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Human Dimensions of Small-Scale and Traditional Fisheries in the Asia-Pacific Region¹

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Abstract: The Asia-Pacific region is home to a diversity of coastal cultures that are highly reliant on the ocean and its resources for sustenance, livelihoods, and cultural continuity. Small-scale fisheries account for most of the livelihoods associated with fisheries, produce about as much fish as industrialized fisheries, and contribute substantially to the economies of countries and territories in the Asia-Pacific region. Yet these resource systems and their human communities face numerous local and global threats, and social vulnerability to these pressures places at risk the livelihoods, food security, well-being, and traditional lifestyles of coastal communities and cultures of the Asia-Pacific region. This article and special issue provide an overview of the challenges and opportunities for small-scale and traditional fisheries and the role of human dimensions research in the sustainable governance of these resource systems. It is increasingly clear that sufficient understanding of the social, economic, and cultural aspects of these linked social-ecological systems is critical in determining pathways toward sustainability.

THE ASIA-PACIFIC REGION encompasses a broad diversity of human cultures and marine ecosystems, which together compose a set of linked social-ecological systems with unique characteristics and contexts. Many millions of people living on islands and along coastal zones in this vast region rely extensively on the ocean and its resources for sustenance, livelihoods, and cultural continuity. Small-scale fisheries are particularly important to these communities, and these fisheries are often conducted in ways that reflect customs and traditions of the past and incorporate new strategies for success in the present.

The capacity of participants in small-scale fisheries to adapt to contemporary sources of change is an increasingly important consider-

ation for the management and sustainability of these resource systems worldwide. In the Asia-Pacific region, small-scale fishery resource systems face critical challenges, including global climate change, socioeconomic development and social change, and vulnerability to human and natural disturbances. Social vulnerability to these pressures has the potential to diminish the livelihoods, food security, well-being, and traditional lifestyles of coastal communities and cultures of the Asia-Pacific region and beyond (McGoodwin 2001, United Nations Environment Programme 2004, Béné et al. 2007, Bell et al. 2011).

At the global scale, small-scale fisheries account for most of the livelihoods associated with fisheries (Berkes et al. 2001). Estimates from the United Nations Food and Agriculture Organization, for example, suggest that these fisheries employ more than 90% of the world's capture fishers (Food and Agriculture Organization of the United Nations 2012a). Small-scale fisheries yield almost the same amount of fish for human consumption globally as industrialized commercial fisheries but with a much lower environmental footprint (Berkes et al. 2001, Chuenpagdee et al. 2006, Jacquet and Pauly 2008). However, the

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environmental footprint of small-scale fisheries can also be substantial and cannot be discounted (Hawkins and Roberts 2004, Newton et al. 2007, World Wildlife Fund 2008). Many impoverished communities in the developing world rely directly on coastal fisheries systems for food security and livelihoods (Govan 2007, Food and Agriculture Organization of the United Nations and WorldFish Center 2008, Bell et al. 2009, Chuenpagdee 2011), and degradation of these environments poses a serious risk for food security and human well-being (Kent 1997, Whittingham et al. 2003, World Resources Institute 2005, Béné et al. 2007, Food and Agriculture Organization of the United Nations and WorldFish Center 2008). Despite increasing recognition of their importance, fewer resources and attention are directed toward these small-scale fisheries versus the industrialized fishing sector (Chuenpagdee and Pauly 2008, Jacquet and Pauly 2008).

Small-scale fisheries also contribute substantially to the economies of countries and territories in the Asia-Pacific region. Though estimates are often not accounted for in official statistics, research has shown that small-scale fisheries can compose a substantial amount of the total gross domestic product (GDP) (Gillett and Lightfoot 2001, Zeller et al. 2007, The World Bank et al. 2010). For example, in the Pacific islands, about 30% of the GDP contribution from the fishing sector in the region is attributed to subsistence fishing (Asian Development Bank 2009). In these settings, a substantial proportion of the total population can be engaged in some form of consumption-oriented fishing or gathering (Dalzell et al. 1996, Gillett and Lightfoot 2001).

Small-scale and traditional fisheries encompass a wide diversity of harvesting, gathering, and postlandings processing, distribution, and marketing activities. Discrete and encompassing definitions are thus difficult to achieve, because social and ecological aspects of these fisheries tend to vary based on local and regional contexts (Berkes et al. 2001, Chuenpagdee et al. 2006, Evans and Andrew 2009), and fisheries themselves can be defined through various dimensions, including bio-

logical, technological, economic, social, cultural, or political factors (McGoodwin 2001, Food and Agriculture Organization of the United Nations and WorldFish Center 2008). Further, the terms “traditional,” “customary,” “artisanal,” and “small-scale” are often used interchangeably, and specific terms are sometimes used in a descriptive manner to highlight specific types or aspects of small-scale fisheries (Smith 1979, Chuenpagdee et al. 2006, Gillett 2011). It is important to note that although “traditional” fishing methods may connote historical origins, these practices are dynamic and continually evolving through adaptive processes, including the introduction, loss, and syncretization of knowledge (Berkes et al. 1998, Kittinger et al. 2013).

Despite the diversity of these fisheries systems, some attributes of small-scale and traditional fisheries are somewhat consistent across contexts (Kurién and Willmann 2009). First, the level of financial investment in fishing operations tends to be substantially less than that of industrial-scale fisheries, and investments are usually made by individuals, families, or small firms rather than by larger corporate entities. Where vessels are involved, they tend to be relatively small and minimally powered and are thus relatively limited in terms of range and overall fishing capacity. However, there are exceptions: for example, in Kerala State, India, traditional types of plank-built canoes used with ring seines can have a length greater than 21 m and may be equipped with two outboard engines, each of 25 hp. Second, fishing gears and other technologies tend to be more traditional in nature and reflect local customs that have evolved historically. But small-scale fishers can also be very quick to take on board new technologies if they prove to be more effective and are affordable. Finally, whereas profit motives underlie most industrial-scale fishing activities, small-scale and traditional fisheries tend to be associated with a variety of motivations that may or may not overlap. Such motivations include commercial production and profit-seeking, recreation and relaxation, and harvesting of seafood to eat, share, or use for specific and often highly important cultural purposes. Notably, recreational motives are

TABLE 1
Key Attributes of Small-Scale and Traditional Fisheries

Key Attributes	Definition (References) ^a
Physical characteristics	
Vessel size	No vessel; most vessels between 5 and 15 m, often <24 m (C, D, E)
Size of engine (horsepower)	None; 10 hp (E), 15–60 hp (C, D), max. 400 hp (C, E)
Vessel type	Nonmotorized: canoe, sail, dingy, etc. (A, B, C, D, E); motorized: inboard, outboard (A, B, C, D)
Boat gross registered tonnage (GRT)	Less than 20 GRT (C, D), max. less than 50 GRT (E)
Gear type	Coastal gathering, fishing from shore, beach seines, small nets, hand lines, longlines, dive, spears, traps, small trawlers (C, D)
Distance from shore	Onshore and nearshore waters; up to 22 km offshore (C)
Social characteristics	
Number of crew	~1–6 (A, B, C, D)
Occupational mobility	Full-time, many part-time fishers (C, D, E)
Fishing unit	Individuals or family (A, B, E); small groups with some specialization and division of labor (A, B, E)
Vessel ownership	Vessel and gear owned by operator; owned and operated by senior operator, some absentee ownership (E)
Disposition of catch	Operator/household consumption (A, B, E); sales to local markets (A, B) and national and international markets (E)
Processing of catch	Fresh or traditionally processed (smoked, salted) for human consumption, some nonhuman consumption (e.g., for feed) (A, B, E)

Note: Table structure adapted from Food and Agriculture Organization of the United Nations and WorldFish Center (2008:table 2).

^a References: A, Smith (1979); B, Berkes et al. (2001); C, Chuenpagdee et al. (2006); D, Chuenpagdee and Pauly (2008); E, Food and Agriculture Organization of the United Nations and WorldFish Center (2008).

very often subsumed or obscured by economic and sustenance imperatives throughout most of the regions addressed in this special issue. Table 1 summarizes some of the important attributes that render small-scale and traditional fisheries discernibly unlike their industrial-scale counterparts.

Fishing fleets active in the Asia-Pacific region have for decades landed more seafood than those operating anywhere else in the world. Recent estimates for annual marine-capture fisheries landings involve some 48 million metric tonnes per year; of the world's top 10 producers of capture fish, six states are in Asia and the Pacific region: China, Indonesia, Japan, India, Philippines, and Myanmar (Lymer et al. 2010). Although much of these landings are associated with large-scale industrial fishing operations, the numbers of livelihoods and households engaged in or directly sustained by small-scale fisheries in the region largely eclipse those of large-scale fisheries. Estimates of the numbers of participants engaged in the region's small-scale and tradi-

tional fisheries vary widely (Table 2) and depend in part on the criteria and estimation methodology employed. Employment tends to be greatly underreported, and it remains difficult to identify everyone who is engaged in some form of fishing as a livelihood strategy, especially in a part-time capacity.

Even without accurate estimates, it is nonetheless clear that fishing-related opportunities are substantial in terms of their scale and in regard to other social dimensions such as poverty, equity, and vulnerability. For example, Lymer et al. (2010) estimated, in the South China Sea area alone, that more than 5.4 million people are employed in the fisheries sector, with most of the 1.72 million fishing vessels characterized as small-scale. Poverty and food security remain critical considerations in many coastal areas in the Asia-Pacific region, inextricably linking fisheries ecosystems to social vulnerability (Kent 1997, Bell et al. 2009, Kronen et al. 2010). Gender equity is another major issue, and women compose an important and underrepresented

TABLE 2
Global and Regional Estimates of Numbers of Participants in Small-Scale Fisheries

Estimate of Fishers ^a (No.)	Method	Literature Cited
Global scale		
11.6 million	Meta-analysis of FAO data sets	Chuenpagdee et al. (2006)
30–32 million	Not described	United Nations Environment Programme and World Conservation Monitoring Centre (2006)
51 million	Not described	Berkes et al. (2001)
93–97 million ^b	Meta-analysis of secondary data and in-depth case studies	Food and Agriculture Organization of the United Nations and WorldFish Center (2008)
>100 million	Review of key indicators from 17 developing countries	The World Bank et al. (2010)
~1 billion ^c	Not described	International Coral Reef Action Network (2002), International Coral Reef Initiative (2002); as reviewed by Whittingham et al. (2003)
Asia-Pacific region		
80,000 ^d	Not described	Hamnett (1990), as cited in Gillett and Lightfoot (2001)
5.4 million ^e	Various secondary sources	Lymer et al. (2010)
23 million ^f	Review of key indicators from 17 developing countries	The World Bank et al. (2010)

^a Estimates are for fishers employed in small-scale fisheries, except where designated by footnotes following.

^b In developing countries only, includes fishers and postharvest activities.

^c Described as “people currently depend on fish for food, income, and livelihood, at least 85% of whom rely principally on fish as their major source of protein.”

^d Engaged in small-scale commercial fishing, cited in Gillett and Lightfoot (2001:44).

^e Includes employment in the South China Sea fisheries and associated areas.

^f Includes fishers and fish workers in Asia and Oceania, estimated in The World Bank et al. (2010:26).

aspect of small-scale fisheries, accounting for about half the total fishery workforce in developing countries (Food and Agriculture Organization of the United Nations and WorldFish Center 2008, The World Bank et al. 2010, Weeratunge et al. 2010).

Conventional data for formal assessment and monitoring are often lacking in small-scale and traditional fisheries, and such fisheries are often construed as data poor (Dalzell et al. 1996). In developing countries, in particular, monitoring is either nonexistent or weak, and routine data collection efforts are often disrupted when external support for fisheries statistics systems is withdrawn (Gillett 2011). As such, these fisheries are rarely amenable to conventional fishery management approaches that rely heavily on understanding of long-term rates of production and data-intensive stock assessments (Johannes 1998, Ruddle and Hickey 2008). Lack of data is just one aspect of why conventional management may not be effective in small-scale

fisheries; among others are the large number of participants and communities, multispecies nature of fisheries; and multitude of fishing methods employed.

However, traditional ecological knowledge and customary means of managing local marine resources are often embedded in the human cultures and communities associated with small-scale fisheries in the archipelagos of the tropical Pacific. Traditional ecological knowledge and localized approaches to resource management have been extensively studied in parts of this region, providing ample opportunity for alternative management methods that rely more on different forms of information and community-based approaches (Johannes 2002, Cinner and Aswani 2007, ParFish Workshop 2008, Aswani et al. 2011).

The important role of small-scale and traditional fisheries in human communities across the Asia-Pacific region is now broadly recognized. Emerging evidence of this in-

cludes (1) increased attention to regional, national, and local-level assessments of small-scale fisheries; (2) development of guidelines and approaches for securing and strengthening small-scale fisheries (e.g., Food and Agriculture Organization of the United Nations 2012*b*); and (3) emerging knowledge-to-action partnerships directed at small-scale fisheries (e.g., World Forum of Fisher Peoples 2010, <http://toobigtoignore.net/>, www.icsf.net). However, much of the attention and funding continues to be directed toward biophysical aspects of these fisheries ecosystems. Without discounting the importance of ecological dimensions, it is becoming increasingly clear that sufficient understanding of social, economic, and cultural aspects of fishing and associated human communities and cultures are key elements of sustainable governance of these resource systems. As Cinner and David (2011) assert, sustainability in these resource systems is as much about understanding people as it is about understanding the biophysical environment. Similarly, Glazier (2011:xiii) states “In a world of rapidly growing coastal populations and growing reliance on marine resources, humans play crucial roles in the dynamics of ocean systems. It is also significant that the effects of human activities on the ocean and its organisms can be regulated through various social and institutional means. As such, the human dimension is the principal vector through which change in marine systems can be effected.”

As defined here, “human dimensions” refers to the ways in which individuals, communities, and societies interact with, affect, and are affected by natural ecosystems and environmental change through time (Kittinger et al. 2012). Human dimensions research comprises a diverse, multidisciplinary field that seeks to address the complexity of human relationships with ecosystems, including their social, cultural, political, and economic dimensions (Samonte et al. 2010, Kittinger et al. 2012). Human dimensions data and applied social research are increasingly recognized as indispensable to management, conservation, and policy around the globe (Evans and Andrew 2009, Food and Agriculture

Organization of the United Nations 2010, Cinner and David 2011, Ratner and Allison 2012).

Articles published in this special issue seek to advance the multidisciplinary field of human dimensions research and define challenges and opportunities confronting small-scale and traditional fisheries across the Asia-Pacific region, with a particular focus on small island contexts (Figure 1). This issue provides a forum summarizing recent advances in social research, spanning a wide array of topical areas that are relevant to management, conservation, and sustainability of these coupled social-ecological systems.

In the context of small-scale fisheries, it is critical to understand the role of harvesting and fishing activities, and resources in the sociocultural practices and heritage of local communities. A series of articles in this issue examine social, economic, and cultural aspects of fishing and the postlanding disposition and distribution of locally caught seafood in local communities in Pacific island societies. Severance and colleagues (Franco, Hamnett, Anderson, and Aitaoto) (2013 [this issue]) provide an overview of the triggers that initiate fishing events and the role of customary exchange of marine resources in communities in American Samoa and the Mariana Islands. The article elucidates the concept of “fish flow,” which was developed by Severance and fisheries economist Paul Callaghan to describe the vital importance of seafood and its distribution in island communities around the western Pacific. In their research in the Hawaiian community of Hā’ena on the island of Kaua’i, Vaughan and Vitousek (2013 [this issue]) investigate the importance of catch distribution and its vital role in maintaining cultural practices at the community level. Glazier and colleagues (Carothers, Milne, and Iwamoto) (2013 [this issue]) also examine seafood distribution in an island context, using a social network sampling approach to describe social organizational aspects of fishing and to test for and spatially depict intercommunity variability in patterns of seafood distribution on the island of O’ahu, Hawai’i. Finally, Kittinger (2013 [this issue]) presents results from a participatory research

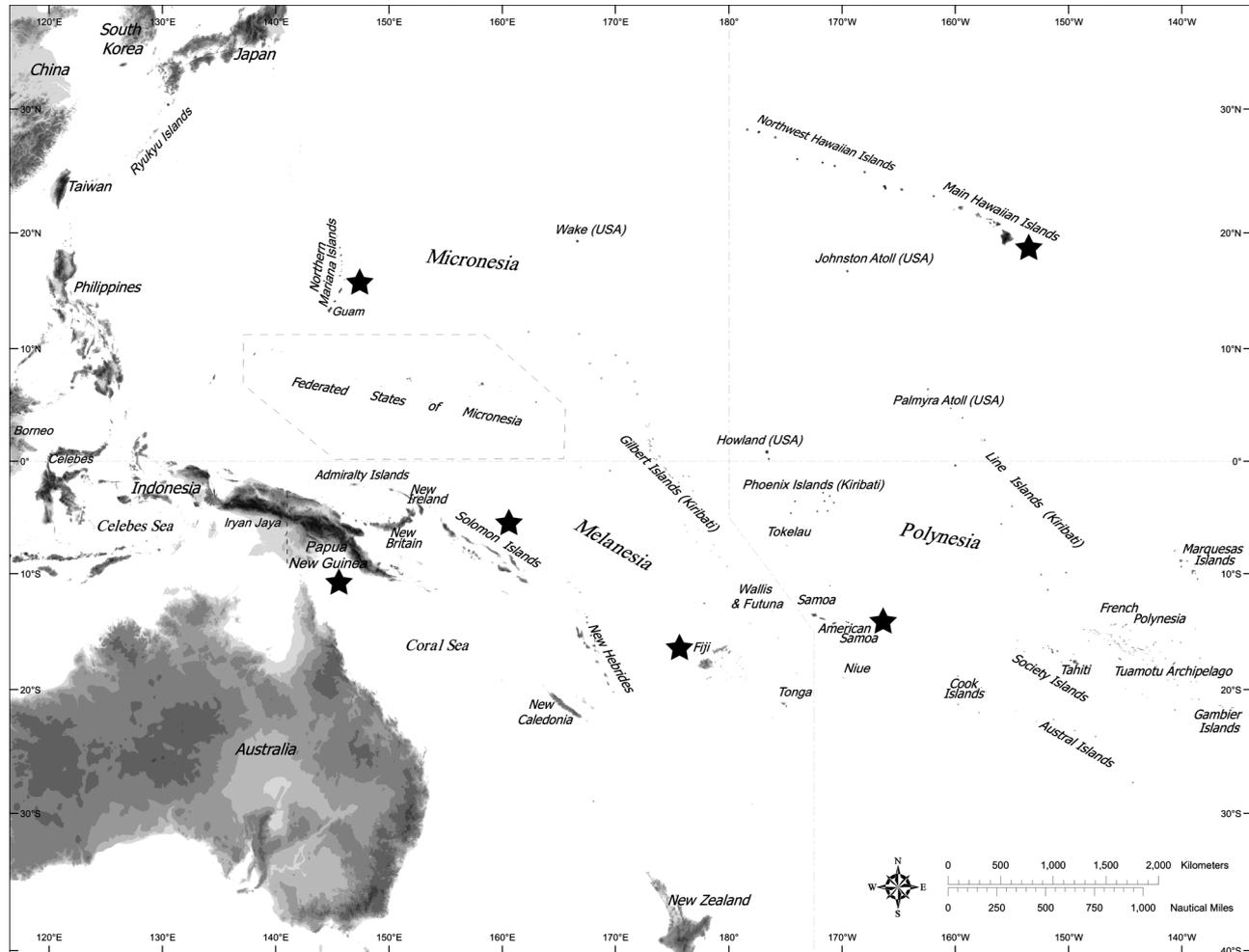


FIGURE 1. Map of the Asia-Pacific region. Stars indicate geographies where studies in this special issue focus their attention.

approach to characterize social and ecological aspects of subsistence-oriented fisheries in urban Maunaloa Bay, O'ahu, Hawai'i. The article documents social and environmental factors that influence the distribution of coral reef fisheries ecosystem services, assesses shifting baselines among long-time fishers, and describes the advantages of participatory assessments in building local social adaptive capacity for fisheries comanagement.

Another series of articles investigates temporal changes in small-scale fisheries and associated marine ecosystems in Oceania and Indonesia. The authors draw on a diversity of social science and ecological methods, including key respondent interviews, traditional ecological knowledge, and historical archival approaches, to further investigate the concept of "shifting baselines," whereby each generation calibrates their understanding of ecological conditions via their first association with the marine environment (Pauly 1995). Levine and Sauafea-Le'au (2013 [this issue]) conducted oral history research with elder fishers in American Samoa to document local perspectives on traditional use and management of marine resources, and local observations of changes in marine habitats and important seafood resources through time. Albert, Love, and Brewer (2013 [this issue]) compare ecological assessments of reef health with stakeholder perceptions of change in the Solomon Islands and Fiji. They report differences in perceptions and reef health in both areas, which they attribute to differences in the rate of environmental change experienced at local scales and respondent perceptions of quality of life. Berzunza-Sanchez, Gomez Cabrera, and Pandolfi (2013 [this issue]) assessed the human influences over the historical status of reef resources in Papua New Guinea, identifying important social drivers of ecological change. Their historical reconstruction of exploitation and human drivers may help inform fisheries management on the potential for resource recovery and the appropriate management approaches that might reduce human drivers influencing resource exploitation.

Finally, this special issue includes three important review papers, each of which addresses critical issues in small-scale fishery

management in the region. Friedlander, Shackeroff, and Kittinger (2013 [this issue]) provide an overview of customary marine resource knowledge and its application in contemporary management in the Hawaiian Islands. The authors discuss the history of customary marine tenure in the Islands and through a series of case studies illustrate how traditional ecological knowledge and customary management practices are being used in the modern context. They also present evidence of the efficacy of community-based fishery management, showing that reef fish biomass in areas managed in the traditional way is on par with that in no-take reserves and higher than in areas with rotating closures or open to fishing. Allen (2013 [this issue]) addresses the problem of defining subsistence fishing, reviewing various typologies used to classify or categorize this important dimension of small-scale and traditional fishing in the western Pacific. Finally, Aswani and Ruddle (2013 [this issue]) synthesize several decades of research in the Asia-Pacific region to examine the strengthening of coastal and marine resource management and conservation using alliances between local communities and external institutions. Using an institutional perspective, they highlight the importance of management frameworks that hybridize local beliefs and customary institutions with conventional management concepts, including marine protected areas and ecosystem-based management.

In conclusion, the overarching purpose of this special issue is to highlight new findings from human dimensions research and their applicability to the sustainable management of small-scale and traditional fisheries in the Asia-Pacific region. The explicit focus on human dimensions of these resource systems has much potential to expand both scholarly research and the application of this field to real-world governance and management challenges. It is our hope that this special issue will inspire managers, conservationists, fishers, and other stakeholders in the region to further incorporate this important area of research into management and conservation, and inspire researchers and other scholars to push the frontiers of human dimensions

research in the Asia-Pacific region in the years to come.

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