

Editorial

Towards polycentric governance of small-scale fisheries: insights from the new ‘Management Plans’ policy in Chile

STEFAN GELCICH*

Center of Applied Ecology and Sustainability (CAPES) & Centro de Conservación Marina, Departamento de Ecología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Chile

Received 7 July 2014; Revised 20 July 2014; Accepted 21 July 2014

INTRODUCTION

Small-scale fisheries are increasingly conceptualized as complex social–ecological systems (Folke *et al.*, 2005; Basurto *et al.*, 2013). Management of complex social–ecological systems requires knowledge to monitor resource availability, make decisions about their allocation, and respond to feedbacks from the system at multiple social and ecological scales (Berkes *et al.*, 2003; Robinson and Berkes, 2011). Typically, no one agency, organization or group is likely to have the full range of knowledge needed for effective management of complex social–ecological systems (Berkes *et al.*, 2003; Gelcich *et al.*, 2006). Thus, there is a pressing need to develop environmental governance models, the structures and processes by which people in societies make decisions and share power with respect to the environment (Folke *et al.*, 2005), which can allow partnerships and cooperation among agencies and stakeholders to confront the management of such complex systems (Berkes, 2009; Gelcich *et al.*, 2010; Robinson and Berkes, 2011).

A possible way to deal with environmental governance of complex marine social–ecological

systems is to incentivize shifts towards the development of new multi-level, polycentric forms of governance, partly through government-designed decentralization (Ostrom, 2010). ‘Polycentric’ connotes many centres of decision making, that are independent of each other (Ostrom *et al.*, 1961). Polycentric systems are thus characterized by multiple governing authorities at differing levels rather than a monocentric unit (Ostrom, 1999). Each unit within a polycentric system exercises considerable independence to make norms and rules within a specific domain (such as in a family, a firm, a local government, a state or province, or a region; Ostrom *et al.*, 1961). In theory, with such approaches, problems associated with non-compliance, power inequalities and inappropriate discrimination can be better addressed, and major investments made towards information and innovations (Ostrom, 2010). Although no governance system is perfect, research has shown how polycentric systems can have considerable advantages given their mechanisms for mutual monitoring, learning and adaptation over time (Ostrom *et al.*, 1961; Galaz *et al.*, 2012).

Rather than relying on a single type or level of governance, a shift towards polycentrism would be

*Correspondence to: Stefan Gelcich, Center of Applied Ecology and Sustainability (CAPES) & Centro de Conservación Marina, Departamento de Ecología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Chile. E-mail: sgelcich@bio.puc.cl

advantageous in small-scale fisheries management because it can incentivize the involvement of resource users and managers at different scales. For example, local knowledge can inform the design of diverse, context-specific rules, while larger organizations and the government can enhance the capacity to deal with regional problems and support the necessary conditions to prevent and sanction non-compliance with rules (Gruby and Basurto, 2013). By increasing polycentrism in small-scale fisheries management, the probability of failure throughout a whole region or country could be reduced (Ostrom, 2010). While some management units might fail others could become successful and innovative. This redundancy of local management units means that the costs of failure associated with a centralized governance system are compensated by successes at smaller scales (Ostrom, 1999, 2010).

In Chile, a trend towards polycentric governance has begun to be manifest in a rescaling of small-scale fisheries governance, mixing 'top-down' directives from government with 'bottom-up' approaches in which fishers participate directly in policy implementation (Gelcich *et al.*, 2010). Initially this trend took the form of a co-management approach, which granted exclusive territorial user rights (TURFs) to artisanal fishers for the management of benthic resources (Castilla, 1994; San Martin *et al.*, 2010). More recently, in 2012, Chile acknowledged that the co-managed TURF system was not enough to achieve coastal sustainability and that new complementary overlapping governance approaches were necessary to include the management of multiple species in areas which are not TURF areas (Gelcich *et al.*, in press). Consequently, Chile recently passed legislation to create what have been termed Management Plans (*Planes de Manejo*; Fisheries and Aquaculture Law 20657, 2013). The Management Plan legal framework allows national and local fisheries agencies, in a joint process with artisanal fishers and the fishing industry, to create locally agreed-upon fishery management plans, that can operate at different geographical scales (cove, bay, administrative region, set of regions), for different species or multiple species (Subpesca, 2014). The new policy operates on top of and overlaps other existing coastal management and

zoning practices. Central to the policy is the expressed government commitment to engage key stakeholders in an integrated and collaborative process.

This paper explores the potential of the Chilean legislative initiative as an enabling condition to shift towards polycentrism in small-scale benthic fisheries management. Key opportunities and challenges associated with the integration of multiple knowledge systems and the interaction of actors across different levels of governance are identified. While Chile is used as working example, the analysis can inform other countries/regions wishing to engage in polycentric governance approaches with small-scale fisheries.

THE CHILEAN MANAGEMENT PLAN POLICY

In February 2013 Chile approved the legal framework that allows for the possibility to implement Management Plans '*planes de manejo*' (see Gelcich *et al.*, in press, for a historical perspective). These Management Plans can be established for all fisheries, including benthic and pelagic fisheries, as well as those with shared stocks between industrial and small-scale fleets (article 8 Law No. 20.657). The Management Plan Policy essentially allows the management of a species or group of species within a bay, an administrative region, part of a region, or a set of regions through the establishment of management committees, which can include both artisanal and industrial fishers as well as government and private company representatives. The management committee is in charge of developing, implementing, monitoring and adapting a specific management plan.

Within the Management Plan legal structure, the creation of Management Plans for small-scale benthic fisheries (articles 8 and 9) can be targeted at different geographical scales and typically follow a set process. In the first stage, an interest group must contact the Undersecretary of Fisheries. The Undersecretary must convene all registered artisanal fishers and ensure that no stakeholders are excluded. Then participation criteria are established. Participation criteria are defined based on target species, fisher categories,

fishing gear used, and the available history of landings in that geographical area. Once the participation criteria are agreed, the Undersecretary facilitates the establishment of a management committee. This committee comprises between two and seven representatives of the artisanal fishers' community, one representative of processing plants, a representative of the national directorate of the maritime territories, and a representative of the national fisheries service. The main responsibility of the management committee is to advise and provide input to the design of a management plan proposal with the help of technicians/consultants (Figure 1 (A); Gelcich *et al.*, in press).

Once the management plan proposal is established it is open for comments from third parties that include the Undersecretary of Fisheries Science Committee, NGOs and the general public. Comments are considered by the management committee and the plan is finalized. When the management plan is officially decreed, it becomes compulsory for fishers to comply with all measures contained therein. The management committee is responsible for implementing, assessing and modifying the plan. Also, this committee plays an advisory role, and every three years the number of

participating fishers must be reviewed. Every five years the whole management plan must be assessed (Figure 1(A)). Currently, artisanal benthic management committees are in the process of being established in Chile and management plan proposals are under consultation (Subpesca, 2014).

OPPORTUNITIES FOR POLYCENTRISM

The legal structure associated with the Management Plan policy provides a set of opportunities to embrace a shift towards polycentric governance. In particular, the establishment of arenas such as the management committees, where the integration of local knowledge, constant monitoring of social-ecological feedbacks and multi-level interactions can take place, could effectively act as an enabling condition for polycentrism. If these elements are effectively embraced they have the potential to provide more autonomy to management committees which can ideally increase the institutional diversity upon which resource sustainability is managed.

The Management Plan policy provides a setting for resource users to become influential actors in

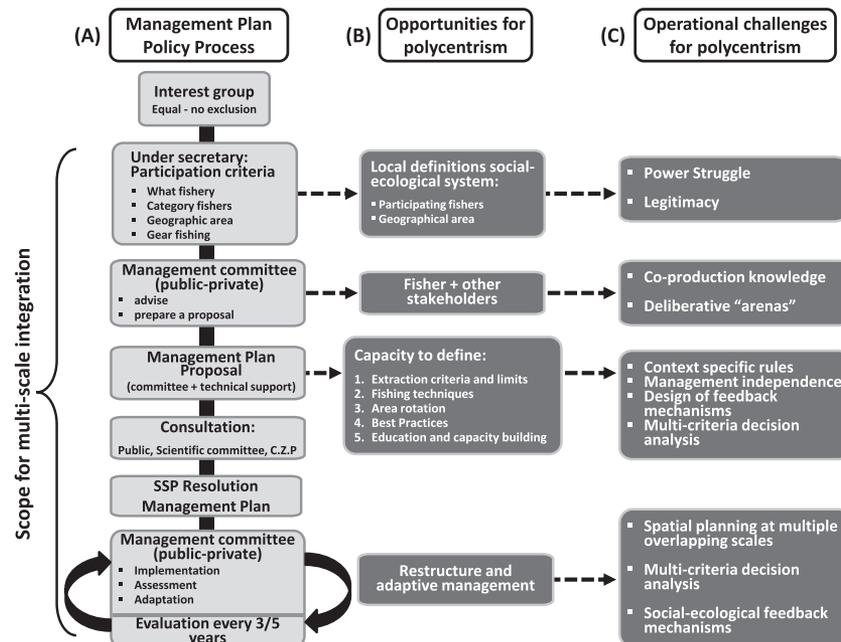


Figure 1. Schematic representation of the Chilean Management Plan policy process (A), highlighting opportunities where polycentric governance can be operationalized (B) and the main implementation and operational challenges to embrace polycentrism (C).

management committees. In fact, small-scale fishers are the stakeholder group with the greatest representation on such committees. This provides opportunities to include local knowledge at appropriate scales. The inclusion of local knowledge allows for small-scale fishers' understanding of how the social–ecological systems operate to be an important element of specific management strategies (Figure 1(B)). Such information can be useful to better-adapt rules that are locally relevant regarding how to manage these complex systems (Gruby and Basurto, 2013). In addition management arenas that include local knowledge can provide rapid and direct feedback on how resources respond to the management plan (Wilson *et al.*, 2006). Locally developed management actions which are legally recognized as part of the Management Plan policy include: (1) the establishment of specific criteria and limitations for extraction; (2) determining extraction and harvesting techniques; (3) rules for rotation of areas; (4) establishment of best practices, sustainability and restoration of ecosystems; and (5) locally tailored education and capacity building programmes (Figure 1(B)).

A key aspect for increased polycentrism (beyond decentralization) is the enabling of institutions, at multiple levels, to integrate local with scientific knowledge (Andersson and Ostrom, 2008). Through the establishment of management committees as the main arena through which management plans are established, the Chilean policy provides opportunity for knowledge co-production, defined as 'the collaborative process of bringing a plurality of knowledge sources and types together to address a defined problem and build an integrated or systems-oriented understanding of that problem' (Armitage *et al.*, 2011). Research has pointed to advantages of these types of arenas, as they enable trust building, sense making, learning, vertical and horizontal collaboration, and conflict resolution (Folke *et al.*, 2005). In Chile, the policy establishes that management committees become such an arena that will bring together government, fishers and other stakeholders. As such, the committees have an opportunity to become catalysts and facilitators between different levels of governance, and across resource and knowledge systems. In this sense, to achieve polycentric governance, the

members of the committee will need to become what has been termed in the literature 'catalysts of integration among different types of knowledge' (Feldman and Khademian, 2007) and 'stewards of collective learning processes' (Roberts, 1997).

CHALLENGES FOR POLYCENTRISM

The existence of a new policy framework alone will not provide the conditions needed to achieve polycentric governance. Rather, there are both management and implementation conditions which are needed. Design choices on how the Chilean Management Plan policy is operationalized can therefore lead to situations in which there is more or less polycentrism. The main challenge will be to provide each Management Plan with the possibility to represent local actors and exercise considerable independence to develop and enforce rules within their scope of authority and geographical area (Figure 1(C)), while support from other management levels, such as national agencies, can help with enforcement, implementation funding and boundary establishment (Andersson and Ostrom, 2008).

If the management plans are going to become an arena for co-production of knowledge, important issues related to internal power dynamics among the participants of the management system, their competitive versus collaborative patterns of interaction, and the establishment of functional operational linkages, must be explored (Figure 1(C)). To achieve more polycentrism the management plan process must ensure that all the relevant local organizations are included (Figure 1(C)). In addition, knowledge co-production arenas must include deliberation processes in which 'people confer, ponder, exchange views, consider evidence, reflect on matters of mutual interest, negotiate, and attempt to persuade each other' (NRC, 1996 in Robinson and Berkes, 2011). In this sense, knowledge integration is path-dependent. That is, the outcome is strongly influenced by the history of the case (Gelcich *et al.*, 2010). It is important that the arenas do not create a situation where a powerful individual or organization assumes a leadership role that then erodes the deliberative

democratic process (Gruby and Basurto, 2013). Knowledge integration for management must necessarily be flexible and adaptive, and be coupled with constant assessments of feedbacks, to avoid it becoming a box-ticking exercise that ultimately constrains adaptive capacity (Gelcich *et al.*, 2006).

The management committee, by law, must revise the Management Plans in light of new information made available to them during both the development and implementation phases of the Management Plan (Subpesca, 2014). Thus, it is important to generate institutional mechanisms that ensure that once a Management Plan is established, the social–ecological feedbacks are included in decisions that relate to equitable allocation and management of resources (Figure 1(C)). User representatives in the Management committee arena must have equal opportunities to debate rationally considered options and reach consensus so that the legitimacy of the outcomes is recognized by all relevant actors.

To deal with some of the challenges associated with the increase of polycentrism in small-scale fisheries management, a research agenda to support implementation is needed. Critical elements include the development of spatially explicit decision support tools, such as marine spatial planning and zoning schemes (Douvere, 2008). Typical spatially explicit decision support tools operate at one level of governance; developing support tools which can deal with multiple overlapping management agreements that operate at different scales (i.e. local rules in use, fisher associations, regional regulations, national regulations) provide a rich area of scientific enquiry which must be developed to support trends towards polycentric governance. In fact, common platforms of data, information, and knowledge sharing could be constructed with respect to social–ecological aspects of the fisheries and maintained as a fundamental way of supporting Management Plans.

Multi-criteria decision analysis (MCDA) applied to polycentric governance is another emerging research frontier that must be developed. MCDA is a family of decision techniques that support multi-objective problems, incorporating ecological, economic and social data in the decision models

(Huang *et al.*, 2011). MCDA attempt to provide a structured and transparent process to incorporate people's values in decision making, promoting participation, negotiation and consensus (Estévez *et al.*, 2013; Tammi and Kalliola, 2014). In this sense, advances in theory and practice of MCDA tailored to support the process of Management Plans implementation could help ensure healthy deliberative processes.

It is necessary to call attention to the fact that as the Management Plan policy is new for Chile, most of the initial management plans for benthic resources have been led by the Undersecretary of Fisheries and aimed at operating at large spatial scales (Subpesca, 2014). These Management Plan processes were mainly triggered by the need to rationalize management of some heavily exploited benthic resources (i.e. kelp species). While there is great learning potential from these initial case studies, it is also critical to begin generating the first applications which are initiated by local communities for the management of resources at the scale of individual bays or parts of regions. It is here where the real potential and challenges of the policy will emerge and where tight collaboration between researchers, managers and communities will become critical. We must be prepared to engage in such an opportunity.

CONCLUSION

Moving towards polycentricism seems a better approach to improving small-scale fisheries policies across the world than reliance on any single prescriptive management strategy. Chile's new Management Plan policy is an attractive setting for discussing the potential opportunities and challenges for small-scale fisheries to develop polycentric governance approaches. What seems to be evident from the example presented here is the importance of having transparent and deliberative knowledge co-construction *arenas* as a condition in order to achieve more polycentric strategies. Attempts to transition towards more polycentricism are continuing and as such they must be followed and guided to avoid pitfalls

in which adaptive capacity and local rules can become eroded (Gruby and Basurto, 2013). A shift towards polycentric governance for small-scale fisheries can be supported by the development of frameworks and tools to systematize and guide collaboration. I call for research which can guide shifts towards more polycentrism in fisheries governance, as it can provide a setting to achieve sustainability and adaptive capacity of complex coastal social–ecological systems, based on the needs and interests of resource users, while also buffering against silver bullet management tools and interventions.

ACKNOWLEDGEMENTS

I thank A. Pinto, J. Rivera, G. Jerez, L. Burotto of the Undersecretary of Fisheries for support and advice. I am grateful to JC Castilla for his constant support and friendship which was a critical inspiration for this manuscript. I thank Fondecyt 1120103, Nucleo Milenio Initiative P10–033 F and NC 120086 of the Ministerio de Economía, Fomento y Turismo, Conicyt FB 0002 and the Pew Marine Conservation Fellowship for funding. I thank J Baxter for providing comments and suggestions.

REFERENCES

- Andersson K, Ostrom E. 2008. Analyzing decentralized resource regimes from a polycentric perspective. *Policy Science* **41**: 71–93.
- Armitage D, Berkes F, Dale A, Kocho-Schellenberg E, Patton E. 2011. Co-management and the co-production of knowledge: learning to adapt in Canada's Arctic. *Global Environmental Change* **21**: 995–1004.
- Basurto X, Gelcich S, Ostrom E. 2013. The social–ecological system framework as a knowledge classificatory system for benthic small-scale fisheries. *Global Environmental Change* **23**: 1366–1380.
- Berkes F. 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. *The Journal of Environmental Management* **90**: 1692–1702.
- Berkes F, Colding J, Folke C. 2003. *Navigating Social–Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge. *Ecology and Society* **9**(1): 1. [online] URL: <http://www.ecologyandsociety.org/vol9/iss1/art1/>.
- Castilla JC. 1994. The Chilean small-scale benthic shellfisheries and the institutionalization of new management practices. *Ecology International Bulletin* **21**: 47–63.
- Douvere F. 2008. The importance of marine spatial planning in advancing ecosystem-based sea use management. *Marine Policy* **32**: 762–771.
- Estévez RA, Walshe T, Burgman M. 2013. Capturing social impacts for decision-making: a Multicriteria Decision Analysis perspective. *Diversity and Distributions* **19**: 608–616.
- Feldman MS, Khademian AM. 2007. The role of the public manager inclusion: creating communities of participation. *Governance: An International Journal of Policy, Administration, and Institutions* **20**: 305–324.
- Fisheries and Aquaculture Law, 20.657. 2013. Ley N° 20.657. Chile. Modifica en el ámbito de la sustentabilidad de recursos hidrobiológicos, acceso a la actividad pesquera industrial y artesanal y regulaciones para la investigación y fiscalización, la Ley General de Pesca y Acuicultura contenida en Ley No 18.892 y sus modificaciones. 09-Feb-2013.
- Folke C, Hahn T, Olsson P, Norberg J. 2005. Adaptive governance of social–ecological systems. *Annual Review of Environment and Resources* **30**: 441–473.
- Galaz V, Crona B, Österblom H, Olsson P, Folke C. 2012. Polycentric systems and interacting planetary boundaries — emerging governance of climate change–ocean acidification–marine biodiversity. *Ecological Economics* **81**: 21–32.
- Gelcich S, Edwards-Jones G, Kaiser M, Castilla JC. 2006. Co-management policy can reduce resilience in traditionally managed marine ecosystems. *Ecosystems* **9**: 961–966.
- Gelcich S, Hughes TP, Olsson P, Folke C, Defeo O, Fernández M, Foale S, Gunderson LH, Rodríguez-Sickert C, Scheffer M, *et al.* 2010. Navigating transformations in governance of Chilean marine coastal resources. *Proceedings of the National Academy of Sciences of the United States of America* **107**: 16794–16799.
- Gelcich S, Pinto A, Rivera J, Jerez G, Burotto L. in press. Exploring opportunities to include local and traditional knowledge in the recent 'Marine Management Plans' Policy of Chile. FAO Working Paper.
- Gruby RL, Basurto X. 2013. Multi-level governance for large marine commons: politics and polycentricity in Palau's protected area network. *Environmental Science & Policy* **33**: 260–272.
- Huang IB, Keisler J, Linkov I. 2011. Multi-criteria decision analysis in environmental sciences: ten years of applications and trends. *Science of the Total Environment* **409**: 3578–3594.
- NRC (National Research Council). 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press: Washington, DC.
- Ostrom E. 1999. Coping with tragedies of the common. *The Annual Review of Political Science* **2**: 495–535.
- Ostrom E. 2010. Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change* **20**: 550–557.
- Ostrom V, Tiebout C, Warren R. 1961. The organization of government in metropolitan areas: a theoretical inquiry. *American Political Science Review* **55**: 831–842.
- Roberts N. 1997. Public deliberation: an alternative approach to crafting policy and setting direction. *Public Administration Review* **57**: 124–132.
- Robinson LW, Berkes F. 2011. Multi-level participation for building adaptive capacity: formal agency–community

- interactions in northern Kenya. *Global Environmental Change* **21**: 1185–1194.
- San Martin G, Parma A, Orensanz J. 2010. The Chilean experience with territorial use rights in fisheries. In *Handbook of Marine Fisheries Conservation and Management*. Grafton RHR, Squires D, Tait M, Williams M (eds). Oxford University Press: New York; 324–337.
- Subpesca. 2014. <http://www.subpesca.cl/prensa/601/w3-propertyvalue-51242.html>.
- Tammi I, Kalliola R. 2014. Spatial MCDA in marine planning: experiences from the Mediterranean and Baltic Seas. *Marine Policy* **48**: 73–83.
- Wilson D, Ahmed M, Siar S, Kanagaratnam U. 2006. Cross-scale linkages and adaptive management: Fisheries co-management in Asia. *Marine Policy* **30**: 523–533.