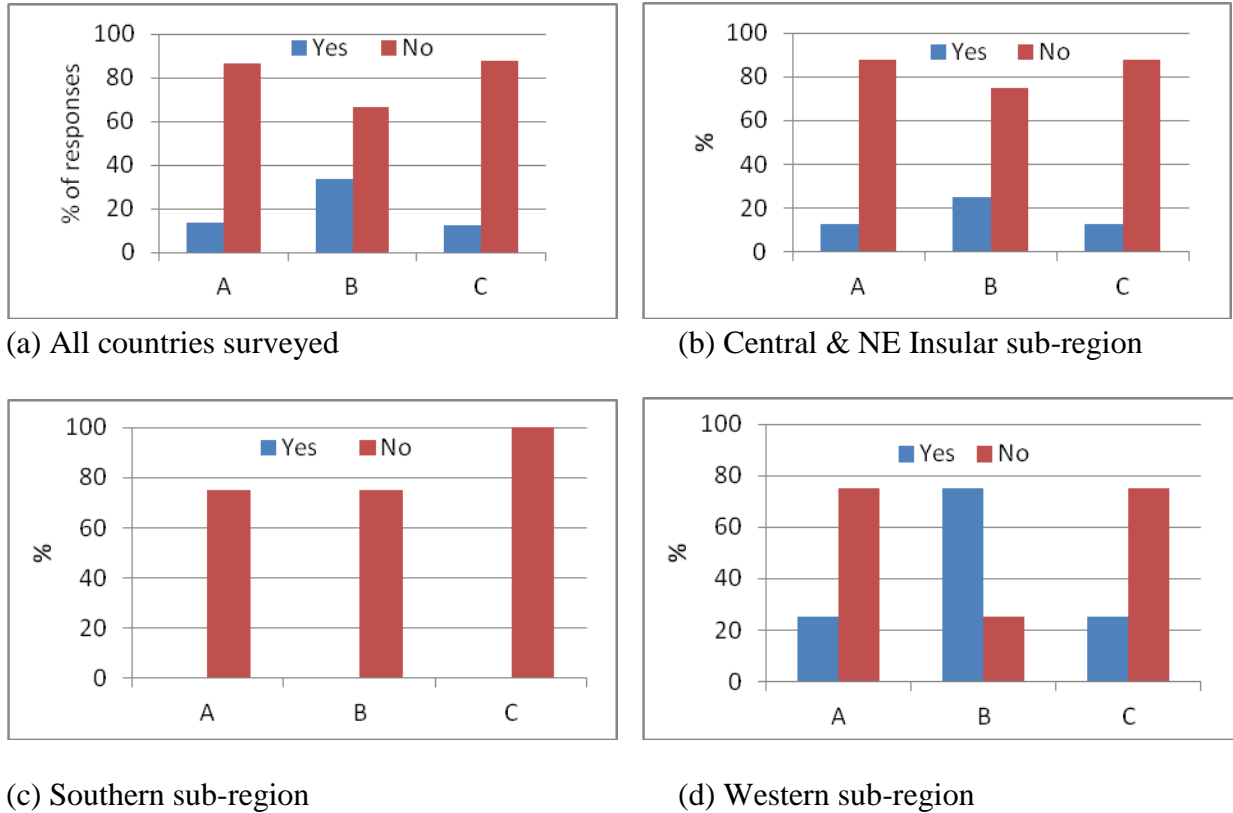
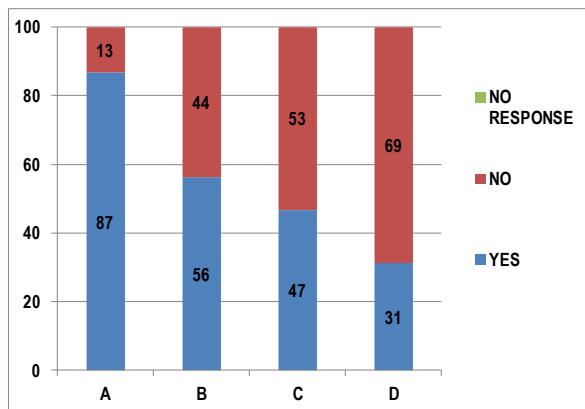


Figure 8. Frequency, by percentage, of responses to three questions measuring the effectiveness of enforcement on fisher compliance: A - adequacy of funding for allowing enforcement of all regulations; B - severity of penalties to serve as a deterrence to non-compliance; C - the effectiveness of the risk of detection to stimulate regulation of compliance. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries comprising the Central and NE Insular WECAFC region; (c) surveyed countries comprising the Southern WECAFC region; (d) surveyed countries comprising the Western WECAFC region.

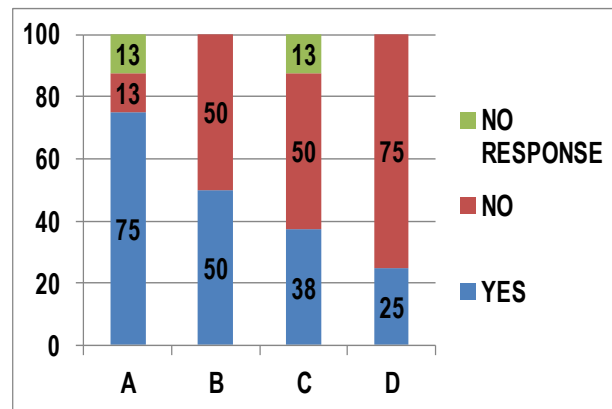
Stakeholder involvement and transparency in fisheries management

Overall, the majority of country respondents indicated that stakeholders were formally involved in the management of marine capture fisheries at all levels (national- 75%, regional- 62%, local- 82%). However, participatory processes were less often a formally required part of

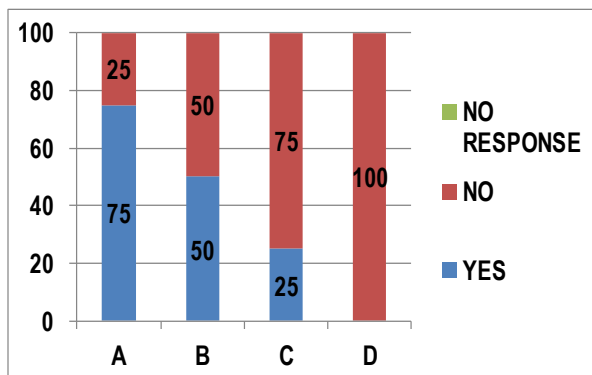
fisheries management (57% of countries) and even fewer countries (43%) explicitly identify the stakeholders in their legislative frameworks. Consultative management, in which stakeholders were consulted but had no management responsibility, was most commonly practiced (87% of 16 countries) (Figure 9a). Management strategies, in which government involvement was limited, were also practiced, though less common: that is, co-management with stakeholders sharing some responsibility (56%), co-management with stakeholders sharing significant responsibility (47%), and devolution of management in which there was full stakeholder control (31%) (Figure 9a). Among the responding countries within the sub-regions examined, a similar pattern and frequency were indicated for the central and northeast insular sub-region (Figure 9b), but a more pessimistic pattern in respect of stakeholder participation was indicated for the southern sub-region (Figure 9c). The best indicated progress in stakeholder involvement was indicated by responding countries in the western sub-region, where there were higher frequencies of occurrence of the full range of stakeholder participation (Figure 9d). These results suggested that, except for the western sub-region, the level of organisation and possibly also education among stakeholders, political will, and/or legislation was not yet sufficient to support the transfer of notable responsibilities for fisheries management to stakeholder groups.



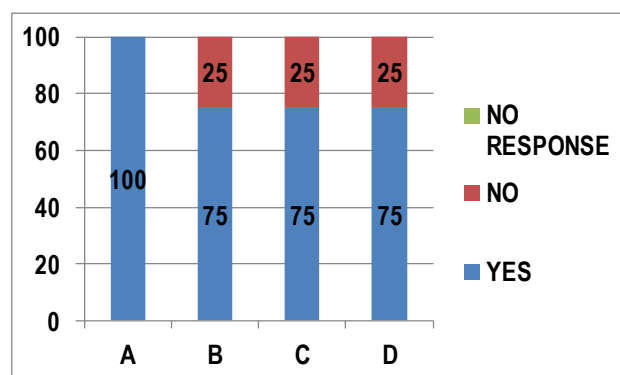
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region

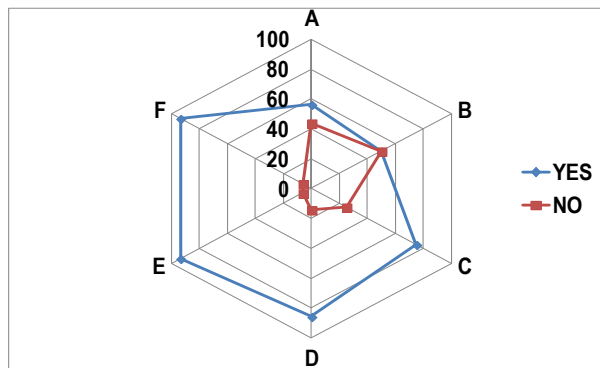


(d) Western sub-region

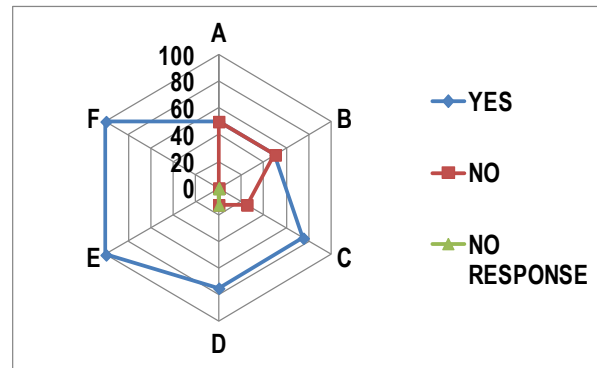
Figure 9. Frequency, by percentage, of responses concerning the present management arrangements for stakeholder involvement: A - consultative, with stakeholders having no management responsibility; B - consultative with stakeholders having some management responsibility; C - co-management, with stakeholders actively participating and sharing significant management responsibility; D - devolution of management, with stakeholders having full management responsibility. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

More than half of the responding countries considered their management process to be fully transparent, with 75% of cases indicating that meetings were advertised in advance and open to all stakeholders. While nearly all countries confirmed that opportunities were provided for fishery participants and other stakeholders to contribute to the decision-making process, only about 50% of the countries stated that management information was clearly documented and easily available to the public (Figure 10a). This general pattern was also indicated for the central and northeast sub-regional group of countries (Figure 10b). In the southern sub-region, a more pessimistic picture was apparent, with all responding countries indicating the absence of full documentation and the availability of this to the public (Figure 10c). In contrast, all aspects of the management process were perceived to be satisfactorily transparent for the responding countries of the western sub-region (Figure 10d).

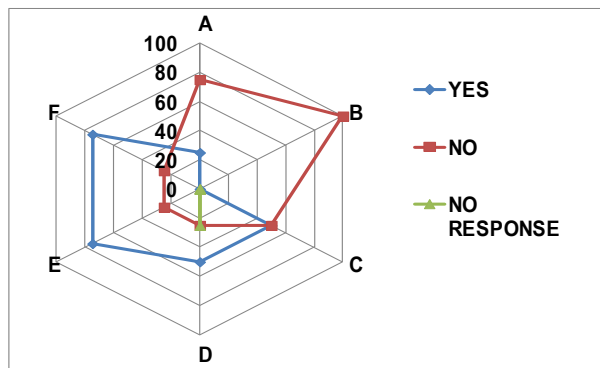
Internet email and direct mail were the more common methods used to disseminate information (81% & 75% of cases respectively), followed by fax and printed materials. Less than half the countries indicated that they made use of television and internet websites to transmit information, suggesting that these methods required resources, financial or otherwise, that were not commonly available within national fisheries authorities.



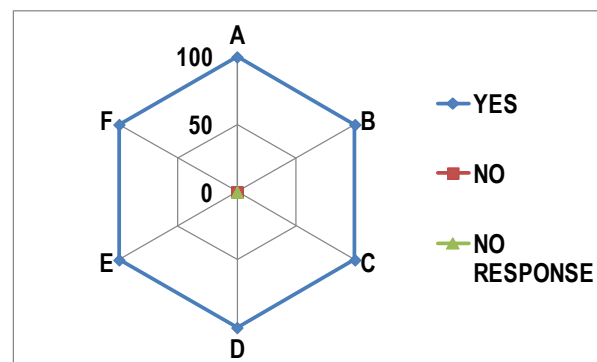
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub- region



(d) Western sub-region

Figure 10. Frequency, by percentage, of responses to questions measuring transparency in management: A - all parts of process transparent; B - information clearly documented and easily available to the public; C - meetings open to all stakeholders; D - meetings advertised and publicized in advance; E - fishery participants contribute to decision-making through public comments; F - other stakeholders contribute to decision-making through public comments.

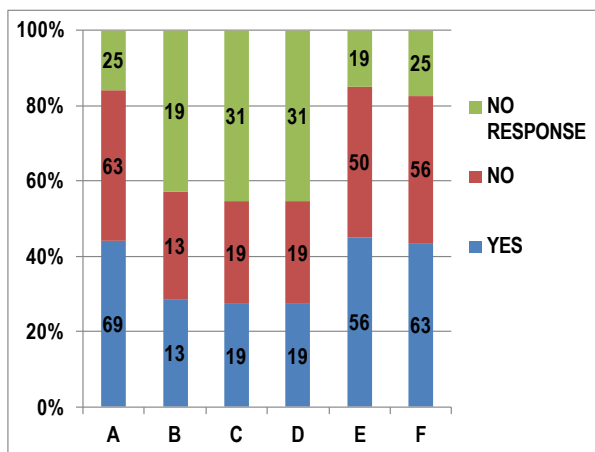
The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

Conflict management

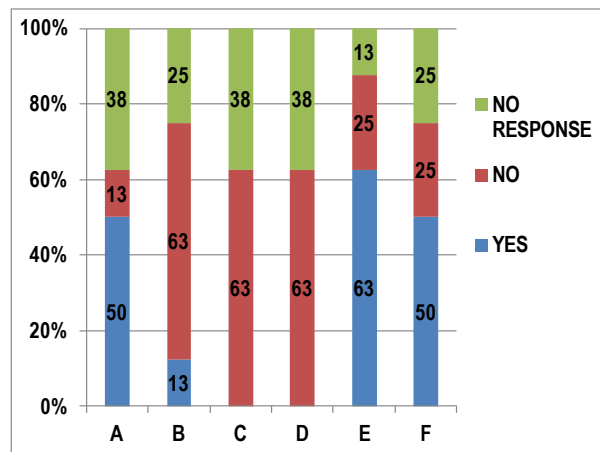
In only 19% of the responding countries were steps for conflict resolution included in the legislation. Additionally, only 44% and 40% of legislative frameworks incorporated the

consideration of multiple users within the fishing sector, and of users of other sectors of the economy respectively.

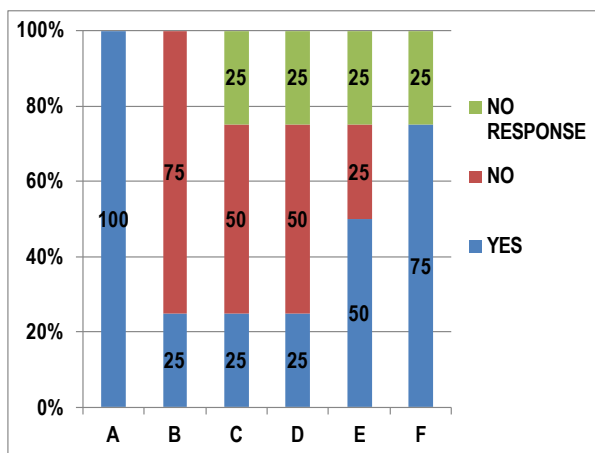
To address conflicts, the most common management tools utilized included zoning areas for various uses (69%), limiting the access of fishers depending on the target species or gear utilized (63%), and stakeholder education programmes (56%). Less often, conflict management tools included: stock enhancement (13%), resource allocation for fishery participants (19%) and resource allocation between fishers and other sectors (19%) (Figure 11a). Besides this general pattern, education was found to be the most common tool applied in the central and northeast sub-region, with no responding country indicating the use of resource allocation for conflict management (figure 11b). On other hand, zoning of areas was universally applied by all responding countries in the southern sub-region (Figure 11b). Limiting access by fishers was also used more frequently in the southern and western sub-regions, compared to the central and northeast insular sub-region. Additionally, responding countries in the western sub-region did not use stock enhance at all for conflict management purposes, but made use of resource allocation schemes more than the other sub-regions (Figure 11d).



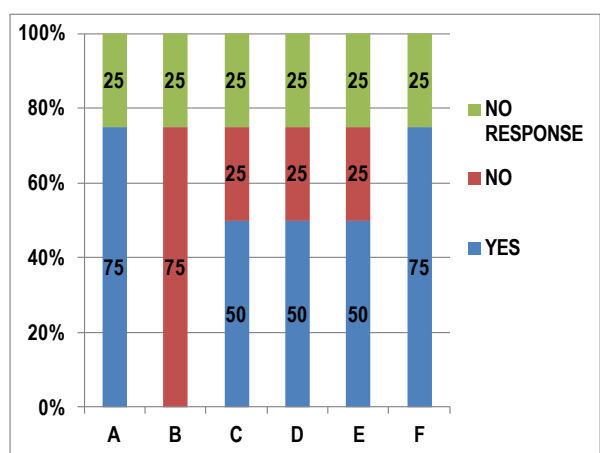
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



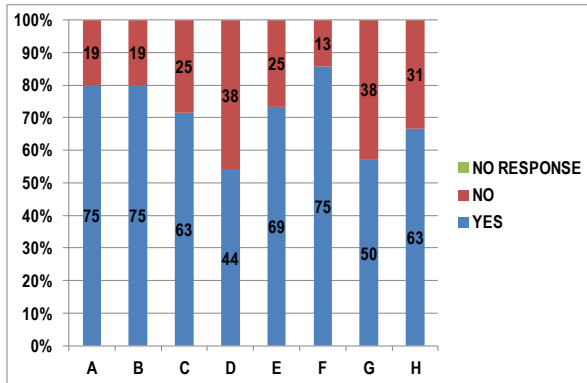
(d) Western sub-region

Figure 11. Frequency (by %) of use of various tools to manage conflict: A - zoning of different areas for different users; B - stock enhancement; C - resource allocation among participants of the fishery; D - resource allocation between fisheries & other sectors; E - education about sharing of resources; F - limited access to certain areas for different types of fishers. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

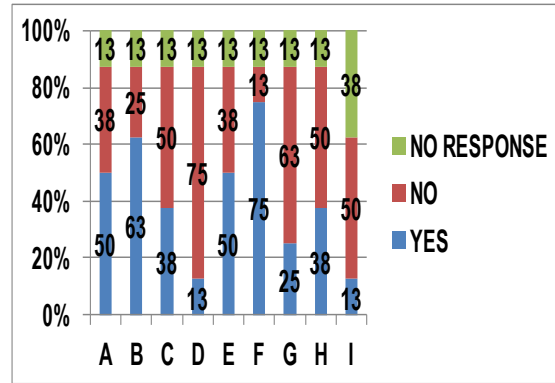
Indirectly related legislation affecting marine capture fisheries management and participation in RFBs

Fisheries management was affected by various other non-fishery laws and regulations. Port management, endangered species, trade legislation, and marine protected area legislation were most often cited as indirectly impacting fisheries management (Figure 12a). Specific legislation which countries most often indicated as ‘having the most impact on marine capture fisheries management’ included CITES regulations, wildlife and natural resource protection acts, and protected areas legislation (e.g. national parks acts). Also important were coastal planning/zoning acts in addition to marine navigation / seaport legislation. In terms of specific sub-regional variations in this pattern, responding countries in the central and northeast insular sub-region believed that port management and trade legislation had the most impacts (Figure 12b), while endangered species legislation was perceived to have the most impacts in the southern sub-region (Figure 12c). However, the impacts of non-fishery legislation was broader (a wider range of laws) and more frequent for countries in both the southern and western sub-regions, compared to that noted for the central and northeast insular sub-region (Figure 12b, c, d).

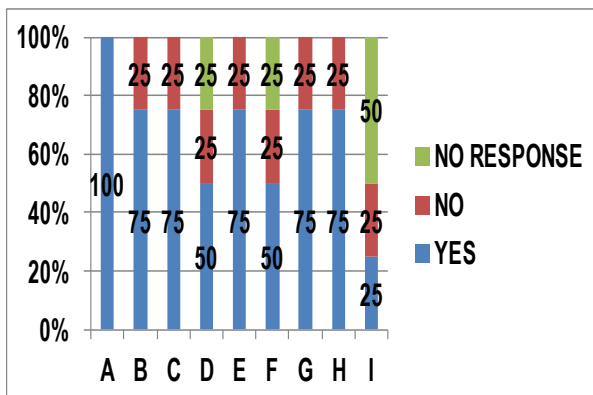
These trends may be due to a combination of influencing factors, namely the scale and nature of the major fishery operations in the larger southern and western countries, where artisanal fisheries involve many more participants, large-scale commercial/ industrial operations are more common, and bycatch issues are particularly important especially in the case of the shrimp trawl fisheries. In view of the sizes of the countries involved, there would also be other equally large-scale activities of other sectors of the economy taking place in the same coastal zone areas, such as maritime transport, and oil exploration and drilling, and hence also the related laws governing the practices of such activities that could indirectly impact fisheries management.



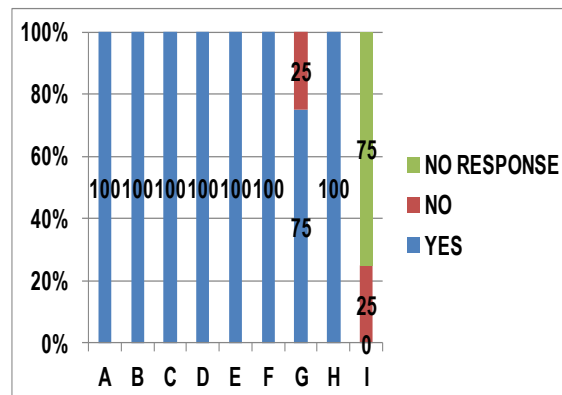
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western WECAFC region

Figure 12. Frequency of responses, by percentage, indicating national legislation instruments that indirectly affect the management of marine capture fisheries: A - endangered species legislation; B - trade legislation; C - biodiversity legislation; D - oceans policy legislation; E - marine protected area legislation; F - port management legislation; G - coastal zone management; H - forestry legislation; I - Other. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

International legislation affecting marine capture fisheries management & RFB participation

Throughout the 16 responding countries, WECAFC was the international organisation of which all countries were members, followed by ICCAT and CRFM (Figure 13). The comparatively lower level of membership in SICA-OSPESCA reflected the relatively limited geographical coverage of this organization (only Central American countries and the Dominican Republic). In most countries (88%), a formal mechanism for compiling and passing fisheries data to the regional/ international organisations was in place. Most frequently, information was shared with the FAO. However, a majority of countries also shared information with CITES,

ICCAT, and CRFM (Figure 14). Other organisations and major data and information gathering initiatives which were indicated included: OSPESCA, the CLME project and NOAA (Figure 14).

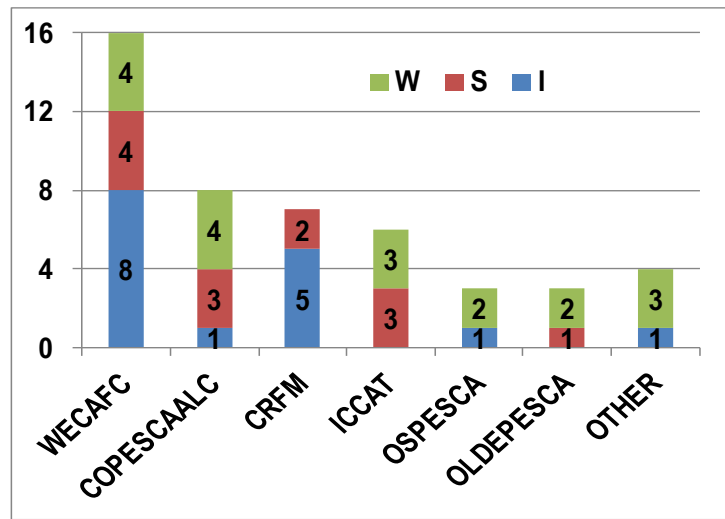


Figure 13. The number of countries that confirmed membership in various regional fisheries organisations of: a total of 8 countries sampled in the Central & NE Insular sub-region (I), a total of 4 countries sampled in the southern sub-region (S), and a total of 4 countries sampled in the Western sub-region (W).

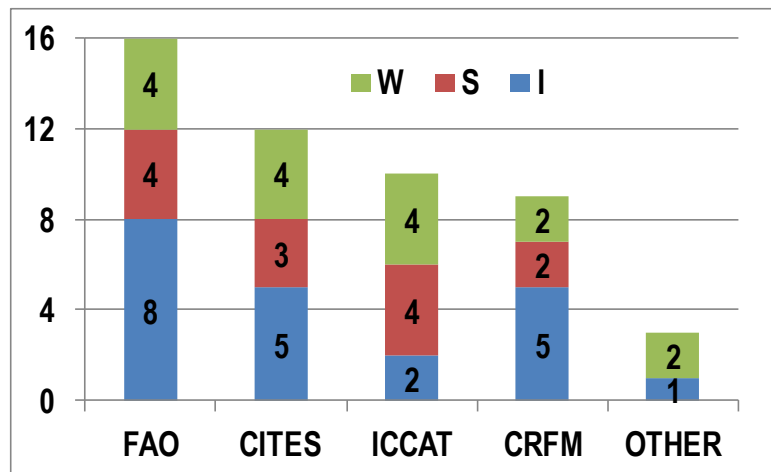
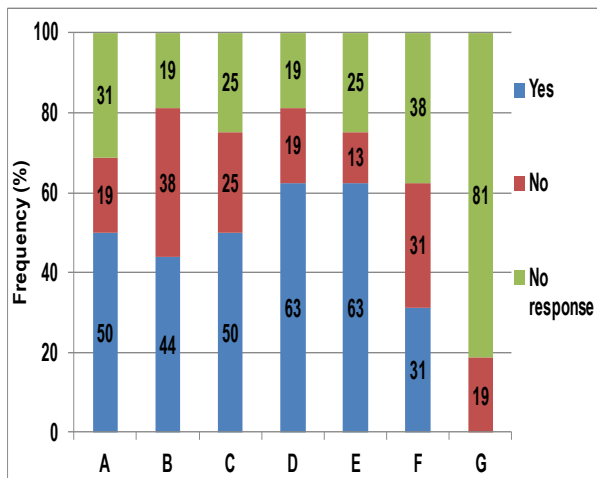


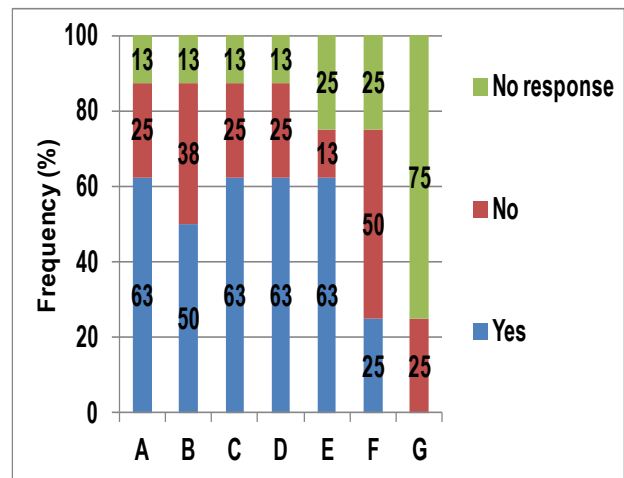
Figure 14. Number of countries providing fisheries related data to the regional/ international organizations identified. Responses to ‘Other’ specifically identified: OSPESCA, the CLME project, and NOAA.

Management of fishing capacity

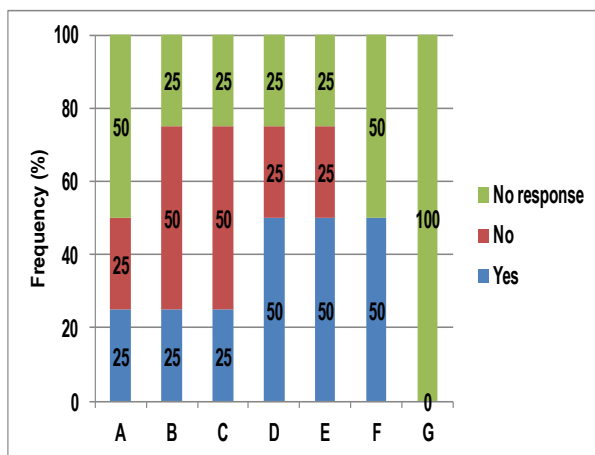
In the majority of the responding countries (67%), efforts were being made to measure fishing capacity. Despite this, a thorough understanding of the levels of fishing capacity was lacking in most countries and only 13% reported that they completed the measurement of fishing capacity for all their marine capture fisheries. The greatest obstacles to completing this task, as perceived by national respondents, were: lack of stakeholder support, lack of human resources, and budget constraints (Figure 15a). Besides these three constraints, lack of political will and data to support measurements were also cited with notable frequency in the central and northeast insular sub-region, while countries in the southern sub-region believed that other more urgent fisheries management priorities was more of a constraint than available budget (Figures 15b-d). These results suggest that there is either lack of motivation for, or lack of appreciation by countries of the usefulness of fishing capacity information and knowledge. The importance of this has therefore not been promoted and / or supported at the political and stakeholder levels.



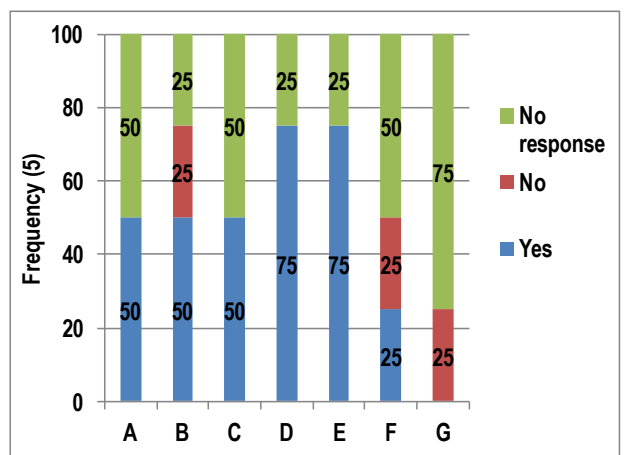
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

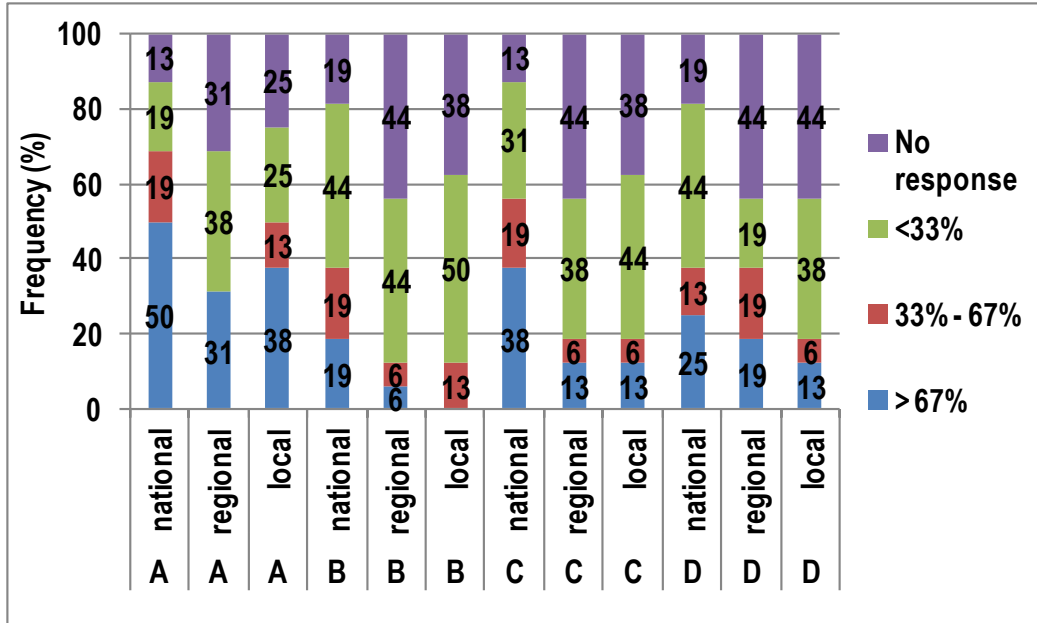
Figure 15. Frequency of responses, by percentage, of the primary obstacles preventing completion of measurement of fishing capacity in marine capture fisheries: A - budget

constraints; B - lack of political will; C - lack of supporting data to make measurements; D - lack of human resources; E - lack of stakeholder support; F - other more urgent fisheries priorities; G - other. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

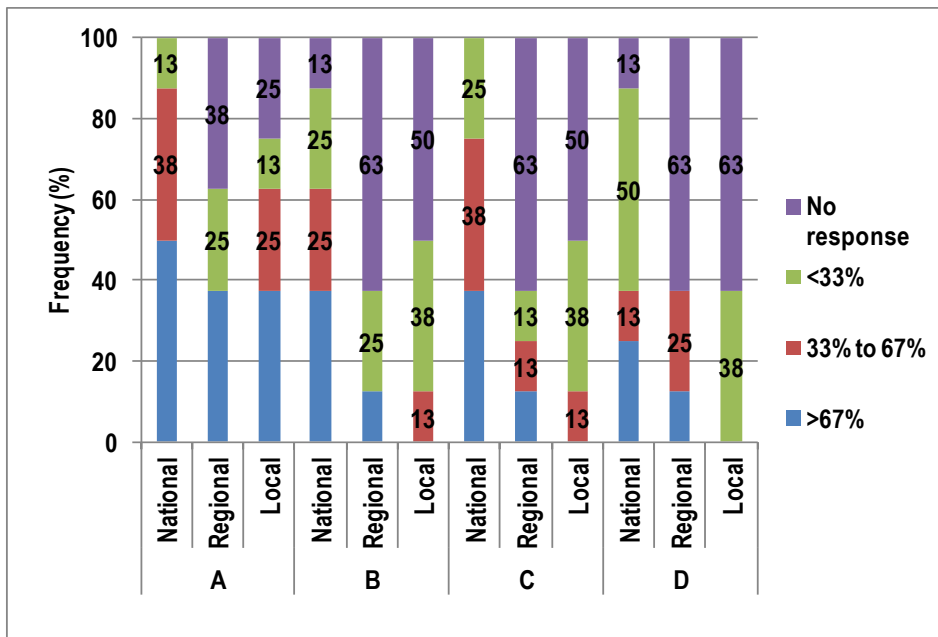
Marine capture fisheries under management – general characteristics

In 50% of the countries, more than two-thirds of the marine capture fisheries were considered ‘managed in some way’ at the national level, with less management believed to be occurring at the regional and local levels. For those fisheries considered managed, 19% had formally documented management plans for national level management of the majority (over 67%) of their fisheries (Figure 16a). While 38% of countries reported having regulations governing the majority (>67 %) of managed fisheries at the national level, for more than 67% of fisheries regulated at the national level, the regulations were informed by methodical scientific monitoring and evaluation in 25% of the responding countries. The situation for the central and northeast insular sub-region seemed to be the most balanced, especially in view of the small-size of the islands concerned and hence an expected natural greater emphasis on national-level activities in terms of plans and regulations (Figure 16b). The situation appeared to be the worst in the southern sub-region, where management achievements were identified usually for less than 33% of the fisheries (Figure 16c). While the western sub-region appeared to show comparatively higher frequencies regarding fisheries regulations, these were not equally matched with achievement in development of fisheries management plans and scientific monitoring and evaluation of management performance (Figure 16d).

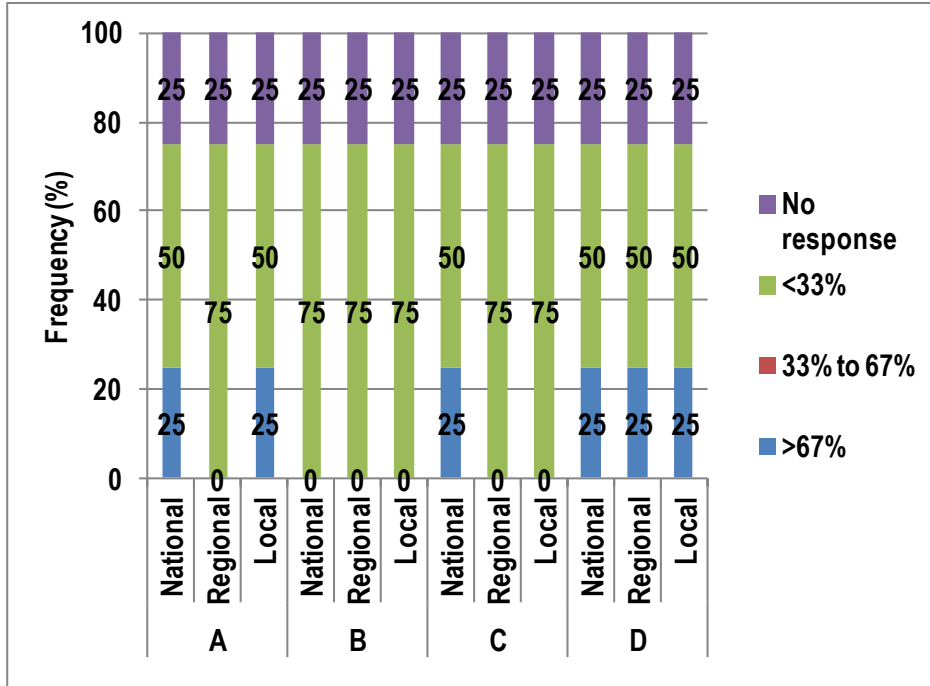
There was a perception within countries that the number of fisheries managed had increased over the past ten years, but 31% of the responding countries felt that there were major fisheries (in terms of weight of landings) that were not currently being managed. Furthermore 87% of countries did not have a formal definition of overfishing within their management frameworks.



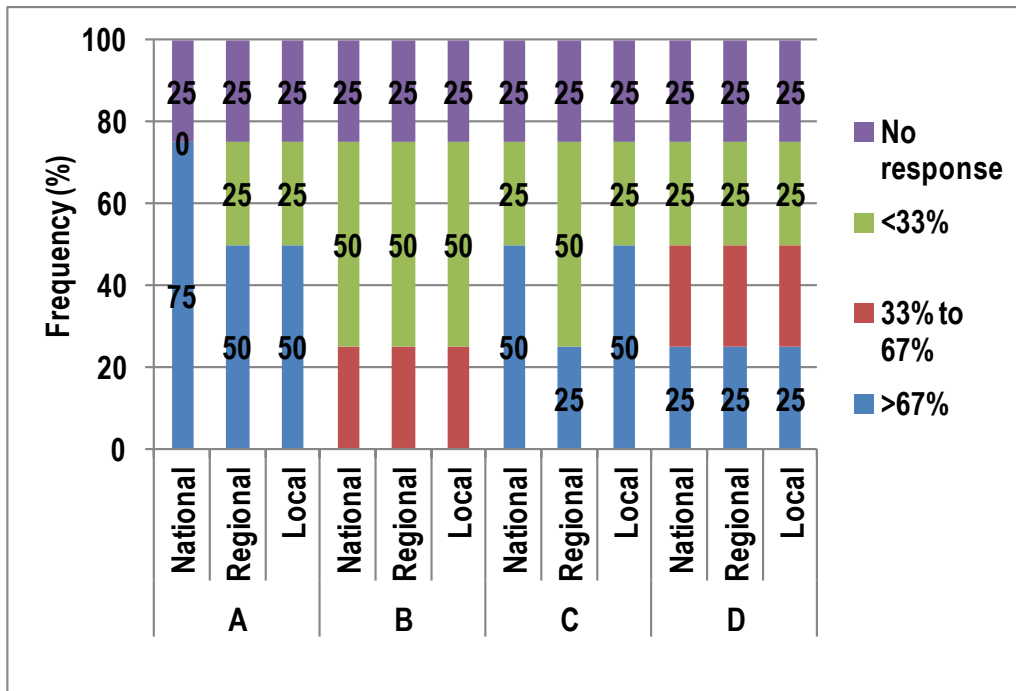
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

Figure 16. Frequency of responses (by %) confirming various management achievements at the national, regional and local levels, specifically identifying: A - % fisheries managed in some way; B - % fisheries with formal management plans; C - % fisheries with published regulations;

D - % fisheries for which regulations are based on methodical scientific monitoring and evaluation. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

REVIEW OF FISHERIES MANAGEMENT TOOLS IN USE WITHIN THE LARGEST MARINE CAPTURE FISHERIES

Each country correspondent was asked to identify up to 3 major commercial/industrial, small-scale, and recreational fisheries for his/her country. Responses from the 16 countries surveyed identified 25 commercial, 39 small-scale, and 19 recreational fisheries as being the largest fisheries by volume in each sub-sector (Appendix 1).

Characteristics of fishery & activity trends

Approximately 15 times more participants were involved in small-scale/ artisanal fishing operations than were involved in commercial fisheries (Table 3). This trend differed somewhat from global comparisons of the two subsectors (e.g. Berkes *et al.* 2001). Despite the much higher number of individuals involved in small-scale fishing, landings were more than six times higher for commercial fisheries. That noted, the complex and extensive distribution of small-scale artisanal fishing operations is known to pose challenges for sampling these fisheries, and hence fish landings were believed to be under-reported (Bahri, 2011).

Table 3. Basic data on the largest fisheries by sub-sector. Country respondents were requested to identify the top three (by volume) fisheries for each subsector within the 16 countries.

Responding countries			
	Commercial / industrial*	Small-scale ³	Recreational
Number of participants	10377 ¹	160000 ⁴	n.a.
Total landings (mt)	1.38 million ²	205000 ⁵	n.a.
Number of vessels	3031 ¹	82000 ⁴	n.a.

Notes: n.a. = not available

*** 7 of the 16 respondents indicated that no commercial fisheries exist in their countries**

- 1. Data on only 18 out of 25 fisheries identified were reported in the survey**
- 2. Total landings from Venezuela were from a single commercial fishery (Tuna)**
- 3. Netherlands Antilles did not provide data**
- 4. Data on only 30 out of 41 fisheries identified were reported in the survey**
- 5. Data on only 38 out of 41 fisheries identified were reported in the survey**

NEED TO LOOK AT THE NUMBER OF PARTICIPANTS IN THE COMMERCIAL SUBSECTOR. ARE THEY COMPANIES IN SOME CASES WHILE OTHERS REPORTED TOTAL PEOPLE??

The number of participants in the 25 identified commercial fisheries had predominantly decreased over the previous ten-year period; in 44% of the cases, a decrease was identified, while in 24% of cases, there was an increase. The opposite trend was observed in the same period for the small-scale and recreational fisheries where 57% and 90% of fisheries were identified as taking on greater numbers of participants respectively. The number of vessels employed in each of the three sub-sectors followed similar trends as the number of participants, with 57% of commercial fisheries losing vessels, and 51% and 100% of small-scale and recreational fisheries respectively increasing their fleet sizes.

Changes over the previous five years in landings from the commercial/ large-scale fisheries varied across the countries (Figure 17). Only the Venezuelan tuna fishery reported decreased trends in landing volumes, while Mexico reported decreased trends in landing values. Six countries reported positive trends in either landing volumes or values within the commercial sector. However, these data were not reported for the majority of countries and no information at all on changes to gross landings / values was available from 4 countries. In the same period for the small-scale fisheries, four countries reported reductions in the landings (Figure 18). Most striking is the > 200% decrease in Venezuelan landings which has been attributed to the collapse of the Sardine fishery there (F. Arocha, pers comm.). Six countries reported relatively modest increases to landings (not exceeding 15%) and only in St. Kitts and Nevis were reduced landings associated with increasing values.

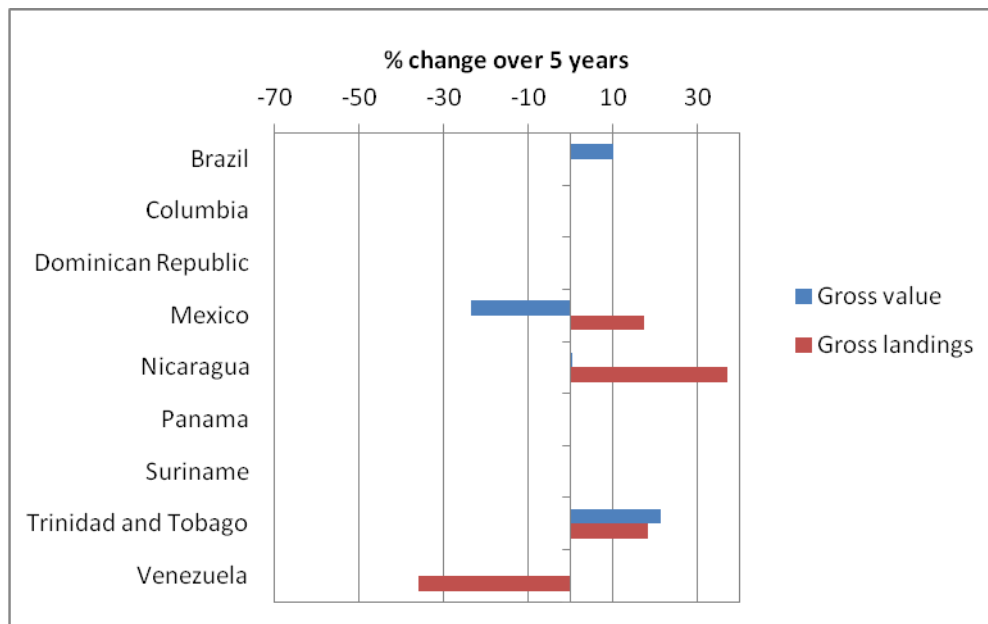


Figure 17. Percentage change in gross landings (red) and gross value (blue) over the past 5 years for the top three commercial fisheries for each of the 9 countries that reported such fisheries. For some countries, no or insufficient data were provided to facilitate a comparison of the 5-year change.

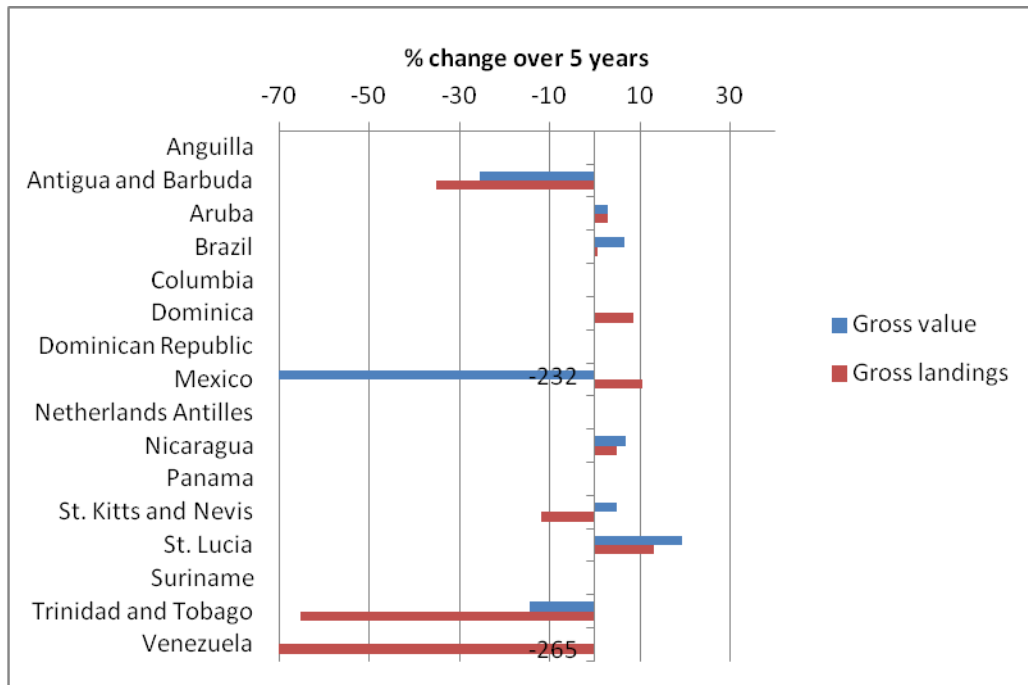


Figure 18. Percentage change in gross landings and gross value for the top three small-scale fisheries for each country over the past 5 years. The large decrease in Venezuelan landings is attributed to the collapse of the Sardine fishery.

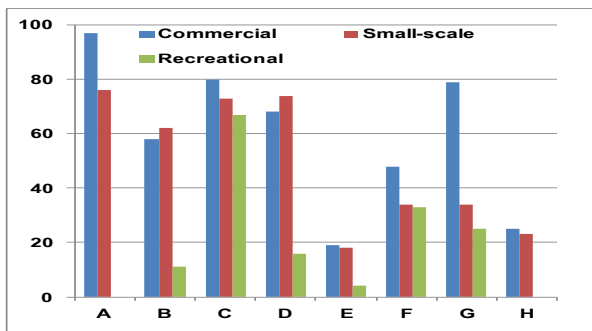
Respondents were asked to indicate the top three fisheries for each sub-sector in terms of the catch value. In the majority of cases (96 and 76 % for commercial and small-scale respectively), the fisheries with highest catch levels were also the fisheries yielding the highest value (Figure 19).

Fisheries specific management plans occurred in about 60 % of the major commercial and small-scale fisheries, while in the recreational sub-sector they were very uncommon (14%). Most of the major fisheries were also multi-species in nature but this aspect was not always accounted for within the management schemes and explicit inclusion of ecosystem considerations was only occasionally made. The major commercial fisheries were much more likely to provide the sole source of income for their participants. Additionally, fish products provided the staple food source in 32% and 23% of the major commercial and small-scale fisheries respectively that were identified by the country correspondents (Figure 19).

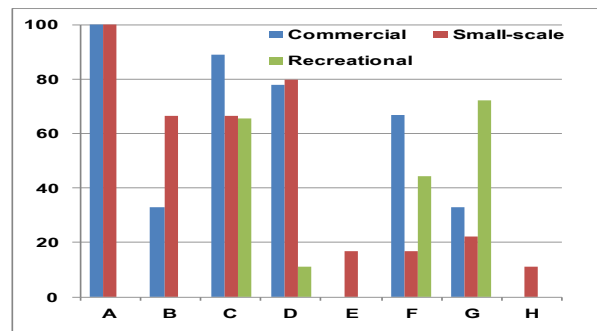
The prevalence of the multi-species of all types of fisheries in the three sub-regions was evident, and this was reflected in management plans at more or less equal levels of occurrence with certain exceptions: these exceptions included the recreational fisheries, and also the southern sub-region, where the incorporation of multi-species considerations occurred much less frequently than would be expected and not at all for the recreational fisheries (Figure 19b-d). Countries of the western sub-region noted more or less equal progress with application of the ecosystem and precautionary approaches. Besides this, the ecosystem approach was only being

applied to the small-scale fisheries in less than 20% of the countries in the central and northeast insular sub-region. On the other hand, responding countries in the central and northeast insular and the southern sub-regions believed that they were making better progress with the application of the precautionary approach, especially: for the commercial and recreational fisheries (>60% and > 40% respectively) in the case of the island countries, and the recreational and small-scale fisheries (100% & > 40% respectively) in the case of the southern countries. It should be noted that in terms of the explanations provided in several cases, as certain regulations had been adopted without scientific information, these were considered precautionary actions by the countries concerned. Likewise, one country indicated that where several species were being harvested and specific regulations, such as minimum size measures were in place to control harvests of each of the species concerned, this was considered an application of the ecosystem approach.

Additionally, the dependence on the fishery as a sole source of income and a sole source of food varied with the sub-region. Among the islands, the recreational fishery participants had the highest dependence for income purposes, followed by the commercial and then the small-scale fisheries. In contrast, the fisheries provided a sole source of income for the participants in both the commercial and small-scale fisheries in the southern sub-region, and for commercial fishery participants in the western sub-region. Interestingly, participants of both the commercial and small-scale fisheries of the southern and western sub-region’s fisheries had a higher dependence on these fisheries as a source of food than those of the islands. Finally, the recreational fisheries of the southern and western sub-regions did not provide either a sole source of income or food for fishery participants concerned. It is not unreasonable to assume that these sub-regional differences in terms of income and food dependence are likely to be linked to similar sub-regional differences in social and economic factors impacting human and social well-being.



(a) All countries surveyed



(b) Central & NE Insular sub-region

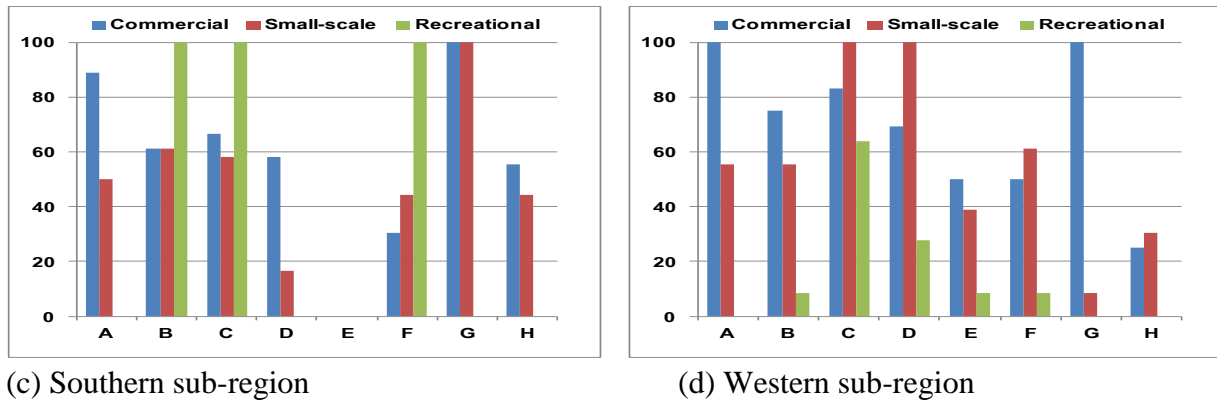


Figure 19. Frequency (by %) of additional characteristics of the top three fisheries from each sub-sector: A - also the top value fisheries; B - have management plans; C - are multi-species fisheries; D - multispecies characteristic is reflected in management plans; E - ecosystem considerations are provided for in management plans; F - precautionary approach addressed in specific ways; G - provide the sole source of income to participants; H - provide the sole source of food for participants. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

Management tools in use within the major fisheries

The technical measures utilized to manage fisheries were categorised under five themes: 1) spatial restrictions, 2) temporal restrictions, 3) gear restrictions, 4) rights and participatory restrictions, and 5) catch and size restrictions (Figures 20 – 24).

Spatial restrictions were popular, especially MPAs, no-take zones, nursery closures, and marine reserves. In particular, a broad range of spatial measures was applied to small-scale fisheries in the three sub-regions examined, with the highest frequency of such application indicated by responding countries of the western sub-region (Figures 20b-d). In addition, in respect of the commercial fisheries, the no take zone was the most popular spatial measure in the southern sub-region, while MPA and nursery area restrictions were more common in the western sub-region. In this instance, it should be noted that terminology, as well as application, of the measure varied by country, e.g. use of the terms MPA and marine reserves, as well as levels of fishing allowed.

Fishing season was the most popular temporal measure applied, and indicated comparatively more frequently by countries of the western sub-region (Figure 21). Fishing season was the most popular measure for the small-scale fisheries of the insular and southern sub-regions (Figure 21b, c). In comparison, limitation of the number of fishing days was also indicated for the commercial and small-scale fisheries of the southern and western sub-regions, though this measure was less frequently applied in all cases (Figure 21c, d). There was a general low level of use of temporal measures for managing the recreational fisheries. While fishing

season was also used for these fisheries of the western sub-region, hours per fishing day was more common. Hours per fishing day was also the main measure indicated for the recreational fisheries of the insular sub-region, where applied in only 5 % of responding countries (Figure 21 b, d).

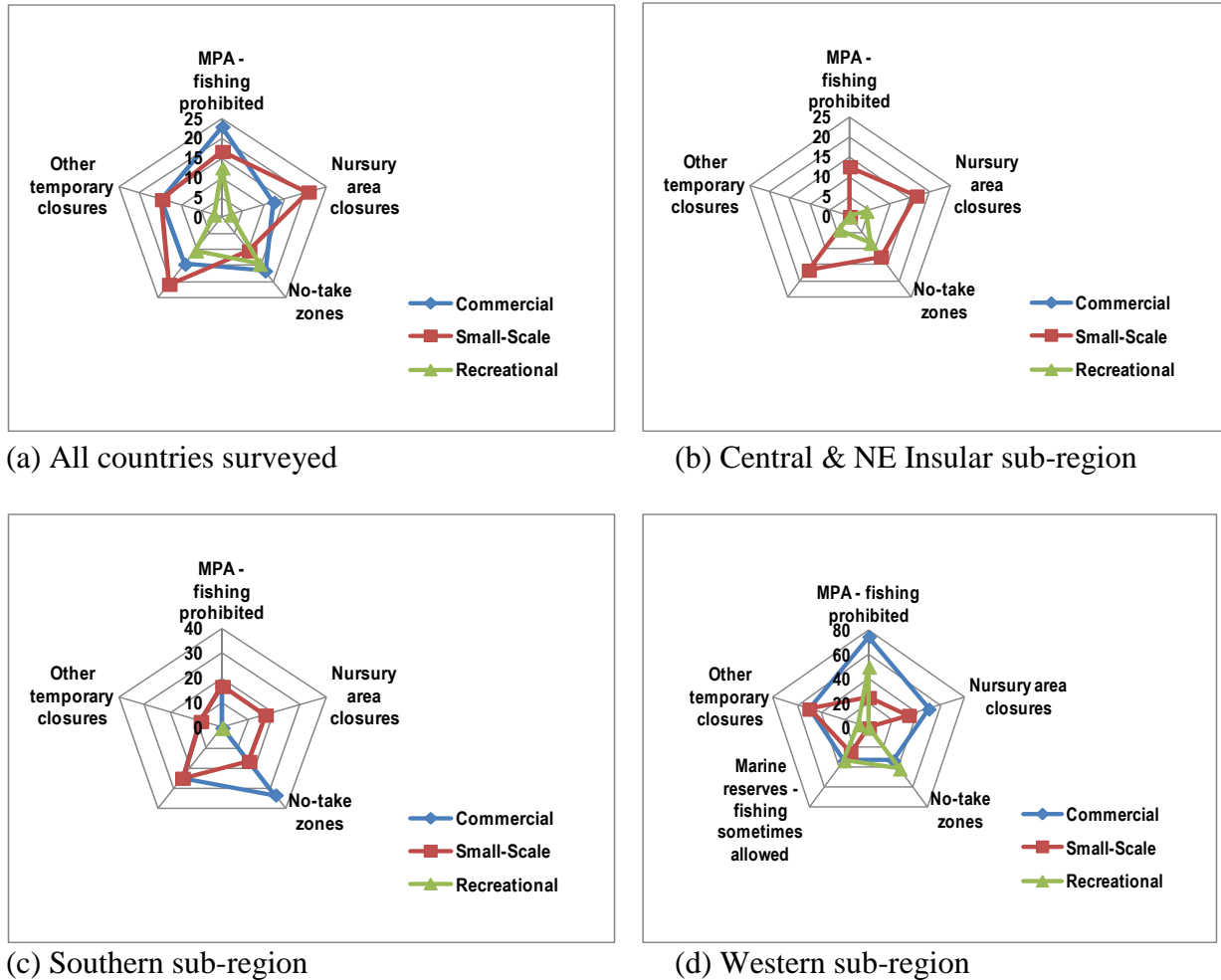


Figure 20. Frequency (by %) of countries using spatial restrictions to manage at least one of the top three fisheries identified in the three sub-sectors (blue = commercial, red = small-scale, green = recreational). The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

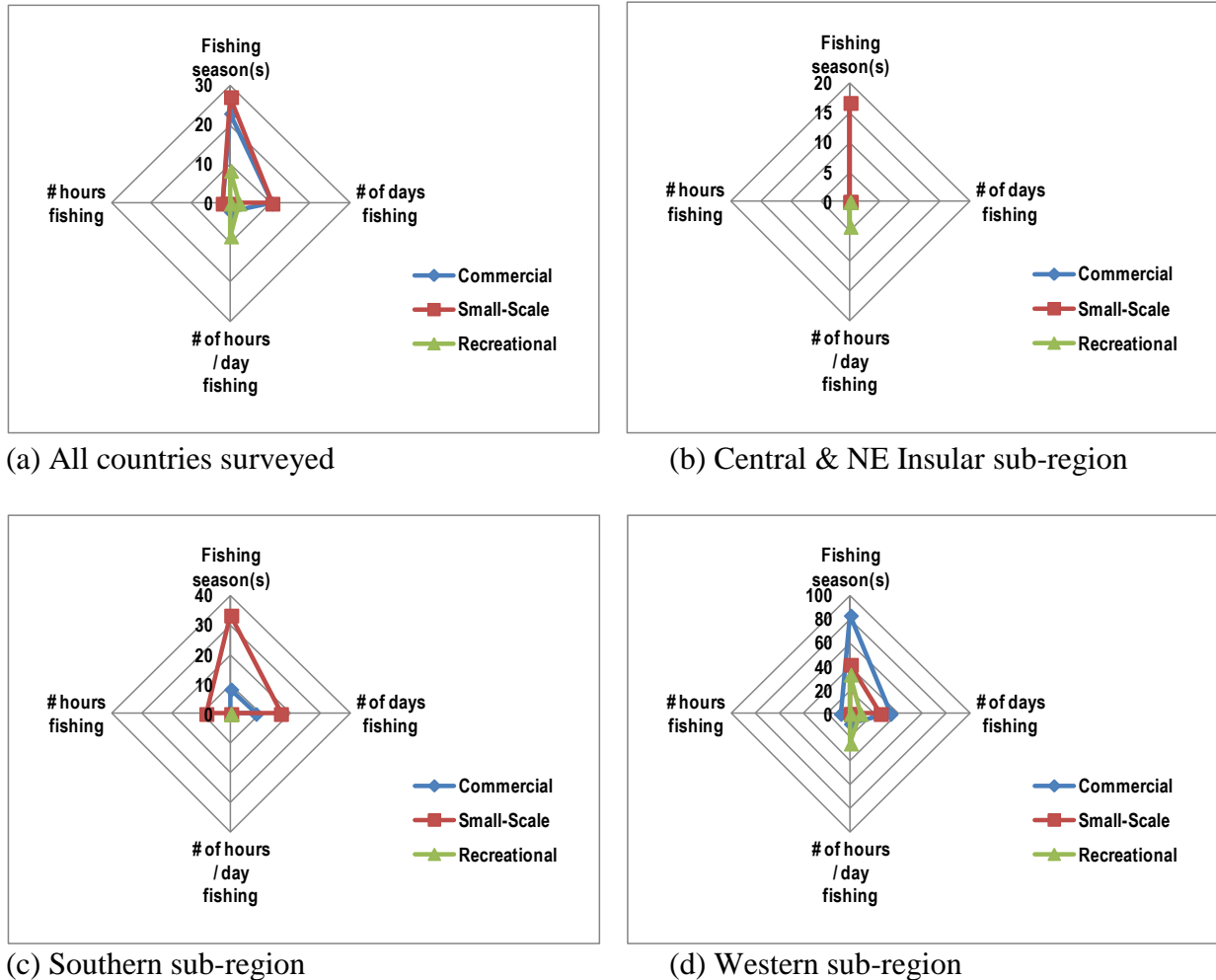


Figure 21. Frequency of countries using temporal restrictions to manage at least one of the top three fisheries identified in the three sub-sectors (blue = commercial, red = small-scale, green = recreational). The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

Generally, gear restrictions were most commonly practiced, especially gear type and gear size measures, but with the lowest level of application in the central and northeast sub-region and the highest indicated for the western sub-region (Figure 22). Vessel size and engine size were also used with notable frequency for commercial fisheries in the southern sub-region and for both commercial and small-scale fisheries in the western sub-regions (Figure 22c, d). Of gear restrictions, hook type and line measures were most common for the few fisheries in which applied, while a broad range of gear measures was applied for the recreational fisheries of the western sub-region (Figure 22b,d).

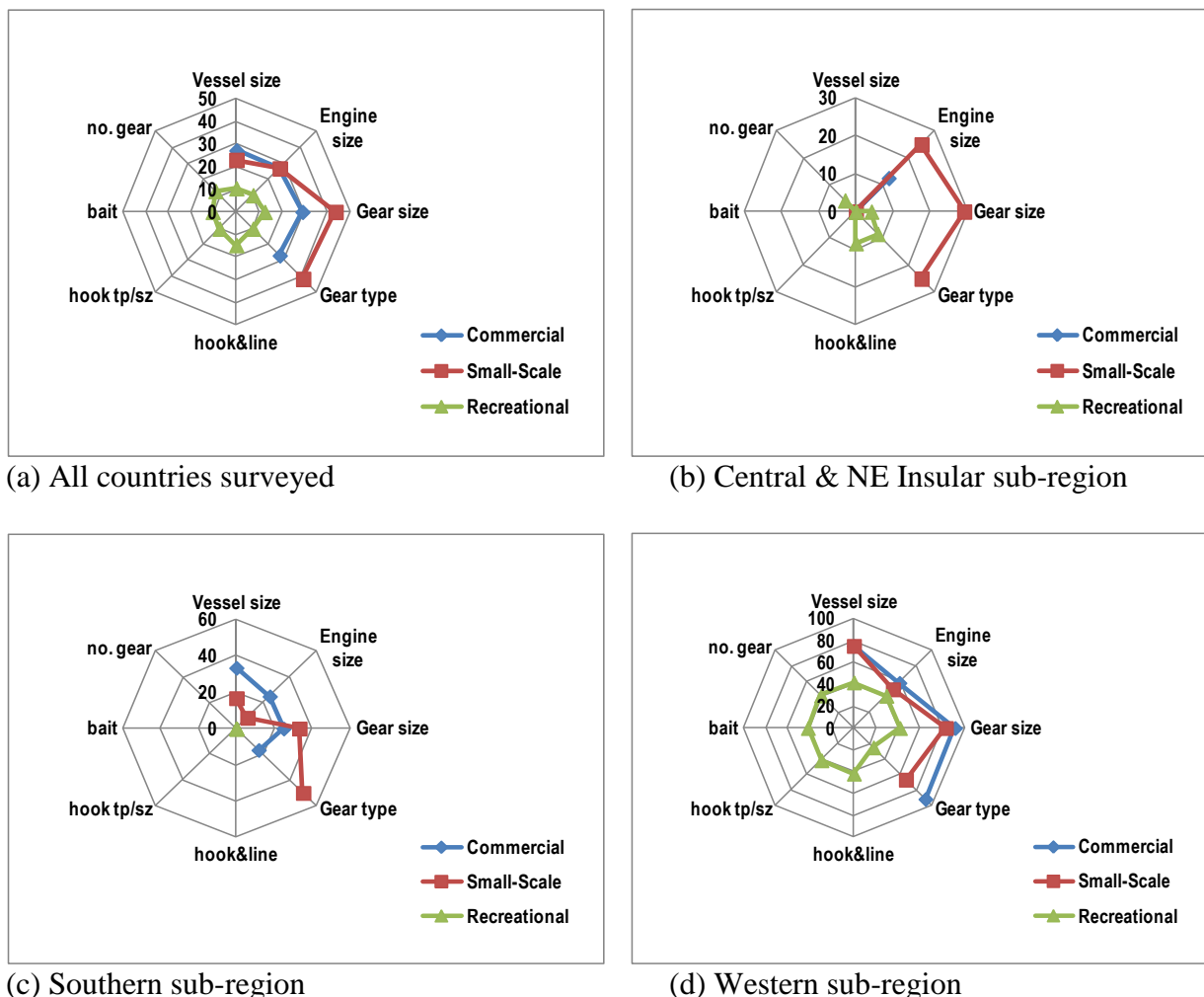
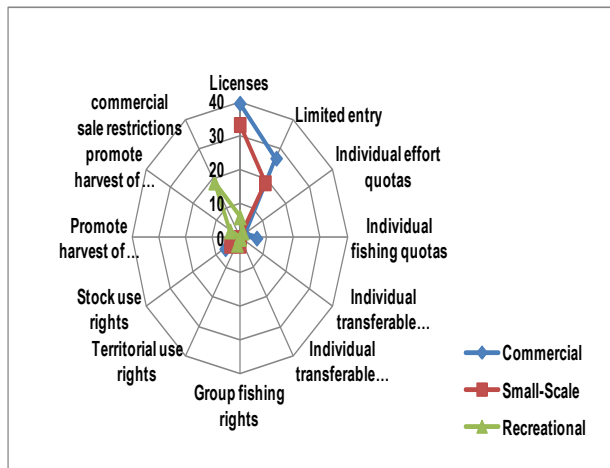
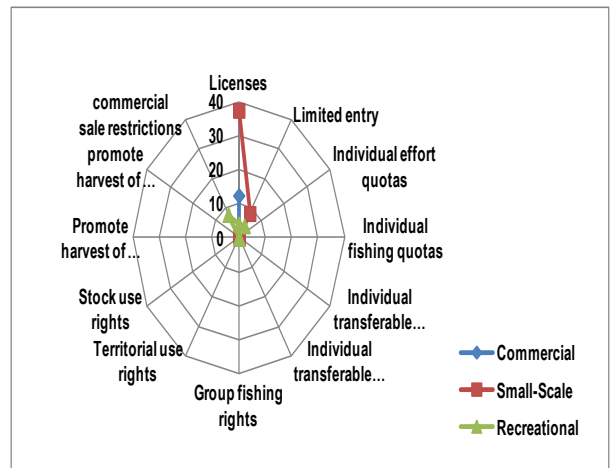


Figure 22. Frequency (by %) of countries using fishing effort restrictions to manage at least one of the top three fisheries identified in the three sub-sectors (blue = commercial, red = small-scale, green = recreational). The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

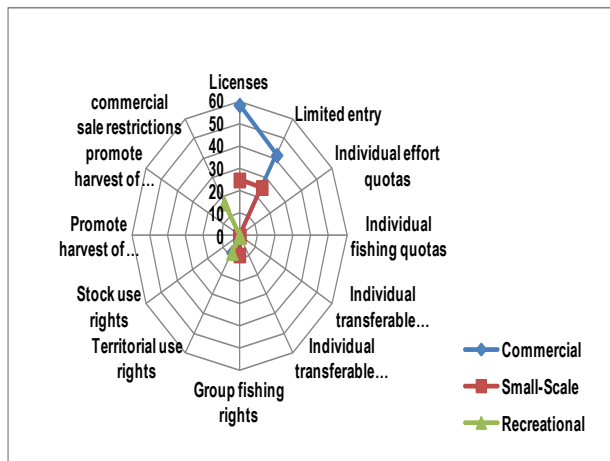
The application of a licensing system was the most common tool to regulate participation levels in fisheries across the WECAFC region (Figure 23). Application of a limited entry system was also indicated, usually for the commercial sub-sector in the southern and western sub-regions (Figure 23c, d). In the case of recreational fisheries, catch sale restrictions were most common in all three sub-regions (Figure 23 b-d). In addition, a few other applications of rights and participatory restriction measures were in use for a very few fisheries in the western sub-region: stock use rights for both small-scale and commercial fisheries, and individual fishing quota allocations for the commercial fisheries (Figure 23d).



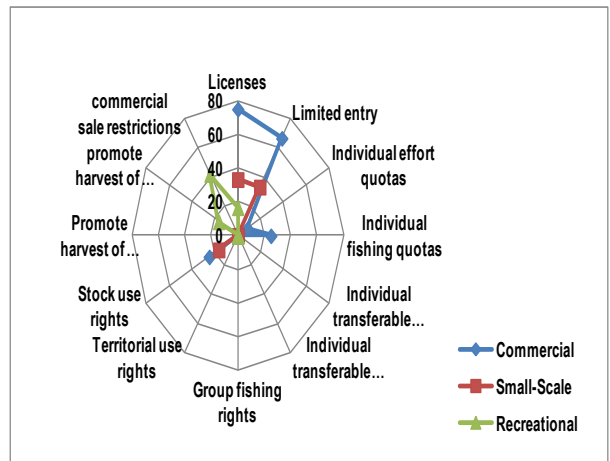
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

Figure 23. Frequency (by %) of countries using participatory and rights/ incentive adjusting restrictions to manage at least one of the top three fisheries identified in the three sub-sectors (blue = commercial, red = small-scale, green = recreational). The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

Regarding catch/ harvest restrictions, total allowable catch (TAC) and size restrictions were the most common, with the broadest range of measures was indicated for the recreational fisheries (Figure 24). In the central and northeast insular sub-region, size restrictions was the most commonly indicated, but applied in less than 25% of the responding countries (Figure 24b). On the other hand, TAC, size and vessel catch limits appeared to be used more or less equally in the southern sub-region for the small-scale fisheries, being applied in about 10% of cases. In this sub-region also, TAC and size restrictions were more frequently applied to the commercial fisheries (> 15% and 25% of cases), compared to the small-scale fisheries (Figure 24c). In the

case of the western sub-region, TAC was the most commonly applied catch restriction measure for both the small-scale and commercial fisheries (Figure 24d). To a much lesser extent, size restrictions were also applied to the industrial fisheries, and individual vessel quotas applied to the small-scale fisheries. In contrast, recreational fisheries in the western sub-region were subjected to a broad range of catch restriction measures (Figure 24d).

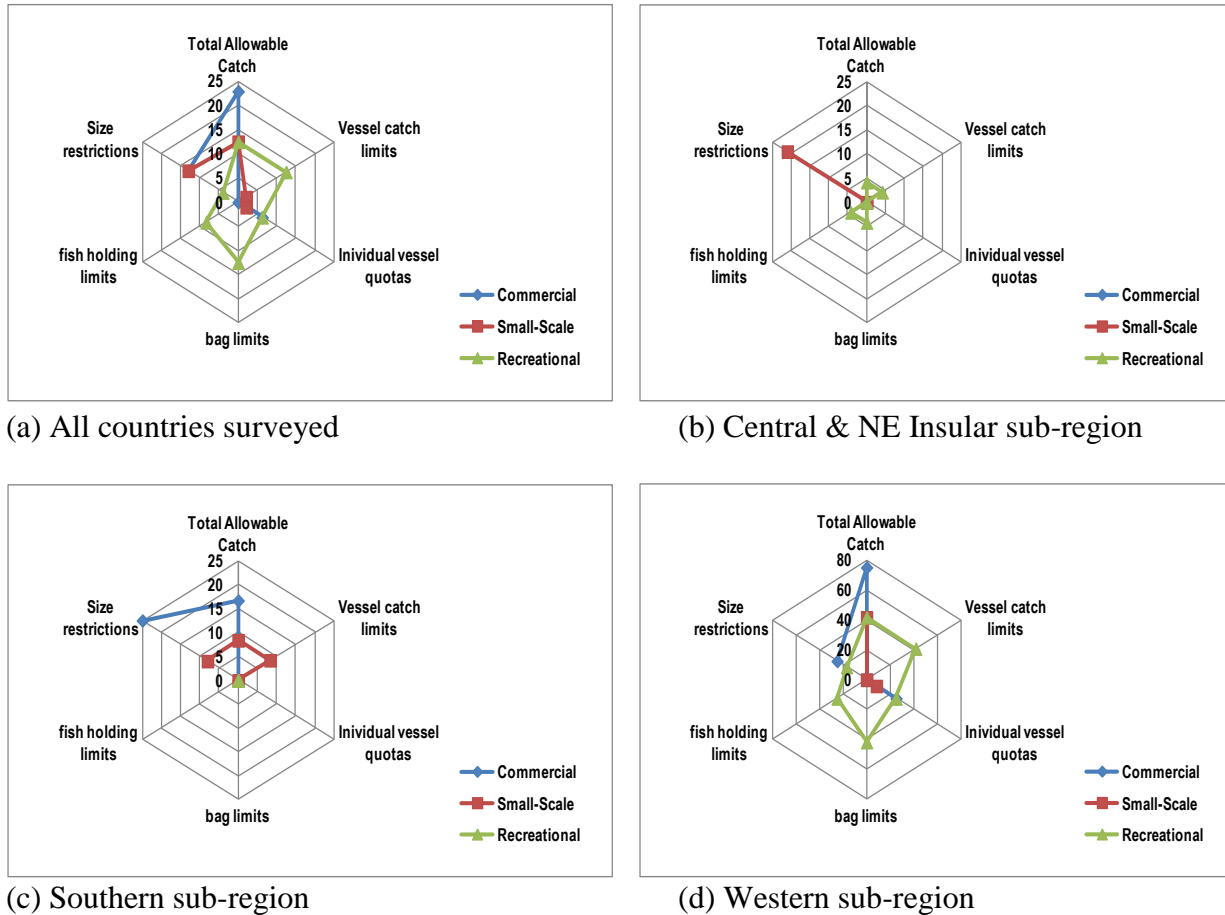


Figure 24. Frequency (by %) of countries using catch and size restrictions to manage at least one of the top three fisheries identified in the three sub-sectors (blue = commercial, red = small-scale, green = recreational). The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

It should be noted that over the last 10 years spatial restrictions were increasingly utilized within the commercial fishery, whereas the other technical measures had predominantly remained unchanged in the level of usage. On the other hand, in the small-scale sub-sector, tools which had grown in usage over the past 10 years included: MPAs and no-take zones (spatial), fishing seasons (temporal), and licensing (rights). In the case of recreational fisheries, few

applications of measures were indicated. For these fisheries, a range of catch restrictions, no-take zones (spatial), and hook/ line restrictions were most common.

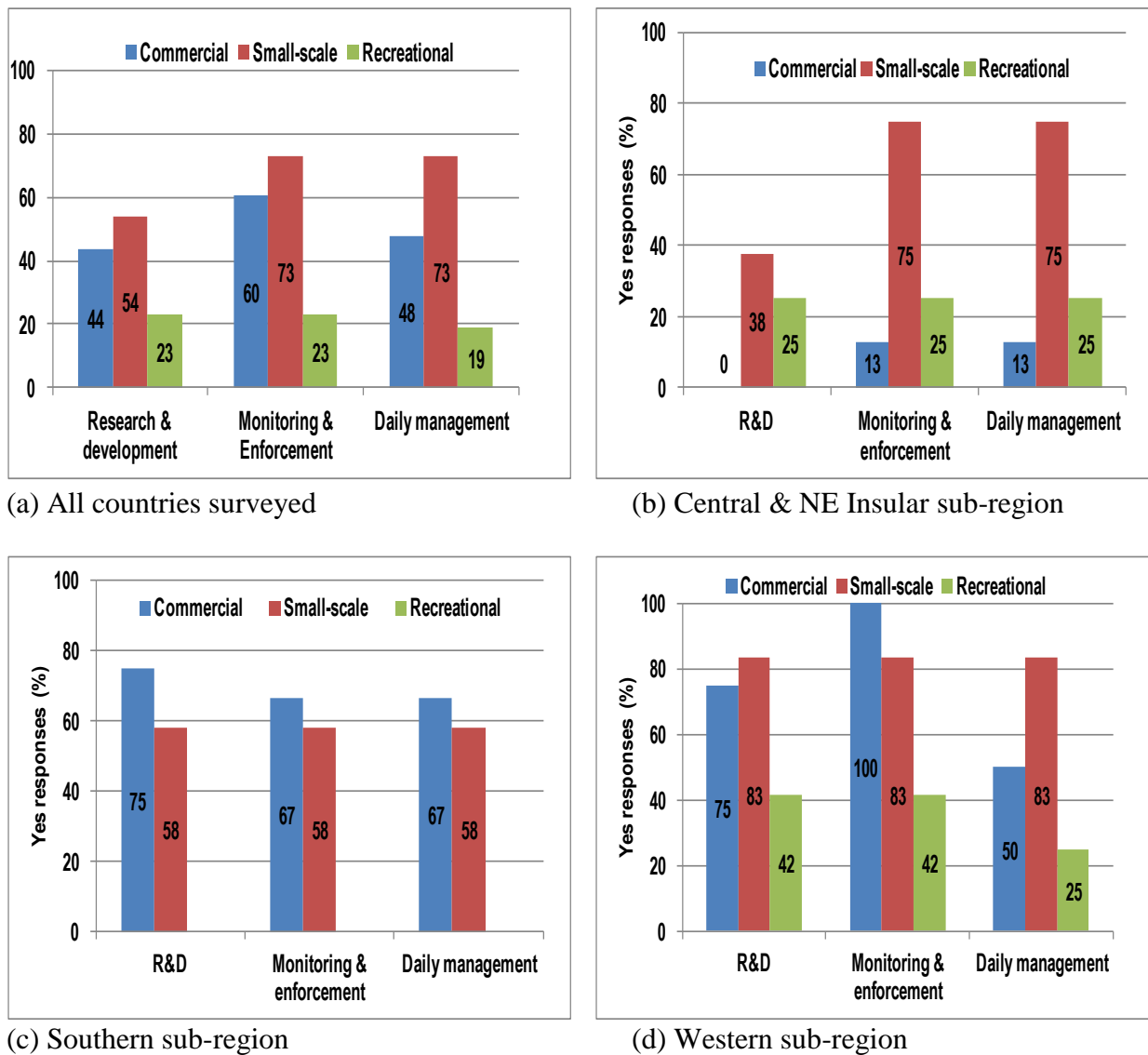


Figure 25. Government management budget outlays: percentage of responses indicating government funding for the top three commercial (blue), small-scale (red) and recreational (green) fisheries across all surveyed countries. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

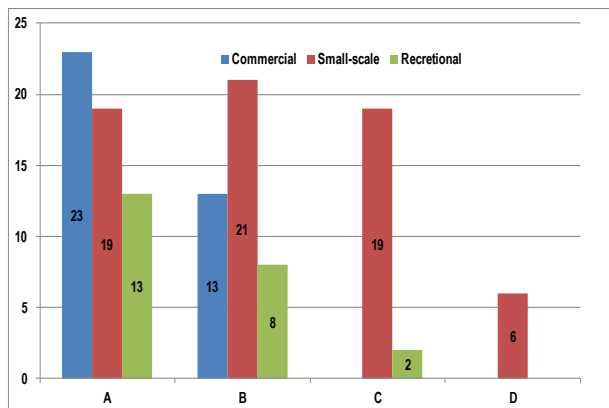
Funding outlays and cost-recovery in fisheries management within the major fisheries

Government funding for management of the major fisheries identified by country correspondents included, *inter alia*, research and development, monitoring and enforcement, and

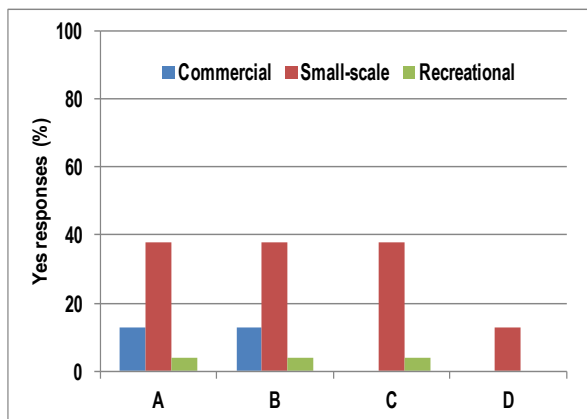
daily management. Generally, the funding targeted commercial and/or small-scale fisheries more heavily than recreational fisheries (Figure 25a). Obviously, as small-scale fisheries were more frequently identified as major fisheries in the central and northeast sub-region, most of the funding was directed at small-scale fisheries, followed by recreational fisheries (Figure 25b). These funds were allocated mostly to daily management and monitoring and enforcement activities, with about half as much allocated for research and development tasks.

In comparison, in the southern sub-region, management funds were more frequently allocated to commercial fisheries than small-scale fisheries in all three aspects (Figure 25c). Furthermore, research and development activities for commercial fisheries were also more frequently supported than monitoring and enforcement and daily management tasks (Figure 25c). Compared to commercial fisheries, small-scale fisheries enjoyed less but more equally distributed funding among the three types of management activities. In contrast, no government funding was indicated for recreational fisheries in the southern sub-region. In the western sub-region, availability of government funding was indicated for all fishery types (commercial, small-scale and recreational fisheries), although least frequently for the recreational fisheries (Figure 25d). While most of the government funds were spent on monitoring and enforcement in the case of the commercial fisheries, followed by research and development tasks, government funds was believed to support all three management tasks fairly equally in the case of the small-scale fisheries. This may likely reflect a response by fisheries managers to address known major areas of weakness, but may also be influenced by the interests of donor-sponsored activities that tend to focus more on research and development and monitoring and enforcement related tasks, and which typically demand some government counterpart funding for implementation.

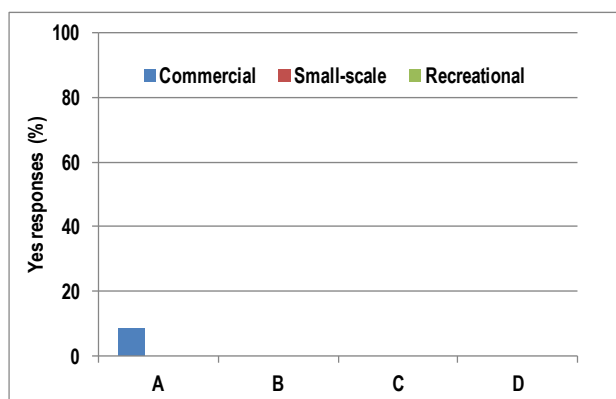
Generally on average, across the major fisheries, management cost recovery mechanisms most often involved collection of licence fees: licence fees collected for commercial fisheries were used to recover management costs for these fisheries; small-scale fishery management cost recovery depended on licences received from small-scale fisheries, as well as other fisheries and resource rents; recreational fishery management costs were recovered by licences charged to recreational and other fisheries (Figure 26a). This general pattern was apparent in the central and northeast sub-region (Figure 26b). In contrast, in the southern sub-region, cost recovery efforts were indicated (< 10% of the cases) and involved licences charged to the fishery concerned only (Figure 26c). In the western sub-region, responding countries also indicated minimal cost recovery efforts for the small-scale fisheries. Cost recovery efforts in respect of the commercial and recreational fisheries involved, in each instance, licences charged to the fishery concerned, as well as similar fisheries, e.g. other commercial fisheries in the case of commercial fisheries management costs (Figure 26d).



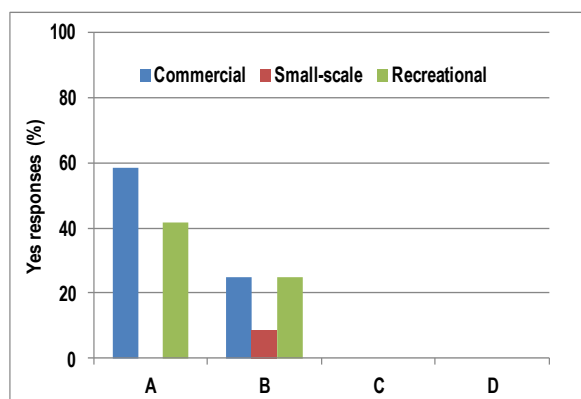
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

Figure 26. Fisheries management cost recovery sources in national legislation averaged across the top three fisheries in each sub-sector: A - licence fees in the fishery; B - licence fees in other fisheries of the sub-sector; C - licence fees in other fisheries of other sub-sectors; D - resource rents. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

These mechanisms have not facilitated recovery of the full management costs. Hence in the commercial sub-sector, increasing costs of fisheries management were predominantly being funded by increased government spending (68% of cases) rather than through participants in the fishery (42%) or other sources (45%). Government funding was also primarily relied upon to cover increasing costs in the small-scale sub-sector: 68% from government, compared to 20% obtained through fishery participants and 53% via other sources. This trend was not apparent in the recreational sub-sector, with government funding at 15%, compared to 31% of funding received from participants and 28% received from other sources. In the commercial and small-scale fishery sub-sectors, heavy reliance on government funding suggests that management

remains primarily top-down (*i.e.* government controlled), rather than bottom-up (*i.e.* market for transferable quotas or fishers cooperative).

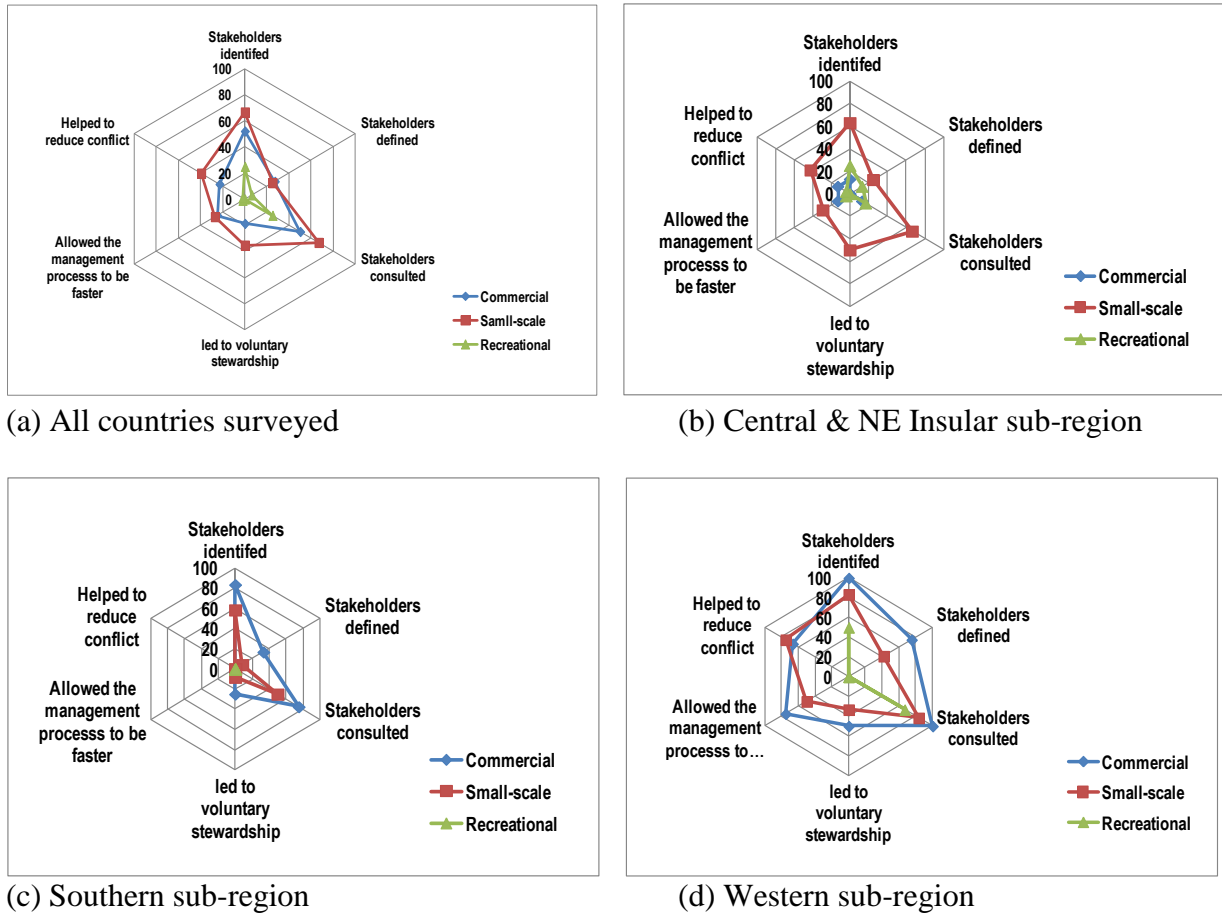


Figure 27. Performance of participatory mechanisms in the major fisheries of the three sub-sectors: A - efforts to identify stakeholders; B - definition of stakeholder in management plans; C - consultation with stakeholders; D - participants’ confidence that the management system creates incentives for voluntary stewardship; E - stakeholder participation has made the management process faster; F - stakeholder consultation has helped reduce conflict. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries comprising the Central and NE Insular sub-region; (c) surveyed countries comprising the Southern sub-region; (d) surveyed countries of the Western sub-region.

Participatory mechanisms and conflict management within the largest fisheries

Stakeholder involvement in the fisheries management process is considered essential for its success and is thus a key principle contained in the FAO Code on Conduct that gives some

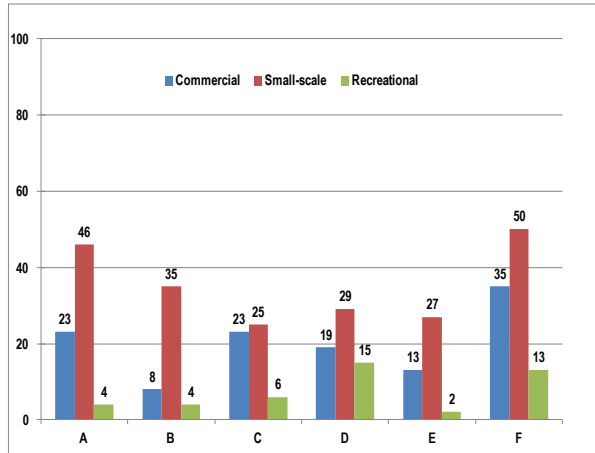
recognition to multiple objectives, roles and responsibilities within each fishery and the need to foster compliance with any agreed upon management measures (De Young, 2006).

Although a formal definition of stakeholders in management plans is not common (especially for small-scale and recreational fisheries), efforts have been made in most fisheries across the three sub-sectors to identify such stakeholders (Figure 27). Some form of consultation with stakeholders was also common in the commercial and small-scale sub-sectors (Figure 27a). Consultation with stakeholders in commercial fisheries resulted in a faster management process in about 30% of cases. The participatory approach helped to reduce conflict more frequently (40%) in the major small-scale fisheries identified compared to other fisheries, and helped equally to create incentives and reasons for stakeholders to voluntarily practice “responsible” fisheries stewardship. However, such outcomes (conflict and voluntary stewardship) for the recreational fishery were less frequently reported (Figure 27a).

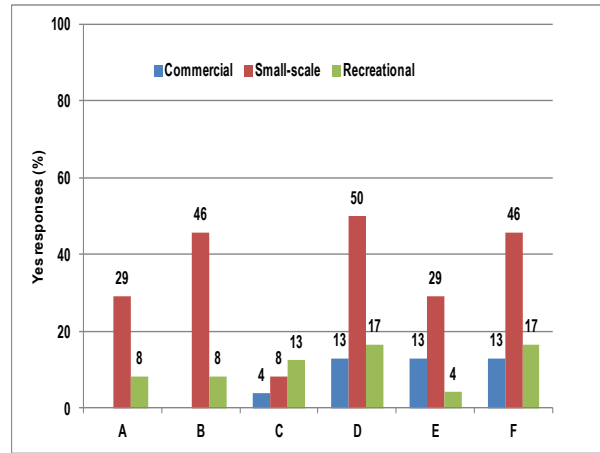
In the central and northeast sub-region, slightly higher levels of stakeholder consultation and achievement of voluntary stewardship than the general overall regional pattern were reported for the small-scale fisheries, which are the most common and largest fisheries in this sub-region (Figure 27b). The range of achievements in stakeholder participation was also broad for the recreational and commercial fisheries, but reported in much fewer instances. On the other hand, in the southern sub-region, participatory management achievements were more frequently for stakeholder identification and consultation (~80% for the commercial fisheries and 60% for the small-scale fisheries) (Figure 27c). Defining stakeholders in management plans and achieving voluntary stewardship were reported for about 40% and 30% of cases in the case of the commercial fisheries, with much lower percentages reported for the small-scale fisheries. Additionally, participatory management was not occurring to any measurable extent for the recreational fisheries in the southern sub-region (Figure 27c). Similar to the other sub-regions, stakeholder identification and consultation was most commonly reported for the western sub-region (Figure 27d). These activities were taking place in 100% of the major commercial fisheries, and 80-85% of the major small-scale fisheries. There was also a high frequency of reports on achievements in defining stakeholders in management plans, creating voluntary stewardship, quickening the management process and conflict reduction for both the commercial and small-scale fisheries, with lower frequencies noted for the latter and higher frequencies noted in terms of quickening the management process and conflict reduction. Regarding the recreational fisheries, the western sub-region noted progress with identifying stakeholders in about 45% of cases and consulting stakeholders in about 80% of cases. Other areas and benefits of participatory management were not reported for the recreational fisheries (Figure 27d).

Generally, although it was found that participatory measures had assisted to reduce conflict within and among fisheries, conflicts were found to be increasing in 43%, 50%, and 33% of the major commercial, small-scale and recreational fisheries respectively: decreases in conflict were reported in 26%, 24%, and 0% of cases respectively. Conflict within all three sub-sectors appeared to be primarily the result of conflicts: with other fisheries, with other types of vessels,

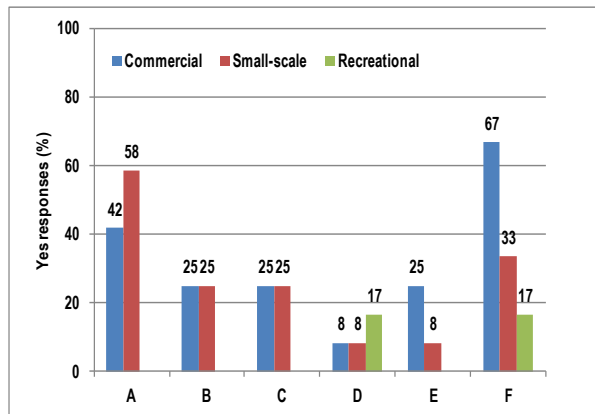
competition for use of the same sea areas, and competition among the same types of vessels in the particular case of the small-scale fisheries (Figure 28a). Within the small-scale sub-sector, conflict among the same types of vessels was also a notable problem. The main source of conflict in the recreational fisheries appeared to be competition with other fisheries, commercial or otherwise.



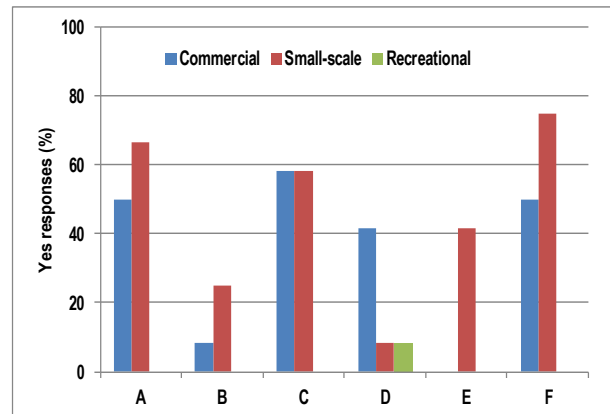
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

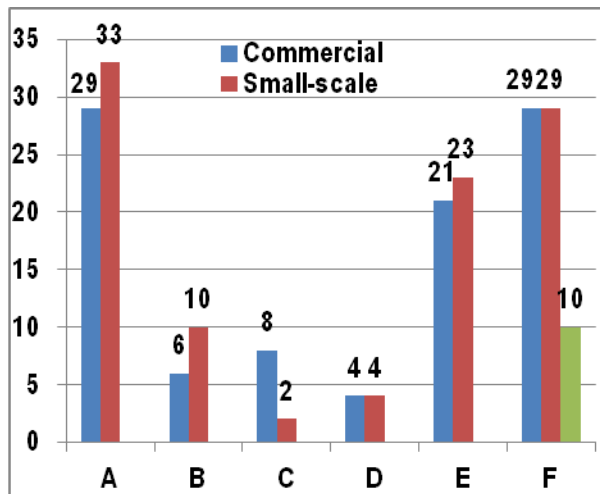
Figure 28. Sources of conflict for fisheries within the three subsectors: A - between different types of vessels; B - among the same types of vessels within the sub-sector; C - competition for gear deployment in the same area; D - between the commercial and recreational sub-sectors; E - with the other industries; F - with other fisheries. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

In the central and northeast insular sub-region where small-scale fisheries predominated, the most important source of conflict was competition between the commercial and recreational fisheries, followed closely by both competition among the same types of vessels and with other fisheries in general (Figure 28b). In contrast to the general pattern, competition for use of the

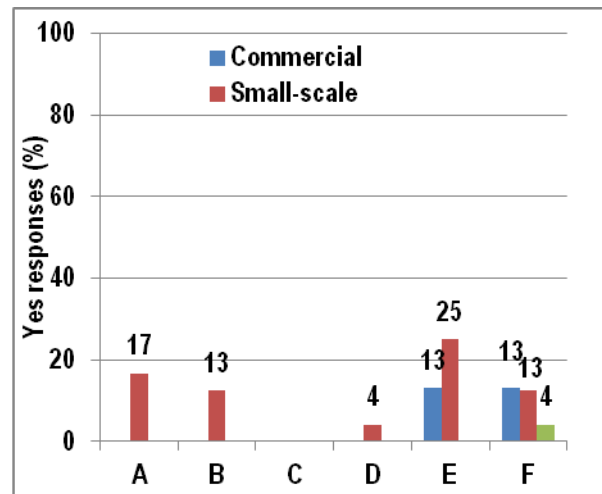
same sea areas was less of a problem in this sub-region. The main source of conflict for the recreational fisheries was the same, as noted for the general regional pattern, i.e. competition with other fisheries. This was followed closely conflict in respect of use of the same sea areas (Figure 28b).

Responding countries of the southern sub-region indicated that the most common source of conflict for the commercial fisheries was competition with other fisheries (67%), followed by competition between with different types of vessels (42%) (Figure 28c). However, competition between different vessels was a more frequent problem (58%) than competition between different fisheries (33%) in the case of the small-scale fisheries. The recreational fisheries experienced similar sources of conflict, as noted for the insular region (Figure 28c). In the western sub-region, conflict was reported more frequently overall, with both the commercial and small-scale fisheries experiencing similar sources of conflict, with the most important being: competition with other fisheries, between different types of vessels, and for use of the same sea areas (Figure 28d). Competition between the recreational and other fisheries was also reported, but appeared to be much less of a problem than in other sub-regions.

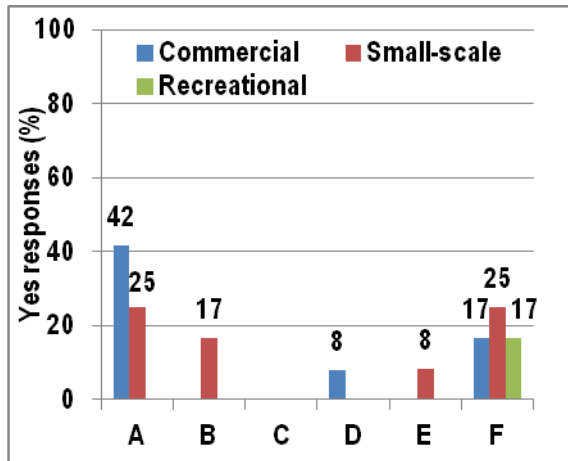
Conflict resolution processes commonly utilized across the region included zoning for specific users, limited access to areas for certain types of fishers, and educational methods to sensitize users regarding the multiple-use nature of certain resources (Figure 29a). This general pattern was observed in the sub-regions also, with the following notable differences: education used comparatively less frequently in the southern sub-region, and resource allocation within the fishery was a fourth common approach applied for about 33% of the major commercial fisheries (Figure 29b-d).



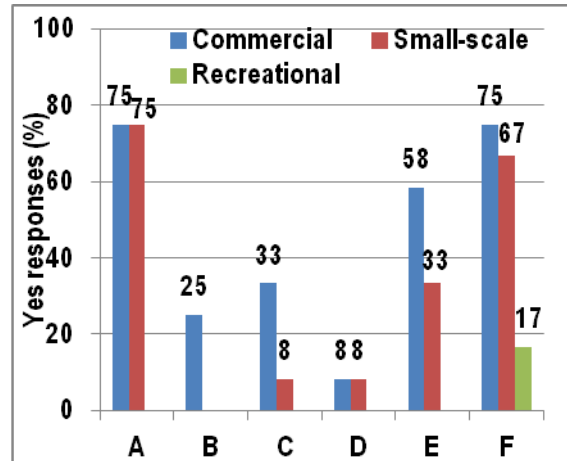
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

Figure 29. Conflict resolution methods within the three subsectors including: A - zoning for different users; B - stock enhancement; C - resource allocation within the fishery; D - resource allocation among sub-sectors; E - education about sharing resource; F - limited access to certain areas for certain types of fishers. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

Fleet capacity management and enforcement methods in use within the largest fisheries

Overcapacity is the factor known to contribute most significantly to failures in fisheries management (e.g. Mace, 1996). For this reason, emphasis has been placed on the implementation of the International Plan of Action (IPOA) for the Management of Fishing Capacity (FAO, 1999). To do this, the current level of fishing capacity must first be established, and each fishery should be analysed for signs of excessive fishing inputs and overcapitalization. Once the level of fishing capacity is known and understood, national fishing capacity management plans should be developed as part of a management strategy in fisheries requiring such actions (De Young, 2006).

Among the major fisheries of the WECAFC region considered in the present study, fleet capacity was being measured in the majority of fisheries (both commercial and small-scale = >70%). No measurements were being undertaken for the recreational fisheries identified (Figure 30a). Across the region, overfishing was believed to be present in about 15% of the major commercial fisheries and 38% of the small-scale fisheries. This belief was strongly supported by similar levels of constant/ decreasing catch rates in 23% and 48% of the major commercial and small scale fisheries respectively, as well as an overall indication level of 6% in the case of the recreational fisheries. Despite a “sense” that overcapacity existed in > 20% of the commercial and small-scale sub-sectors with a greater overall problem perceived for the small-scale fisheries, comparatively few capacity reduction programmes were being applied, especially regarding

small-scale fisheries. Additionally, regulations aimed at reducing fishing efforts impacts were indicated more often for commercial fisheries, even higher than the corresponding perceived levels of overcapacity and overfishing, than were indicated for the small-scale fisheries. Reported levels of application of regulations to reduce fishing effort in the major small-scale fisheries were half and less than half of the corresponding reported levels of overcapacity and overfishing respectively (Figure 30a).

In the central and northeast sub-region where there was a predominance of small-scale fisheries, fishing capacity measurement for the small-scale fisheries was proceeding at just over half the average rate for the region (Figure 30b). While overfishing was indicated less frequently (29%) than the regional average, a constant/ decreasing catch rate was reported for about 50% of the major small-scale fisheries and for about 13% of the recreational fisheries, slightly higher than the regional average in both instances. While overcapacity was considered to be a problem in only 13% of the small fisheries cases examined, no capacity reduction programmes have been implemented for any fishery type. However, regulations to reduce fishing effort were identified for 17% of the small-scale fisheries, a figure comparable with the overcapacity indication level. A few commercial fisheries were also subjected to regulations to reduce fishing effort (Figure 30b).

In the southern sub-region, both the major commercial and small-scale fisheries had similar levels of fishing capacity measurements, as well as perceived problems of overfishing and overcapacity (Figure 30c). However, the small-scale fishery was perceived to be experiencing a much higher incidence of constant or decreasing catch rates compared to the major commercial fisheries. Despite this, capacity reduction programmes and regulations to reduce fishing effort were directed more frequently at the commercial fisheries (42% in each instance) than at the small-scale fisheries (8% in each instance). The situation within the recreational fisheries appeared to be unknown.

In comparison, in the western sub-region, fishing capacity had been measured for a majority of the major commercial fisheries; for these fisheries, a constant or decreasing catch rate was also reported for 67% of cases, and probably linked to this, capacity reduction programmes and regulations to reduce fishing effort were reported for 25% and 58% of cases respectively (Figure 30d). On the other hand, fishing capacity measurements had been measured for only 42% of the major small-scale fisheries. Additionally, there was a higher incidence of overfishing and perceived overcapacity in the small-scale fisheries compared to the major commercial fisheries. Despite this, capacity reduction programmes had not been implemented for any small-scale fishery in the sub-region, and effort-reducing regulations were applied with less frequency (17%) compared to the commercial fisheries (58%, as already noted) (Figure 30d).

These trends suggest that, compared to the commercial fisheries, the small-scale fisheries have been posing real challenges with regard to fishing capacity measurement, as well as effecting fishing capacity and effort reductions. As small-scale fisheries can often include participants with lower income levels in society, such management challenges may be related to

other societal challenges linked to overall poverty alleviation, food security, and lack of alternative livelihood opportunities.

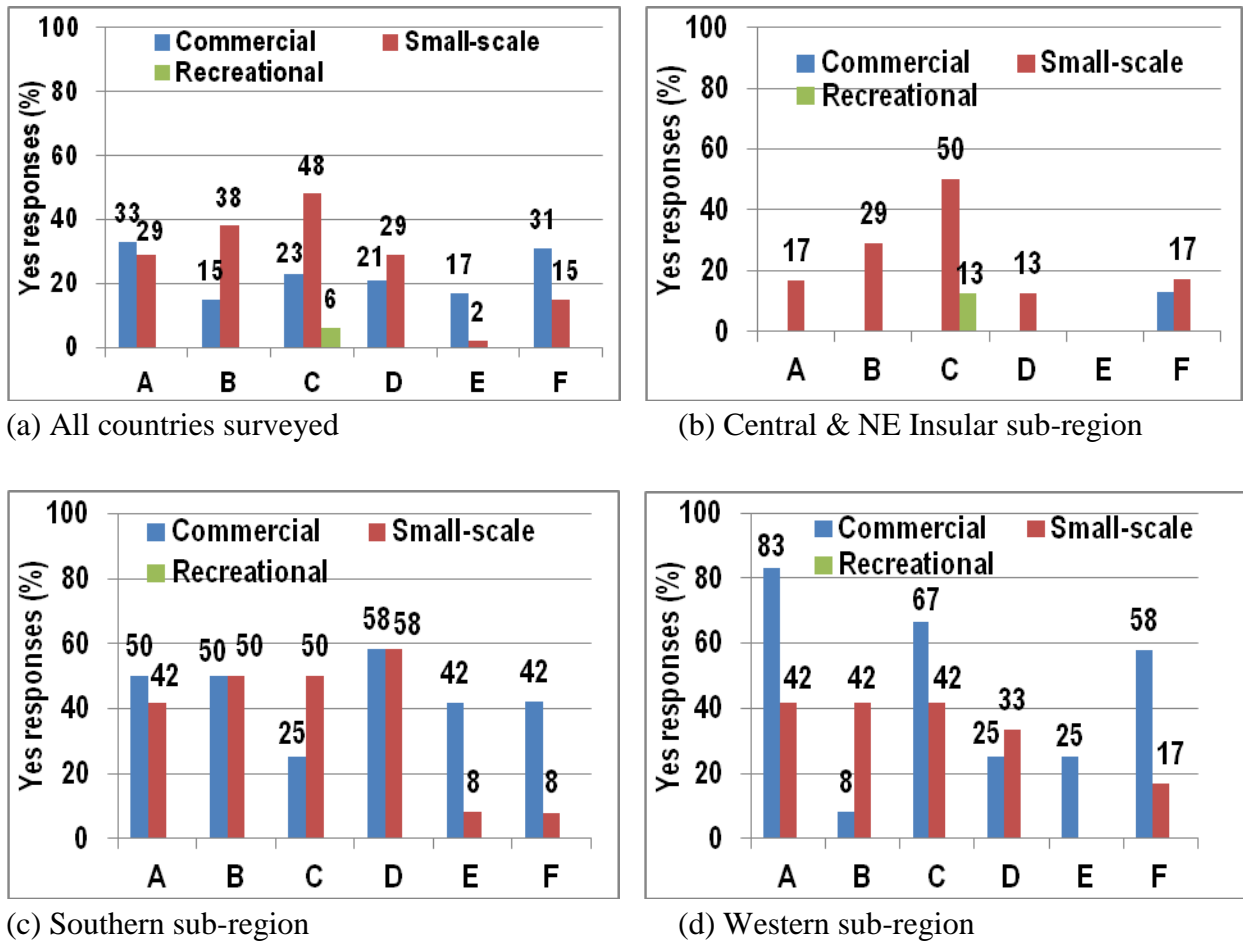
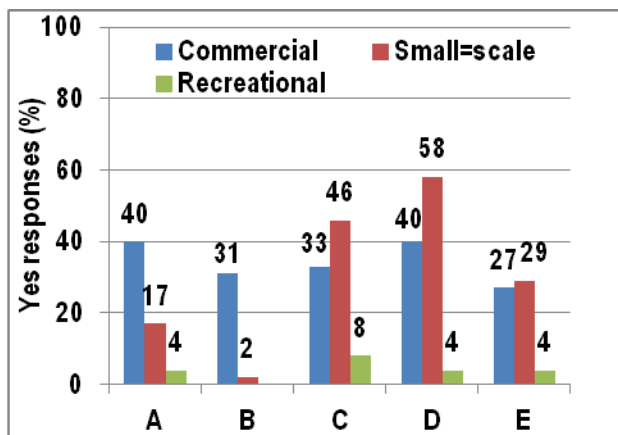


Figure 30. Fishing capacity indicators based on five questions asked of respondents: A - Is fleet capacity measured?; B - Does overfishing exist officially?; C - Is catch per unit area constant or decreasing?; D - Is there a sense that overcapacity exists?; E - Have capacity reduction programs been used?; F - Have regulations in last 2-3 years focused on reducing fishing effort or harvest? The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries comprising the Western sub-region.

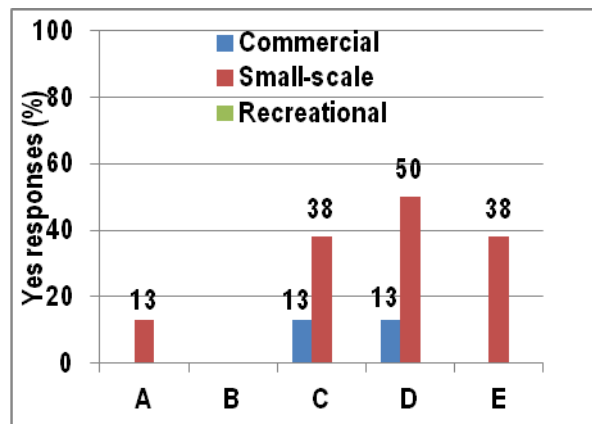
Generally in the region, a range of monitoring, control and enforcement mechanisms was being applied to commercial fisheries, which included the use of VMS and observer programmes, as well as various inspection schemes (Figure 31a). On the other hand, inspection schemes comprised the main form of monitoring, control and enforcement mechanism for small-scale fisheries. To a much lesser extent, recreational fisheries were monitored and controlled using VMS, as well as inspection schemes. The general overall difference between the

commercial and small-scale fisheries may have been due to the higher investment required to implement VMS and observer programmes, which would have restricted their use to higher value fisheries especially in the less developed states. Additionally, the small open-decked vessels that would typically be engaged for small-scale fishing operations would have limited space for additional equipment and personnel who were not also serving as crew.

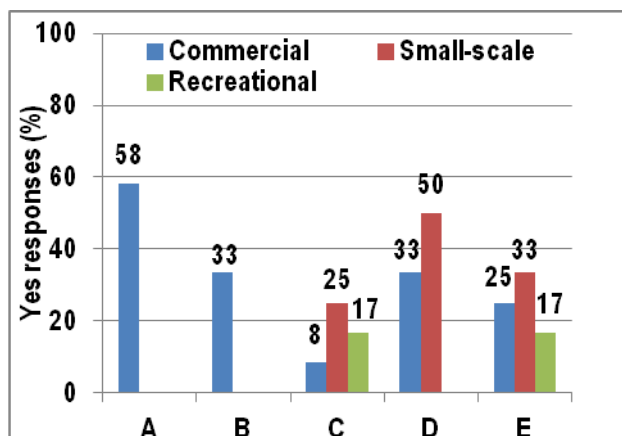
The pattern and frequency of the monitoring, control and enforcement mechanism applied in the central and northeast sub-region was the same as those already noted for the region in general, especially for the small-scale fisheries that dominate in this sub-region (Figure 31b). Perhaps driven by the tools and practices adopted for the dominant fishery type, it is not surprising that land-based schemes were also most common for the commercial fisheries in the central and northeast sub-region. Similarly, the southern sub-regional mechanism tools for monitoring, control and enforcement were consistent with the general regional pattern, except that VMS was not used at all for the recreational fisheries, and random dockside inspections were less frequently used (Figure 31c). In contrast, countries within the western sub-region reported a high level of usage of the full range of monitoring, control and enforcement tools for their commercial fisheries (Figure 31d). VMS was also used for the small-scale and recreational fisheries more frequently than in the other two sub-regions, while at sea boarding and inspections were used comparatively little for the small-scale fisheries and not at all for the recreational fisheries (Figure 31d).



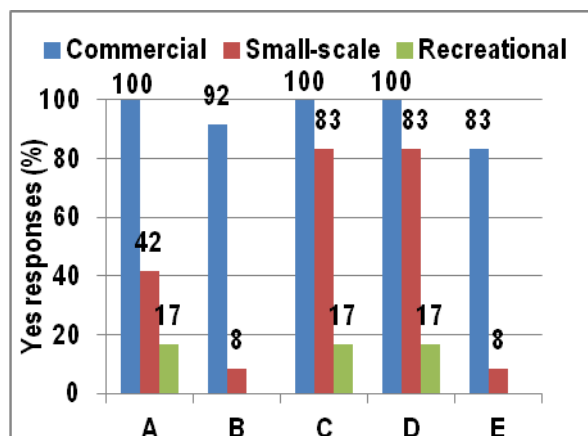
(a) All countries surveyed



(b) Central & NE Insular sub-region



(c) Southern sub-region



(d) Western sub-region

Figure 31. Compliance and enforcement mechanisms in use, averaged across the top three fisheries: A – VMS; B - on-board observers; C - random dockside inspections; D - routine inspections at landing sites; E - at-sea boarding and inspections. The information is illustrated for: (a) the entire group of countries surveyed; (b) surveyed countries of the Central and NE Insular sub-region; (c) surveyed countries of the Southern sub-region; (d) surveyed countries of the Western sub-region.

STATUS OF STOCKS

In 2011, FAO published the latest version of the review of the State of the World Marine Fishery Resources, and separate chapters were devoted to fishery resources in the different FAO Statistical Areas (FAO, 2011). The WECAFC region includes Statistical Area 31 and the northern part of Area 41, and the state of marine fishery resources in these two FAO Areas was addressed by Bahri (2011) and Vasconcellos (2011) respectively.

Bahri (2011) found that there were few quantitative and reliable stock assessments completed for Area 31, and in fact the region had not shown an improvement in the number of assessed stocks since the publication of the previous similar review by FAO. Of 37 stocks or species groups in Area 31 for which data were reported routinely by FAO, 17 stocks/ species groups were found to be fully to over-exploited, while the status of others remained unknown. Only in 7 instances was there low uncertainty associated with the assessment results, suggesting that the data and information base for supporting fisheries management remained rather weak. Of course, assessment efforts had been directed at commercially important species such as the Atlantic menhaden, Gulf menhaden, Caribbean spiny lobster, queen conch, Atlantic Seabob, northern brown shrimp and round sardinella. Moreover, most of the assessments had been done for stocks fished by the USA, Mexico, and Venezuela. Some other assessments, especially of Eastern Caribbean flyingfish and some shrimp species in the southern Caribbean were completed by WECAFC technical working groups established by FAO for this purpose. In the case of several countries that were members of the Caribbean Regional Fisheries Mechanism (CRFM), assessments of various stocks had been facilitated by annual CRFM scientific meetings since

2004 (e.g. CRFM, 2005, 2012). Assessments of the large, highly migratory tunas and billfishes were completed by the International Commission for Atlantic Tunas and represented stock conditions that spanned beyond the WECAFC region.

In Area 41, data on 29 stocks or species groups were reported routinely to FAO. Vasconcellos (2011) reported the availability of status information for 16 stocks/ species groups, with 14 of these indicating a state of full or over-exploitation and 2 stocks considered to be below full exploitation. It should be noted though that Brazil was a major fishing country of only 5 of the stocks/ species groups occurring in Area 41: Argentine croaker and whitemouth croaker that were reported to be fully to over-exploited, Brazilian sardinella that was reported to be over-exploited, weakfishes and swordfish for which there was no stock status information according to Vasconcellos (2011). The stock status information for whitemouth croaker and Brazilian sardinella in Area 41 were considered to be most reliable.

From a geographic standpoint and based on the data and information in Bahri (2011) for the majority of the WECAFC region, there were many stocks/ species groups, countries and maritime jurisdictions for which no reliable, quantitative stock assessments had been undertaken or reported. The overfished/ overfishing state of several top predator fish stocks, stocks of two large invertebrate species (spiny lobster and queen conch) that are distributed throughout the region, and the few assessed stocks of major reef and small pelagic fish groups, suggest that several key trophic component levels are being negatively impacted sufficiently to have broad-scale impacts at the regional-scale ecosystem level. Additionally, the situation of those fisheries and stocks assessed is likely to be representative of other unassessed but similar fisheries operating under similar circumstances and ecosystem conditions in the region. Hence, there is cause for overall concern in the level of fisheries management performance being achieved in actual practice both at the national level and at the level of the WECAFC region, and particularly the data and information base supporting such management.

SUMMARY AND CONCLUSIONS

Countries were facing several challenges with regard to successful sustainable fisheries management.

- Legislation existed in all countries for the management of marine capture fisheries at the national level, which included both legal and administrative frameworks, but the legal framework appeared to be limited and often did not specify a formal management process with identified roles, responsibilities, information needs, and timeframes for activity completion and evaluation.
- Monitoring and enforcement responsibilities were often shared between a national fisheries administration and a navy or coast guard. In the case of the national fisheries administration, there were challenges for cooperation with stakeholders with regard to acquisition of data and information on a routine basis. In the case of the navy or coast

guard, fisheries enforcement patrols were lower in priority compared to other enforcement needs, e.g. controlling illegal shipments.

- Scientific information and knowledge support for the management process were not usually a formal part of the process, but were often dependent on the inputs of interested research institutions and organizations. Certain countries such as Mexico and Venezuela, appeared to have a strong network of supporting fisheries management research institutions, which have helped them to achieve more quantitative understanding of their fishery and stock status situations.
- Fisheries specific management plans were in effect for only 60% of the major commercial and small-scale fisheries, and for very few recreational fisheries.
- Multi-species fisheries were common, but this and ecosystem considerations were often not taken into account in fisheries management plans.
- Stakeholder identification and participation in the management process was not a formal requirement in all countries, but most countries promoted collaboration with stakeholders via open meetings and provision of opportunity for public comments. However, government still retained responsibility for management in most cases. Only about 50% of the countries stated that management information was clearly documented and easily available to the public, which is a key step in the management process for building trust and guaranteeing transparency. Less expensive and less-skilled forms of information dissemination were more popularly used, such as email, ordinary mail and fax.
- Conflict resolution provisions were not included in the legislation of most countries and in less than half of cases did the legislation identify multiple user needs. Management tools used to minimize conflict most often included zoned usage, access limitations, and stakeholder education programmes.
- Fishing capacity measurements had begun for about two-thirds of the countries. However, only 13% of countries had completed this task for all their marine capture fisheries, with other countries prevented from doing so, mostly due to lack of stakeholder support, lack of human resources, and budget constraints.
- Regarding fisheries 'managed in some way' at the national level, which was >67% of fisheries in the countries studied, only about 43% of countries reported having regulations governing these fisheries. Moreover, about one-third of the countries noted that there were major fisheries (in terms of weight of landings) that were not currently managed.
- Management tools and measures were applied more frequently to the commercial-scale fisheries. Application of spatial restrictions and gear restrictions were most common. Temporal, user restriction and catch limitation measures were less popular, and were probably related to the higher costs associated with monitoring, control and enforcement of such measures.
- Fisheries management costs were largely supported by governments. Such costs had increased over the past 10 years, primarily due to increasing demands for monitoring and

enforcement activities. Despite this, and the fact that an increasing number of fisheries were requiring management attention, the available national budgets had not increased correspondingly. This suggested that the actual quantity and/or quality of monitoring and enforcement would have declined in the face of increasing costs that were not being met.

The following actions could assist countries to address these challenges.

- Legislation - Strengthening of legislation that specifies a formal management process, with identified roles and responsibilities for all components of the process, and fixed timeframes for activity completion and evaluation. The legislation should identify stakeholders and make provisions for good governance arrangements. The legislation should make provisions for the adoption and implementation of sustainable management practices, consistent with international instruments to which the country is a signatory. The legislation would therefore have to include also provisions on the information requirements to meet these needs: such information requirements would be expected to take into account internationally agreed paradigms for application of the precautionary and ecosystem-based approaches, with the latter outlining a process for addressing multiple user needs and conflict resolution.
- Management process and plans – It is important to not only establish but to adhere to a formal management process, which should involve establishment and implementation of management plans that identify prioritized objectives, activity steps and timeframes for completion and evaluation. This process should be carried out in partnership with all the relevant stakeholders, and the roles and responsibilities of all stakeholders should be identified in the management plans. If not legislated or enforced, the management agency should consider establishing subsidiary bodies to represent stakeholder inputs formally in the decision-making process, and also to manage multiple user concerns and conflicts. Clearly, the management process would need to be supported by an effective communication and reporting strategy. Special attention should be given to the overall process of collection, analysis and dissemination of data and information, especially to guarantee transparency in management and to nurture stakeholder trust and support.
- Monitoring and enforcement – The legislation and management process should identify and specify separate agencies for monitoring and enforcement. This may already be noted in the legislation, but in practice the enforcement responsibility is shared. As such, fisheries budgets need to be expanded to give formal, regular support to the different partner agencies involved. Most countries indicated that monitoring and enforcement activities had increased and were the primary reasons for increased management costs. Hence, without additional investment by government and stakeholders alike, both monitoring and enforcement would remain limited and render all other fisheries management efforts ineffective. Establishment of limited entry fisheries would help to minimize monitoring and enforcement costs.

- Scientific information and support – the review of the stock status information showed clearly that only very few countries were able to report the actual status of major fish stocks that were being managed by them. To rectify the situation, there is a need to strengthen and maintain a quality statistical monitoring system, which is also relevant to immediate fisheries management needs. This requires constant investment, for which continued support will only be sustained if it is clearly linked to tangible benefits, i.e. generation of applicable and regular management advice. Likewise, additional and more specialized scientific research support in various disciplines is required, such as that obtainable from professional researchers. The requirements for both sources of information need to be given formal recognition in the legislation and management process, if this is not yet so. Furthermore, the scientific groups concerned should also be recognized formally as stakeholders, and be nurtured as permanent partners in the management process.
- Stakeholder participation – Assistance to some stakeholder groups is required, especially within the small-scale fisheries sub-sector, to build their capacity to contribute effectively to the management process, with the ultimate aim of attaining shared investment and responsibility for fisheries management. The need to improve and expand methods of communication and consultation with stakeholders also warrant additional attention by countries, and consideration should be given to developing a formal strategy to achieve this. More modern communication and consultation tools should also be introduced, as soon as possible, and especially if these are being adopted and used readily by stakeholders.
- Fisheries management costs – Cost-effective monitoring, inspection and enforcement strategies are crucial, and stakeholder cooperation should inform and support this process. In fact, an assessment of overall management costs and benefits would help to inform cost-recovery efforts and in so doing, contribute to meeting the increasing costs of monitoring and enforcement. Licence fees and penalty fines may need to be reviewed to determine whether they satisfy their aims.
- Public education and awareness – The work of the fishing industry should be promoted to improve understanding of the industry’s contributions to overall national social and economic development objectives. Hence, formal advocacy and communication strategies are essential investments to ensure effective delivery and uptake of the information, and promotion of the industry’s needs and interests. This action is crucial for changing public opinion, government policy, and all that follows from this.

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APPENDIX 1

The top three fisheries, where these exist and have been identified, for each of commercial, small-scale, and recreational sub-sectors within the WECAFC countries. In some instances, the top fisheries were multi-species in nature. In the case of Caribbean Netherlands, no information was provided for specific types of fisheries.

Commercial / industrial			
Anguilla	n/a	n/a	n/a
Antigua and Barbuda	n/a	n/a	n/a
Aruba	n/a	n/a	n/a
Brazil	Stripped weakfish (<i>Cynoscion</i> spp.)	Croaker (<i>Micropogonias furnieri</i> & <i>Micropogonias undulatus</i>)	Skipjack (<i>Katsuwonus pelamis</i> , <i>Auxis thazard</i> , and <i>Euthynnus alletteratis</i>)
Caribbean Netherlands	n.a.	n.a.	n.a.
Colombia	Tuna (<i>Thunnus albacares</i> , <i>Thunnus obesus</i> , <i>Katsuwonus pelamis</i>)	Shallow water shrimp (<i>Litopenaeus</i> , <i>Farfantepenaeus</i> , <i>Xiphopenaeus</i> , <i>Trachypenaeus</i> , <i>Protrachypene</i> , <i>Solenocera</i> , <i>Heterocarpus</i> spp.)	Deep water shrimp (<i>Solenocera</i> spp., <i>Heterocarpus</i> spp.)
Dominica	n/a	n/a	n/a
Dominican Republic	Snapper	Grouper	Lobster
Mexico	Sardine	Shrimp	Tuna
Nicaragua	Caribbean spiny lobster (<i>Panulirus argus</i>)	Shrimp – Noted for Pacific & Caribbean coasts (<i>Farfantepenaeus</i> , <i>Litopenaeus</i> spp.)	Caribbean queen conch
Panama	Small pelagic	Tuna	Large pelagic species
St. Kitts and Nevis	n/a	n/a	n/a
St. Lucia	n/a	n/a	n/a
Suriname	Finfish	Seabob	Shrimp
Trinidad and Tobago	Trawl	Fishpot & line	Longline
Venezuela	Tuna	n.a.	n.a.

Note: n/a = not applicable; n.a. = not available

Small-scale, artisanal, lifestyle, subsistence, indigenous, customary			
Anguilla	Reef fish	Lobster	Conch
Antigua and Barbuda	Shallow shelf & reef fish	Queen conch	Caribbean spiny lobster
Aruba	Wahoo	Grouper	Snapper
Brazil	Stripped weakfish (<i>Cynoscion</i> spp.)	Seabob shrimp (<i>Xiphopenaeus kroieri</i>)	Spiny lobsters (<i>Panulirus argus</i> , <i>P. Laevicauda</i>)
Caribbean Netherlands	n.a.	n.a.	n.a.
Colombia	Shallow water shrimp	Marine Finfish	Continental finfish
Dominica	Migratory pelagic	Coastal pelagic	Demersal reef
Dominican Republic	Grouper	Lobster	n.a.
Mexico	Shrimp	Shark	Octopus

Nicaragua	Coastal artisanal fisheries – Pacific & Caribbean coasts	Lobster	
Panama	Multi-species		
St. Kitts and Nevis	Coastal pelagic	Reef & bank	Conch
St. Lucia	Tuna	Dolphinfish	Wahoo
Suriname	Mixed species		
Trinidad and Tobago	Monofilament (transparent) gillnet	Fillet (green twine) gillnet	Live bait line fishing
Venezuela	turkey wing ark clam (<i>Arca zebra</i>)	Sardines (<i>Sardinella aurita</i>)	Blue crab (<i>Callinectes</i> sp.)

Note: n/a = not applicable; n.a. = not available

Recreational fisheries (including non-consumptive use)			
Anguilla	n.a.	n.a.	n.a.
Antigua and Barbuda	n.a.	n.a.	n.a.
Aruba	Wahoo	Dolphinfish	Barracuda
Brazil	n.a.	n.a.	n.a.
Caribbean Netherlands	n.a.	n.a.	n.a.
Colombia	Billfish, dolphinfish, tuna	n/a	n/a
Dominica	n.a.	n.a.	n.a.
Dominican Republic	Marlin, Wahoo, Needlefish	Tuna	Dolphinfish
Mexico	Marlin, Sailfish	Shad	n/a
Nicaragua	Billfishes, dolphinfish	n.a.	n.a.
Panama	Billfish	pelagic	bottomfish
St. Kitts and Nevis	Large pelagic	Reef	
St. Lucia	Offshore pelagic (rod and reel from power boat)	n.a.	n.a.
Suriname	n.a.	n.a.	n.a.
Trinidad and Tobago	Multispecies		
Venezuela	Large pelagics - Billfish	Large Pelagics - Dolphinfish, Wahoo, Serra Spanish mackerel, Tuna	n/a

Note: n/a = not applicable; n.a. = not available