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## Enhancing Ecosystem Stewardship in Small-Scale Fisheries: Prospects for Latin America and the Caribbean

### *Fortalecendo o ecosystem stewardship na pesca artesanal: perspectivas para a América Latina e Caribe*

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**ABSTRACT** Despite recognition of small-scale fisheries (SSF) contribution to livelihood diversity and food security worldwide, a better understanding of their social and ecological dynamics is required. This paper is a synthesis of the main findings from the special issue “*Enhancing ecosystem stewardship in small-scale fisheries*” published in this journal. Contributors explored ecosystem stewardship in three dimensions: impacts, monitoring and stewardship. Results suggested that ecosystem stewardship encompasses collaborative action to foster: i) new perspectives on SSF management; ii) a broader perspective on managers and stakeholders – as stewards for implementing these new perspectives; and iii) enabling environments through partnership, networking, communication and collective action. This special issue is an output from the Too Big to Ignore (TBTI) Working Group 4 - “Enhancing the Stewardship”. TBTI is a global research network and knowledge mobilization partnership intended to better comprehend SSF contributions on issues such as food security and poverty alleviation, as well as the associated impacts of global changes, through the efforts of diverse partners around the world.

*Keywords:* co-management; collaborative management; ecosystem approach; small-scale fishery; Latin America; Caribbean.

**RESUMO** Apesar da reconhecida importância da pesca artesanal ou de pequena escala para a diversidade de modos de vida e segurança alimentar, ainda há a necessidade de melhor compreensão da sua dinâmica social e ecológica. Este artigo compreende uma síntese dos principais resultados da edição “*Fortalecendo o ecosystem stewardship na pesca artesanal*”, publicada nesta revista. As contribuições abordaram o conceito de *ecosystem stewardship* em três dimensões: impactos, monitoramento e *stewardship*. Os resultados indicam que *ecosystem stewardship* compreende ações colaborativas para promover: i) novas perspectivas de gestão da pesca artesanal; ii) uma perspectiva mais abrangente sobre gestores e atores da gestão – como responsáveis na implementação destas

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novas abordagens; e iii) um ambiente institucional apropriado a partir de parcerias, formação de redes, comunicação e ação coletiva. Esta edição é um dos produtos do Grupo de Trabalho 4 - “*Enhancing Stewardship*” - do projeto *Too Big to Ignore (TBTI)*. TBTI é uma rede internacional de pesquisa e mobilização de conhecimento formada para melhor compreender a contribuição da pesca artesanal para a segurança alimentar e a redução da pobreza, bem como os impactos associados com mudanças globais, a partir do esforço de trabalho colaborativo em diferentes regiões.

*Palavras-chave:* cogestão; gestão colaborativa; enfoque ecossistêmico; pesca de pequena escala; América Latina; Caribe.

## 1. Introduction

Latin America and the Caribbean (LAC) small-scale fisheries (SSF) share common features and challenges, according to researchers, managers and fishers. These include overexploitation, and dynamic and complex interaction among different fisheries that often lead to competition and conflicts. Another aspect concerns infrastructure issues related to landing, processing and marketing seafood (Salas *et al.*, 2007). Similarly, research and management strategies are limited mainly to ecological outcomes, ignoring human dimensions of fishing, such as food security and livelihoods. Landing information, if any, is of low reliability, especially for multi-species fisheries and in contexts of command-and-control mechanisms (e.g. formally regulated minimum sizes, catch limits, fishing gear restrictions, seasonal and spatial closures, vessel licensing). In addition, institutional failures occur due to the lack of supervision, low legitimacy of institutions, limited comprehension of management tools, and low compliance or fishers engagement (Salas *et al.*, 2007).

In order to acknowledge and encompass this complexity, SSF are interpreted as socio-ecological systems (Berkes *et al.*, 2001; Armitage *et al.*, 2009). Fisheries management should also incorporate the perspective of complex adaptive systems (Mahon *et al.*, 2008). It requires a shift in fisheries management rationale, by acknowledging the differences between large-scale fishing and small-scale fishing and rejecting the perspective that “one size fits all” (Degnbol *et al.*, 2006) for management, as there is no single measure for different contexts. There are, in turn, social and environmental contexts and different management objectives. Moreover, appropriate objectives transcend those limited to maintaining sustain-

able fishing stocks, and should be multiple biological, economic, social and cultural goals (Berkes *et al.*, 2001).

Rapid changes in social and ecological systems can negatively affect their resilience, create social inequalities, food insecurity and increased socio-ecological vulnerability (Chapin III *et al.*, 2010; McConney *et al.*, 2014). Yet, new arrangements for managing small-scale fishing are urgently needed. Well-managed and timed changes can create windows of opportunity that could allow for broadening the scope in fisheries management, achieving increased institutional flexibility, cooperation, learning, and bridging knowledge among other improvements (Gallopín, 2002; 2006; Olsson *et al.*, 2006; Folke *et al.*, 2007; Young *et al.*, 2008; Cinner *et al.*, 2011). Increased adaptive capacity and social-ecological resilience, maintenance of ecosystem services and human well-being through ecosystem stewardship are expected outcomes from these new approaches (Chapin III *et al.*, 2010).

Ecosystem stewardship in small-scale fisheries has been recently addressed by scholars (McConney *et al.*, 2014). Too Big to Ignore is a global research network with an agenda to elevate the profile of small-scale fisheries worldwide (<http://toobigtoignore.net/>). Research and other activities are conducted in workgroups, such as “Working Group 4 - Enhancing the Stewardship” (WG4). The preferred approach to stewardship relies on our ability to develop strategies for understanding and adapting to the complex, unpredictable and emergent properties of fishery systems (Mahon *et al.*, 2008). WG4 explores three dimensions: the first deals with the need to understand social-ecological impacts and changes in SSF; second, to be able to monitor the positive and negative consequences of those changes; and third, to institutionalise stewardship to add resilience to governance (McConney *et al.*, 2014).

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The first major TBTI-WG4 meeting was held in Curitiba in 2013 (TBTI, 2013). As a result of this meeting, a call for papers on “Ecosystem stewardship in Small-Scale Fisheries” for a Special Issue in *Desenvolvimento e Meio Ambiente* Journal was opened. The special issue addressed WG4 research themes (impacts, monitoring, stewardship) for Latin American and the Caribbean. Additionally, although papers written in English were accepted, the special issue aimed mainly to provide information in Portuguese and Spanish so as to target a broader audience and receive LAC scholars contributions.

This paper, as part of the special issue, comprises a synthesis of the main findings from individual papers, adding further interpretative value to their contributions in order to better comprehend ecosystem stewardship in LAC small-scale fisheries.

## **2. The concept of ecosystem stewardship in SSF**

The terminology stewardship has been used in different contexts of ethics and politics related to rights and responsibilities in governance processes (Saner & Wilson, 2003). By the end of the last century, the term began to be owned by the environmental discourse, emphasizing interdependent man-in-nature relationships and expressing environmental concern and accountability (Wunderlich, 2004). The concept was incorporated into natural resource management, often replacing the idea of management to highlight different forms of management responsibility (Worrell & Appleby, 2000).

Historically, the concept defines the notion of someone’s responsibility (the steward) over another’s property (things), in the sense that the former is not the owner, but a custodian who takes care of something (Wunderlich, 2004). Application in natural resource management has expanded the understanding of the “steward” to stakeholders with responsibility for proper resource use, who will “take care” of something under communal or public property rights. It also embodies ethical issues about life on the planet, assigning responsibility not only for the proper use of resources, but also the right to life of other species, and also for future generations. The concept was first applied in rural areas

(agriculture), which generated some controversy, since it would affect the presumption of free use by landowners. Usually, however, fisherfolk are not the owners of marine resources, and here the concept has better legal compliance (being the responsibility to take care of the property of another) (Soliman, 2014).

This expanded responsibility means that stewardship is more inclusive compared to conventional management, transcending the simplistic definition of the manager as the only one responsible for ensuring the sustainable use of resources. From a stewardship perspective, it is necessary to engage stakeholders and their ideology, both from the point of view of their responsibility for management as well in the sense that management should meet societal objectives, whether explicitly formulated by society or just from the inherent right to life of other species. This process certainly involves dealing with problems and conflicts (Worrell & Appleby, 2000). Thus, the concept also relates to prior definitions of self-reliance (Galtung *et al.*, 1980) combined with ecological prudence (Sachs, 2008) taken from ecodevelopment theory (Vieira *et al.*, 2005).

Worrell & Appleby (2000, p. 269) defined stewardship as “the responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as of private needs, and accepts significant answerability to society”. Authors also highlighted that motivations behind the concept will reflect if species or habitat conservation is beneficial primarily for biodiversity, or for human beings. From a man-in-nature perspective and social-ecological systems (Berkes & Folke, 1998), human beings are part of ecosystems and landscapes (Davidson-Hunt & Berkes, 2003; Vieira, 2009). This is in opposition to the idea that man is the external driver that makes ecosystems unstable (Gunderson & Allen, 2010). From the former perspective, ecosystem stewardship relies on ecosystem conservation that includes both human well-being and biodiversity conservation.

Ecosystem stewardship then can be understood as “a strategy to respond to and shape social-ecological systems under conditions of uncertainty and change to sustain the supply and opportunities for use of ecosystem services to support human well-being” (Chapin III *et al.*,

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2010, p. 241). This approach acknowledges the uncertain and unpredictable nature of social-ecological systems (Holling, 2001). It also seeks to understand changing drivers of social systems due to certain ecological conditions as well as changes in ecosystems due to certain dynamic social system conditions (Vieira, 2005). As opposed to conventional natural resource management, ecosystem stewardship enables flexible institutions, collaboration, learning and use of a plurality of knowledge forms, all of these being essential assets for resource management in a world undergoing rapid transformation (Armitage *et al.*, 2009).

Based on the above mentioned definitions, we choose for not translating ecosystem stewardship into Portuguese, taking into consideration the apparent absence of a proper term in Portuguese that encompassed the related principles. Overall, the broadened idea of taking care and responsibility over management and the inclusion of an ecosystem-related ethics belong with the notion of champions and ecosystem prudence. Champion is highlighted by the definition of a distinct role and of responsibility attributed to stakeholders in fisheries management. Ecosystem prudence stresses the need for strategies that are built upon a prudent manner and coherent with a broader approach to fisheries management, from a social-ecological systems perspective.

Small-scale fisheries are characterised as complex adaptive systems, including a variety of social-cultural elements, a high diversity of natural resources and fishing practices spread over many areas, and several other overlapping activities (Berkes *et al.*, 2001). Despite recognition of the complexity and unpredictability of small-scale fisheries, fishery management and science tend to rely on actions to control, instead of learning and adaptation. Ecosystem stewardship fosters self-organisation and adaptive capacity through empowerment, learning and responsible management to achieve equity and transparency in governance (Mahon *et al.*, 2008).

Ecosystem stewardship is a central element in a search for increasing responsibility in maintaining ecosystem services and human well-being, enabling flexibility and adaptive capacity. Implications for SSF include creating opportunities for collaboration among managers and resource users, as well as other stake-

holders, focusing on cooperation and on equity of fishery governance outcomes. Strategies include undertaking: (i) to reduce the magnitude of predicted stressors, exposure and sensitivity; (ii) to focus on fostering resilience policies; and (iii) to embrace opportunities to avoid unsustainable paths for social-ecological systems (Chapin III, *et al.*, 2010; McConney *et al.*, 2014). McConney *et al.* (2014) argue for three perspectives on ecosystem stewardship in SSF. The first addresses the notion of social-ecological impacts in SSF, such as ecosystem changes and fishing overexploitation. Loss of habitat and biodiversity increase vulnerability, exposure to risk and food insecurity. It also takes into consideration how economic development in the coastal zone changes ecosystems, often leading to undesirable or irreversible paths, while affecting coastal villages such as fishing communities. Additionally, cumulative failures in fisheries and coastal management highlight inconsistencies in decision-making. The second perspective, monitoring, acknowledges the need to develop new methodological and analytical approaches. Developing these methods and approaches would lead to more comprehensive evaluation and monitoring of social-ecological impacts. The third, stewardship, relies on designing and enabling proper institutions for ecosystem stewardship in fisheries governance.

From these perspectives, TBTI-WG4 posed a major guiding question as follows: What alternatives are available for minimizing environmental impacts and fostering stewardship within small-scale fisheries? To examine this broad issue, WG4 used three main components each associated with a guiding question: 1) **social-ecological impacts**: how, and to what extent, do or will small-scale fisheries and aquatic environments impact upon each other? 2) **monitoring**: what integrated practical systems for monitoring and evaluation exist, or need to be developed, to address the impacts of small-scale fisheries on aquatic environments and the reverse? 3) **stewardship**: what institutional arrangements for stewardship exist, or need to be developed, to allow small-scale fisheries to be responsible, adaptive and resilient social-ecological systems? (TBTI, 2013; McConney *et al.*, 2014).

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### 3. *Synthesis of the lessons learned*

Our synthesis of the main findings and lessons learned from individual papers in this special issue is based on these TBTI-WG4 three guiding questions. Unless indicated otherwise, all references in the following sections are to papers in this issue. Comments and reflections are offered by the special issue editors, at the end of each section, to guide readers to a final synthesis on ecosystem stewardship in SSF.

#### 3.1. *Social-ecological impacts*

Social-ecological impacts and fisherfolk responses are related to context-specific social and cultural aspects and fishing practices. Environmental and fisheries policies that neglect local fishery dynamics and the multiple scales of social-ecological systems (spatial, temporal, jurisdictional and institutional - Cash *et al.*, 2006), can reduce resilience and lead to loss of SSF livelihood diversity. Fisherfolk and their perceptions and practices should be mobilised in order to understand impacts and create collaborative strategies (McConney *et al.*, 2014).

On the regional (LAC) level, Defeo and colleagues (this issue) evaluated the impacts of climate change, and the joint effects of globalisation of markets and governance, using case studies of invertebrate SSF in Latin America. The condition of vulnerability forced by climate change could be aggravated in a context of weak governance, together with the erosion of traditional systems and poverty. The authors conclude that government institutions have not been able to adopt proactive and effective actions to deal with the combined effect of the fishery and climate change in pursuing SSF communities' well-being.

Such deficiency or challenges could also affect the ability to deal with socio-ecological changes in the local/regional context. Inappropriate institutional arrangements increase vulnerability of local SSF communities and impair their ability to respond to changes. Prudencio and colleagues (this issue) demonstrated that changes in a watershed landscape in southern Brazil triggered by many sources, including problems with a sector-based

governance and lack of co-management process, resulted in local/regional socio-ecological crisis.

That situation reinforces the need to strengthen institutional arrangements at different levels of management. Azevedo & Pierri (this issue) evaluated the current fisheries policy in Brazil at national level. They suggested that increasing government promotion of public policies focusing on poverty reduction is exacerbating SSF communities' vulnerability. Authors argue that, despite the presence of social policies and immediate alleviation of poverty, ecological dimensions and traditional territories of fishers – essential to ensure sustainability of livelihoods and traditional practices – have not been properly addressed, leading to increasing long-term vulnerability.

At the local level, the fragility of the government institutions handling social-ecological impacts in SSF communities was apparent in the study case of Spínola and colleagues (this issue). They evaluated a co-management process inside a Marine Extractive Reserve (RESEX in Portuguese) in southern Brazil. The RESEX's deliberative council was not able to guarantee local rights for the fishers to use the resources at the time of implementation of a government infrastructure project. Also, the lack of capacity of the RESEX's council to deal with local problems that involves social groups with high economic and political power.

We observed that the impacts affecting SSF come from various sources (biophysical, socioeconomic) and levels (global, regional, local). They create synergistic effects in local contexts of SSF, which challenges the institutions at different levels of management in dealing with its effects and changes sometimes uncertain and unpredictable. It is essential to strengthen the institutional arrangements, set the levels of the processes to be managed, as well as to promote cooperation between all actors, since it is impossible for a single actor hold the knowledge to deal with the complexity of the problems associated the socio-ecological changes.

#### 3.2. *Monitoring*

There is a lack of long-term programs for monitoring SSF in LAC that involve fishers in data collection



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(Salas *et al.*, 2007). Collaborative monitoring approaches have the potential to increase the quantity and quality of information on fishery systems by recognizing the importance of local ecological knowledge of fishers, as well as serving as a means to empower local communities (Medeiros *et al.*, 2007). Similarly, participatory monitoring can help fishers to become familiar with other knowledge systems and on impacts that may have not been perceived through their local experiences. Monitoring should not be seen only as a collection of data or generation of system information, but an opportunity to bridge knowledge, promote collective action and share learning. In this sense, any actor in management (a steward) may contribute to the generation of information and knowledge (McConney *et al.*, 2014).

Malafaia and colleagues (this issue) report on a participatory monitoring initiative developed in reef systems in northeastern Brazil. It was possible to obtain relevant data about spawning aggregations of reef fishes, which could support the SSF management. The fishers involved saw benefits from sharing their knowledge of the resource system. However, the success of this collaborative approach will depend on the continuity of the process for trust building among all the stakeholders.

The fishery monitoring concept must be expanded, both in the sense of the stakeholders involved in data collection and analysis, as the type of information and the origin of the mobilised knowledge. This would provide not only a better understanding of the fishing systems, but also a *rapport* between stakeholders in decision-making, strengthening the legitimacy, compliance and the effectiveness of management.

### 3.3. Stewardship

Salas *et al.* (2007) highlight the need to strengthen aspects of SSF including: building local capacity for self-regulation and self-organization for participation in fisheries management; the establishment of equitable access and rights to fisheries resources among stakeholders; and the explicit consideration of socio-economic issues, especially taking into account the processes of globalization affecting many fisheries. To achieve these, diverse groups must assist SFF communities through

partnerships to provide a range of services and support functions, seeking to reduce poverty and conserve biodiversity at the same time (Seixas & Berkes 2010).

As pointed out by McConney *et al.* (2014), the concept of ecosystem stewardship includes reducing vulnerability, promoting resilience and tapping into opportunities to transform undesirable trajectories. It should also include support for self-reliance and self-organization of fisherfolk. The authors add that, in some situations, to achieve these objectives, a complete renovation of the institutions may be required. Specific institutional arrangements in SSF for the promotion of stewardship can generate a greater sense of belonging to the process of decision-making. An example would be the passage from a conventional model of fisheries management to adaptive co-management (Armitage *et al.*, 2009), involving the stewardship over resources in search for maintenance of fishing livelihoods, which require productive and healthy ecosystems.

Hellebrandt and colleagues (this issue) evaluated initiatives to promote food security in SSF and aquaculture contexts in Latin America. These ranged from large projects executed by international organizations to small-scale projects conducted by civil society, local government, and the private sector. They demonstrated a striking divergence between project planning and implementation. Interventions that adopted food security in a simplistic manner, or purely as a concept, were predominant.

These findings align with research by Trimble and colleagues (this issue), and Carneiro and colleagues (this issue), on the importance of extension projects to support the stewardship of SSF. In the first case, the authors describe an experience of participatory research in a SSF community in Uruguay involving undergraduates and graduates. They found that participatory research can enhance students' transdisciplinary growth, with emphasis on knowledge sharing. However, it is important that academics recognize the relevance of other actors to comprehend the research problem, in a manner of "science with people" as opposed to "science for people". In the second case, the authors propose a methodological framework for SSF extension projects based on their experience in southeastern Brazil. Critiquing the conventional approach of the Brazilian extensionism that

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originated in the 60s and 70s, they encourage extension appropriate to the complexity of SSF. This demands a review of the reciprocal relationship between theory and practice of action research, of instruments of participatory methodologies, and a focus on community-based management of SSF.

In relation to proper institutional arrangements to foster ecosystem stewardship in SSF, Pomeroy and colleagues (this issue) discuss the implications and practical application of marine spatial planning (MSP) as an ocean and coastal resource management paradigm in Asia and the Caribbean. They evaluated where MSP fits in the range of management paradigms, and its impacts on SSF stewardship. Their main conclusion is that while MSP with zoning is increasingly recognized as an important management approach for ocean resources, countries in the two regions are still challenged by capacity, technical, legal, and institutional constraints in the implementation process.

Co-management processes in SSF can support ecosystem stewardship. Success depends on several factors (Pomeroy, 2007), such as the socioeconomic dynamics. Caldeira & Pierri (this issue) analyze the opportunities for co-management in the local context of southern Brazil. They note that incorporating the economic dimension into the co-management process is important in the search for a cost-effective activity, that is socially just and ecologically prudent, thus reducing the transaction costs of the process and providing an enabling environment for resource management.

The stewardship perspective extends the notion of shared responsibilities and inevitably assumes the need for institutional arrangements in the context of co-management. Co-management involves not only government and resource users (fishers), but other stakeholders involved in the process. The search for equity, which necessarily implies sharing power in decision-making, is one of the main challenges, and should be considered by all stakeholders.

#### **4. Final considerations**

The global fishery crisis increases SSF vulnerability, since fishery livelihoods are highly dependent

on external conditions that affect social-ecological systems. Increasing efforts to more comprehensively understand SSF (e.g., for Brazilian SSF, Haimovici *et al.*, 2014) have not yet overcome our limited knowledge about SSF. Consequently, the prevailing narrow views of conventional fisheries management fail to deal with the complex dynamics of SSF. Global collective efforts, such as Too Big to Ignore (TBTI), have been seeking to strengthen research partnerships and catalyze knowledge mobilization concerning the socio-economic importance of SSF and their relationship to conservation.

TBTI-WG4 focuses on improving the stewardship in SSF. After a brief introduction to ecosystem stewardship, we highlighted differences compared to conventional management. This included: widening shared responsibilities among stakeholders in SSF management (the stewards); searching for equity in management objectives and expected outcomes; and maintaining important ecosystem services for human well-being. Stewardship also recognizes the unpredictability and uncertainty of social-ecological systems, requiring institutional flexibility to cope with changes and transform situations into opportunities to create adaptive capacity and hence resilience. As pointed out by McConney *et al.* (2014), stewardship is a collective effort to enable sustainable futures in SSF, reducing the impacts of the global fisheries crisis.

In this special issue, based on contributions from SSF research in Latin American and the Caribbean, some of the challenges and opportunities of ecosystem stewardship were pointed out:

- Climate and socioeconomic impacts on SSF will increase fishers' vulnerability if there are no appropriate institutional arrangements to deal with them (Defeo *et al.*, this issue). Institutions must be effective at achieving the broad dimensions of SSF sustainability and not just short-time social welfare (Azevedo & Pierri, this issue). They must be robust enough to guarantee real decision-making rights for fisherfolk in co-management (Spínola *et al.*, this issue). The transition from conventional fishery management to adaptive co-management can be facilitated by considering the economics of SSF, and balancing transaction costs (Caldeira & Pierri, this issue).

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- Emerging management approaches, such as MSP, can contribute to the stewardship of SSF if appropriate institutional and technical conditions are strengthened (Pomeroy *et al.*, this issue). Otherwise, the socio-ecological changes from bio-physical and socio-economic sources could generate a socio-ecological crisis, trapping SSF communities in eroding traditional practices (Prudencio *et al.*, this issue).
  - Partnerships from local or external institutions to support SSF stewardship must achieve real measurable results, and not remain purely at a conceptual level (Hellebrandt *et al.*, this issue). This demands, for example, reframing the role of extension by external agents (universities, government, etc.), considering the complexity of SSF (Carneiro *et al.*, this issue) and using the opportunities for knowledge sharing (Trimble *et al.*, this issue). Developing collaborative processes for resource system data generation may enhance stewardship, but its effectiveness will depend on continuous trust building among stakeholders (Malafaia *et al.*, this issue).

Contributions highlight three important aspects of the concept of ecosystem stewardship: a) it comprises a set of collaborative actions to promote a management perspective – ecosystem-based, participatory, adaptive, recognising the need to address the environmental crisis in a coordinated, collaborative manner leading to building sustainable futures; b) it reframes the role of the manager - that goes beyond the government agent, but to stakeholders directly and indirectly dependent on the sustainability of resources; c) it requires institutional strengthening through partnerships, multi-level cross-

-scale connections and communication strategies for effective collective action.

This special issue does not encompass all experiences of ecosystem stewardship in small-scale fisheries in Latin America and the Caribbean. It describes first attempts, available mainly in Portuguese and Spanish, to gather information on the topic. The authors acknowledge that the English language is a barrier for many researchers and managers in LAC. In this sense, the collection is a basic reference starting point for new experiences to be shared.

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## References

- Armitage, D. R.; Plummer, R.; Berkes, F.; Arthur, R. I.; Charles, A. T.; Davidson-Hunt, I. J.; Diduck, A. P.; Doubleday, N. C.; Johnson, D. S.; Marschke, M.; McConney, P.; Pinkerton, E. W.; Wollenberg, E. K. Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment*, 7(2), 95-102, 2009. doi: 10.1890/070089.
- Azevedo, N. T. de; Pierri, N. A política pesqueira no Brasil (2003-2011): a escolha pelo crescimento produtivo e o lugar da pesca artesanal. *Desenvolvimento e Meio Ambiente*, 32, 61-80, 2014. doi: 10.5380/dma.v32i0.35547
- Berkes, F. Alternatives to conventional management: lessons from small-scale fisheries. *Environment*, 31(1), 5-19, 2003.
- Berkes, F.; Folke, C. *Linking social and ecological systems*. Cambridge: Cambridge University Press, 1998.
- Berkes, F.; Mahon, R.; McConney, P.; Pollnac, R.; Pomeroy, R. *Managing small-scale fisheries: alternative directions and methods*. Ottawa, Canada: International Development Research Centre, 2001.
- Caldeira, G. A.; Pierri, N. As relações econômicas e a gestão compartilhada de recursos comuns: o caso da pesca marinha em Pontal do Paraná, Sul do Brasil. *Desenvolvimento e Meio Ambiente*, 32, 119-138, 2014. doi: 10.5380/dma.v32i0.35927.
- Carneiro, A. M. M.; Diegues, A. C. S.; Vieira, L. F. S. Extensão participativa para a sustentabilidade da pesca artesanal. *Desenvolvimento e Meio Ambiente*, 32, 81-99, 2014. doi: 10.5380/dma.v32i0.35949.
- Cash, D. W.; Adger, W. N.; Berkes, F.; Garden, P.; Lebel, L.; Olson, P.; Pritchard, L.; Young, O. Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and Society*, 11(2), 8, 2006.
- Chapin III, F. S.; Carpenter, S. R.; Kofinas, G. P.; Folke, C.; Abel, N.; Clark, W. C.; Olsson, P.; Smith, D. M. S.; Walker, B.; Young, O. R.; Berkes, F.; Biggs, R.; Grove, J. M.; Naylor, R. L.; Pinkerton, E.; Steffen, W.; Swanson, F. J. Ecosystem stewardship: sustainability strategies for a rapidly changing planet. *Trends in Ecology & Evolution*, 25(4), 241-249, 2010. doi:10.1016/j.tree.2009.10.008.
- Cinner, J. E.; Folke, C.; Hicks, C. C. Responding to change: using scenarios to understand how socioeconomic factors may influence amplifying or dampening exploitation feedbacks among Tanzanian fishers. *Global Environmental Change*, 21, 7-12, 2011. doi:10.1016/j.gloenvcha.2010.09.001.
- Davidson-Hunt, I. L.; Berkes, F. Nature and society through the lens of resilience: toward a human-in-ecosystem perspective. In: Berkes, F.; Colding, J.; Folke, C. *Navigating social-ecological systems: building resilience for complexity and change*. Cambridge University Press, 2003. p. 53-82.
- Defeo, O.; Castrejón, M.; Ortega, L.; Kuhn, A. M.; Álava, A. de. Variabilidad climática y su impacto en pesquerías de pequeña escala de invertebrados en América Latina. *Desenvolvimento e Meio Ambiente*, 32, 29-39, 2014. Doi: 10.5380/dma.v32i0.36217.
- Degnol, P.; Gislason, H.; Hanna, S.; Jentoft, S.; Nielsen, J. R.; Sverdrup-Jensen, S.; Wilson, D. C. Painting the floor with a hammer: technical fixes in fisheries management. *Marine Policy*, 30, 534-543, 2006. doi:10.1016/j.marpol.2005.07.002.
- Folke, C.; Pritchard, L.; Berkes, F.; Colding, J.; Svedin, U. The problem of fit between ecosystems and institutions: ten years later. *Ecology and Society*, 12, 38, 2007.
- Gallopín, G. C. Planning for resilience: scenarios, surprises and branch points. In: Gunderson, L. H.; Holling, C. S. (Eds.). *Panarchy: understanding transformations in systems of humans and nature*. Island Press, Washington, 2002, p. 361-393.
- Gallopín, G. C. Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16, 293-303, 2006. doi: 10.1016/j.gloenvcha.2006.02.004.
- Galtung, J.; O'Brien, P.; Preiswerk, R. *Self-Reliance: a strategy for development*. London: Bogle-L'Ouverture Publications, 1980. 422 p.
- Gunderson, L. H.; Allen, C. R. Introduction: Why resilience? Why now? In: Gunderson, L. H.; Allen, C. R.; Holling, C. S. (Eds.) *Foundations of ecological resilience*. Island Press, 2010. p. xiii-xxv.
- Haimovici, M.; Andriquetto Filho, J. M.; Sunye, P. S. (Orgs.). *A pesca marinha e estuarina no Brasil: estudos de caso multidisciplinares*. Rio Grande: Editora da FURG, 2014. 191p.
- Hellebrandt, D.; Allison, E. H.; Delaporte, A. Segurança alimentar e pesca artesanal: análise crítica de iniciativas na América Latina. *Desenvolvimento e Meio Ambiente*, 32, 7-27, 2014. doi: 10.5380/dma.v32i0.35548.
- Holling, C. S. Understanding the complexity of economic, ecological, and social systems. *Ecosystems*, 4, 390-405, 2001. doi: 10.1007/s10021-001-0101-5.

- Mahon, R.; McConney, P.; Roy, R. N. Governing fisheries as complex adaptive systems. *Marine Policy*, 32, 104-112, 2008. doi:10.1016/j.marpol.2007.04.011.
- Malafaia, P. N.; Olavo, G.; França, A. R.; Seara, F. S.; Freitas, M. B. O.; Almeida, J. C. de; Alencar, S. M. de; Rêgo, L. S.; Castro, M. S. de. Experiência de monitoramento participativo a bordo de embarcações da pesca artesanal no Território da Cidadania do Baixo Sul da Bahia, Brasil. *Desenvolvimento e Meio Ambiente*, 32, 165-180, 2014. doi: 10.5380/dma.v32i0.35742
- McConney, P.; Medeiros, R.; Pena, M. (Eds.) *Enhancing Stewardship in Small-Scale Fisheries: Practices and Perspectives. Too Big To Ignore (TBTI) and Centre for Resource Management and Environmental Studies, The University of the West Indies, Cave Hill Campus, Barbados. CERMES Technical Report No. 73. 2014. 162p.*
- Medeiros, R. P.; Matarezi, J.; Bonilha, L. E. C.; Wahrlich, R. “Se der rebojo de vento sul vai dar tainha” – elementos para o monitoramento participativo da pesca artesanal – lições do litoral sul do Brasil. In: Costa, A. L. (Org.). *Nas redes da pesca artesanal*. IBAMA, Brasília, 2007. p. 203-224.
- Olsson, P.; Gunderson, L. H.; Carpenter, S. R.; Ryan, P.; Lebel, L.; Folke, C.; Holling, C. S. Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society*, 11, 21, 2006.
- Pomeroy, R. Conditions for successful fisheries and coastal resources co-management: lessons learned in Asia, Africa, and the Wider Caribbean. In: Armitage, D.; Berkes, F.; Doubleday, N. (Eds.) *Adaptive co-management: collaboration, learning, and multi-level governance*. UBC Press: Canada, 2007. p. 172-187.
- Pomeroy, R. S.; Baldwin, K.; McConney, P. Marine Spatial Planning in Asia and the Caribbean: application and implications for fisheries and marine resource management. *Desenvolvimento e Meio Ambiente*, 32, 151-164, 2014. doi: 10.5380/dma.v32i0.35627.
- Prudencio, J. M.; Vieira, P. F.; Fonseca, A. L. de O. Etnoconservação de recursos naturais na zona costeira catarinense: uma análise das transformações da paisagem na bacia do Rio da Madre, à luz do enfoque de ecodesenvolvimento. *Desenvolvimento e Meio Ambiente*, 32, 41-60, 2014. doi: 10.5380/dma.v32i0.35553.
- Sachs, I. *Caminhos para o Desenvolvimento Sustentável*. 3. ed. Rio de Janeiro: Garamond, 2008.
- Salas, S.; Chuenpagdee, R.; Seijo, J. C.; Charles, A. Challenges in the assessment and management of small-scale fisheries in Latin America and the Caribbean. *Fisheries Research*, 87, 5-16, 2007. doi:10.1016/j.fishres.2007.06.01,
- Saner, M.; Wilson, J. *Stewardship, good governance and ethics*. Policy Brief No. 19: Institute on Governance, Ottawa, Canada, 2003. 19 p.
- Seixas, C. S.; Berkes, F. Community-based enterprises: the significance of partnerships and institutional linkages. *International Journal of the Commons*, 4(1), 183-121, 2010.
- Soliman, A. Duty of stewardship and fisheries governance: a proposed framework. *Maritime Studies*, 13, 11, 2014. doi: 10.1186/s40152-014-0011-8.
- Spínola, J. L.; Teixeira, C. F.; Andriquetto Filho, J. M. Desafios à cogestão: os impactos da Via Expressa Sul sobre o extrativismo na RESEX Marinha do Pirajubaé. *Desenvolvimento e Meio Ambiente*, 32, 139-150, 2014. doi: 10.5380/dma.v32i0.35694.
- TBTI – Too Big To Ignore. *Report on Enhancing Stewardship in Small-Scale Fisheries through Ecosystem Approaches and Other Means*. Too Big to Ignore Latin America and the Caribbean joint workshop with Working Group 4, 6-9 August 2013, Curitiba, Paraná, Brazil. TBTI, Canada. 2013. 38p. Disponível em: <<http://toobigtoignore.net/wp-content/uploads/2013/10/TBTI-LAC-WG4-Curitiba-workshop-report2.pdf>>.
- Trimble, M.; Iribarne, P.; Lázaro, M. Una investigación participativa en la costa uruguaya: características, desafíos y oportunidades para la enseñanza universitaria. *Desenvolvimento e Meio Ambiente*, 32, 101-117, 2014. doi: 10.5380/dma.v32i0.35603.
- Vieira, P. F. Gestão de recursos comuns para o ecodesenvolvimento. In: Vieira, P. F.; Berkes, F.; Seixas, C. S. (Orgs.). *Gestão integrada e participativa de recursos naturais: conceitos, métodos e experiências*. Secco/APED: Florianópolis, 2005. p. 333-377.
- Vieira, P. F. Políticas ambientais no Brasil: do preservacionismo ao desenvolvimento sustentável. *Política & Sociedade*, 14, 27-75, 2009.
- Vieira, P. F.; Berkes, F.; Seixas, C. S. *Gestão integrada e participativa de recursos naturais: conceitos, métodos e experiências*. Florianópolis: Secco/APED. 2005.
- Worrell, R.; Appleby, M. C. Stewardship of natural resources: definition, ethical and practical aspects. *Journal of Agricultural and Environmental Ethics*, 12, 263-277, 2000.
- Wunderlich, G. Evolution of the stewardship idea in American Country Life. *Journal of Agricultural and Environmental Ethics*, 17, 77-93, 2004.
- Young, C.; Charles, A. T.; Hjort, A. *Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods*. FAO Fisheries Technical Paper 1-165, 2008.