

Review

Fisheries and poverty reduction

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Abstract

There is a somewhat pervasive belief in much of the fisheries literature (especially that relating to small-scale fisheries in the developing world) that fishers are among the 'poorest of the poor'. The purpose of this review therefore is to review historic and contemporary research into fisher poverty. Our review commences by acknowledging the paucity of studies on the levels of (income) poverty within the sector and highlights the fact that, somewhat paradoxically, a growing number of studies are suggesting that average incomes for fishing households outstrip those recorded by non-fishing households in the same areas. Nevertheless, these findings must be qualified as poverty cannot be captured exclusively in income terms – and social manifestations of poverty (low literacy levels, reduced access to health care, education, water and sanitation facilities) may be more acute within the fisheries sector. Equally, while fisher households may be more vulnerable (given their lifestyles/location) to exogenous shocks (such as tsunamis), the sector is not a homogenous one and factors such as technological change may also induce the impoverishment of certain sub-groups of fishers over time. As a consequence, fisher households have derived a variety of coping mechanisms, mechanisms which (we argue) militate against considering 'fishing' as an activity in isolation from other facets of the household livelihood strategy. One response, as we note, to this has been the application of livelihoods analysis as a technique for assessing (and redressing) fisher poverty. Championed initially by the Sustainable Livelihoods Fisheries Programme (SFLP) operating in West Africa from 1999 to 2006, the technique has subsequently been deployed in a number of other regions/fisheries. Our review then moves on to assess how interventions within the fisheries sector can contribute to fisher poverty reduction. At the macroeconomic level, while, the emphasis historically has been on the sector's contribution to domestic nutritional requirements and the goal of food security, more recent research has examined the prioritization of the sector within national development plans and poverty reduction strategies. At the microeconomic level, we provide two contrasting examples to show that, while poverty-reducing policy interventions are to be welcomed at the local level, the heterogeneity of the local environment militates against the prescription of a 'one size fits all' approach to poverty reduction. This theme is picked up in the concluding comments of the review, where directions for further research are also highlighted.

Keywords: Fisheries, Aquaculture, Poverty, Vulnerability, Livelihoods, Poverty reduction strategy papers (PRSPs)

Research Methodology: We searched the following databases for relevant articles: Agricola, ASFA (Aquatic Sciences and fisheries Abstracts), CAB Abstracts, Econlit and Social Sciences Citation index, as well as a general Google Scholar search (keywords fish/aquaculture + poverty, fish/aquaculture + vulnerability, fish/aquaculture + livelihoods). We also accessed FAO and the World Fish Center bibliographies. We used the references from the articles obtained by this method to check for additional relevant material, while colleagues at FAO, Portsmouth and the World Fish Center pointed us to further materials.

Introduction

Ever since H. Scott Gordon [1] noted over half a century ago that; '... fishers typically earn less than others, even in much less hazardous occupations or in those requiring less skill' the belief has persisted that fishers and fishing communities are among the poorest of the poor. As a consequence, with international development agencies becoming increasingly preoccupied with the incidence and severity of poverty (most recently evidenced by the centrality accorded in the Millennium Development Goals (MDGs) to halving, by 2015, the global incidence of poverty and hunger), attention has inevitably been directed to the question of how to best implement poverty-reducing strategies within the fisheries sector. One strand of the three-point Action Program proposed in the World Bank publication 'Saving Fish and Fishers' [2], for example, explicitly proposes to link Bank support to the small-scale labour-intensive fisheries sector with the poverty reduction objectives of the MDGs. Yet, as Macfadyen and Corcoran [3] have reported in their FAO-sponsored review of poverty in fishing communities, fisher poverty is not a uni-dimensional phenomenon and, moreover, there is also a growing realization that fishers may not necessarily always be the poorest of the poor.

In the light of this, the review commences by reviewing the literature related to fisher poverty in terms of income. It then broadens the research agenda to consider articles that adopt a more 'holistic' approach to poverty; acknowledging that for many communities/households/individuals fishing is just one component of a complex portfolio of activities designed to sustain/enhance livelihoods. The third part of the review examines articles which relate to the macro-economic dimension of fisheries and (national) poverty reduction strategies. In the subsequent section, we consider the causes of poverty identified in, and the poverty-reducing strategies advocated by, a selection of papers and authors in the areas of coastal and inland capture fisheries and aquaculture. A final section provides some concluding comments and suggestions for future research. Unless stated otherwise, the primary focus of our review will be on small-scale fishers across the developing world for not only are they the most numerous¹[4], but also because it is here that the majority of poor fishers are to be found.

¹An estimated 90% of the 38 million people recorded by the FAO globally as fishers and fish-farmers are classified as small-scale. In addition, a further 114 million people are estimated to be employed in other fisheries associated occupations, particularly in processing and trading, bringing the total estimated to be directly or indirectly employed in the small-scale fisheries and aquaculture to about 152 million. In addition, there are millions of other rural dwellers involved in seasonal or occasional fishing activities who are not recorded as 'fishers' in official statistics.

Are Fishers and Fishing Communities Poor?

Investigating Poverty among Fishers and Fishing Communities

Béné's widely-cited work [5], published in *World Development*, drew attention to the dearth of references to fishers and fishing communities in the burgeoning literature on poverty. He concluded that such under-representation was attributable to a research agenda that had historically emphasized the biological aspects of fisheries, while research examining the social and institutional relations between fisheries and poverty was much less well developed. This oversight is indeed symptomatic of much of the literature, with fisher poverty generally being inferred rather than proven: as was the case in Gordon's [1] seminal paper of 1954. van Dusseldorp and Weerackody [6], Bailey *et al.* [7], Brack [8] and Silberling [9], for example, all simply proceed with their respective arguments and policy recommendations on the basis that net incomes within the (small-scale) fisheries sector are relatively low and participants are poor. The 'fisher equals poverty' hypothesis is firmly embedded in many contemporary FAO national fisheries profiles [10], and is also restated in the most recent *Technical Guideline for Responsible Fisheries* [4].

Yet hard data, as Willmann [11] notes, to show that small-scale fishermen live close to, or below, the poverty line and/or are among the lowest socio-economic groups has, historically, been rather more limited. A notable exception in this regard was the work by Panayotou *et al.* [12], Fredericks *et al.* [13] and Kurien and Willmann [14] in the early 1980s, which employed cost and earnings data to determine the economic status of small-scale fish units in Thailand, Malaysia and Kerala, respectively. More recently, Herrin and Racelis [15] have used socio-economic survey data to determine that 95.3% of the 718 267 Filipino fisher households belong to the low-income group, while Teh and Sumaila [16] also show that mean net incomes of Malaysian fisherfolk at Pulau Banggi are below the national poverty line. However, Allison [17] synthesized household income studies from Malawi, Uganda and Kenya which showed that fishing households earned higher incomes than non-fishing households in lakeshore villages, while Mkenda's research found that artisanal fishers were better off than peasant farmers in Zanzibar [18]. A six-country (Bangladesh, India, Malaysia, the Philippines, Senegal and Tanzania) study by Tietze *et al.* [19] has also cast doubt on the 'fisher equals poverty' hypothesis, disclosing that in five of the countries, not only was the average annual household income of fisherfolk households significantly higher than that of households in neighbouring agricultural villages, but savings rates were higher too. It is becoming clear that the relative and absolute poverty of fisherfolk can be expected to vary by country, by fishery, and even within each fishery, and that broad generalizations are thus unhelpful,

even if they are motivated by a desire to attract greater investment in poverty reduction in fishing-dependent communities.

Nevertheless, the relative paucity of quantitative studies on fisher poverty was recently acknowledged by the FAO Advisory Committee on Fisheries Research [20]: 'the ability to raise the profile of this important sector {small-scale} in policy-making is, however, severely compromised by an absence of accurate and accessible data' (the italics are ours).

Another welcome development is the growing realization that the subtleties and complexities of fisher deprivation cannot be wholly captured by measures of income-poverty alone. Borrowing heavily from the participatory rural appraisal (PRA) techniques developed during the 1990s [21], a series of methodologies (including poverty mapping [22], wealth rankings, poverty profiling, well-being analysis and participatory poverty assessments) have variously been applied to capture the broader plight of disadvantaged small-scale fishers [3]. As such, these methodologies (by providing a broader picture of disadvantage across the village/community/region, etc.) can lead to more effective targeted policy interventions, as the Medium Term Development Plan 2004–2009 for Bohol Province (Philippines) recognized in the case of its local coastal and island communities, for example [23].

Pittaluga *et al.* [24], for example, applied *poverty profiling* techniques to locate, enumerate and thence characterize the differential levels of poverty encountered among the small-scale fishers of Lake Bagré and Kompienga (Burkina Faso). Female-headed fisher households living in rudimentary accommodation with low nutrient intakes and little productive equipment were invariably the poorest of the poor, while male fishers with multiple wives, their own fishing equipment, investments outside the sector and a rich and varied diet, although still considered poor, clearly were not so badly off. Similar techniques also enabled the same authors to contrast the vulnerability of fishing villages across the southern Lake Volta region to different poverty-inducing events (floods, droughts, change in the terms of trade, conflicts, etc.).

Biswas [25] used participatory *well-being analysis* to solicit data on food insecurity, land ownership and occupation from 2181 farmer-fisher households drawn from 14 Bangladeshi districts, and then employed this data to stratify the sample into rich, medium, lower-medium and poor households. In Cambodia, the Asian Development Bank sponsored a *participatory poverty assessment* (PPA) in 2001 that detailed five broad socio-economic strata: ranging from the *kror bamphoi* (extremely poor, with no way out of their present situation) to the *thouthear* (fully self-sufficient, without debts) in the lowland Khmer villages, and the characteristics that saw households assigned to such categories. The *kror bamphoi*, for example, invariably had little or no land, no fishing or farming implements of note, accumulated debts, no kinship support and young, extended families [26].

The spatial representation of demographic, wealth, income, service access and allied data (*poverty mapping*) produced by Amarasinghe *et al.* [27] for Sri Lanka not only highlighted that the most extreme levels of poverty (more than two standard deviations below the national average) were to be found in three of the coastal divisions of Colombo district, but also facilitated the precise targeting of subsequent poverty-reducing interventions. Similarly, *wealth rankings*, used to classify 687 fisher-farmer households in Kerala (India) according to their relative wealth or well-being, provided a baseline against which Sathiadhas *et al.* [28] proposed to measure the effectiveness of aquaculture interventions. In many cases, a combination of these approaches may be (have been) used. The ADB and Sathiadhas studies, for example, supplement their use of PPA and wealth rankings, respectively with poverty mapping, while Biswas combines wealth ranking (to select participating households) with well-being (to thence stratify such households) techniques.

Insights into Fisher Poverty

Three insights into fisher poverty are revealed through the application of these various, yet related, techniques.

First, fisher poverty, particularly at the level of the local community, cannot be captured exclusively in monetary income terms. While it is true that economic criteria (catches, number of livestock, standard of housing, degree of self-sufficiency/nutritional supply, landholding and the security of property rights, capital investments, household indebtedness, etc.) generally predominate – reference is also made to social factors (literacy levels, access to education, health and other basic household needs – such as clean water, etc.) as well as to social manifestations of poverty (power relations and the political space for participation).

In the particular case of small-scale fishers, vulnerability may be exacerbated by a series of further factors, including: the high risk nature of such fishing activities, the geographic remoteness of many communities, their low socio-political status, their insecure access to fish stocks (and the tendency towards the overfishing of same, given the open or quasi-open access status of many small-scale fisheries), their responsiveness to technical change, and the (generally unfavourable) nature of their local organizational environment (spatially dispersed households, often located in remote areas, with the temporary absenteeism of key household members as they migrate to fish/seek alternative sources of income). Demographic factors too (worker/dependent ratios within the household, age of the household heads), although not particular to fisher households, are also likely to influence the probability of household marginalization. Clearly, the varied nature of these factors (and the likely interaction between them) means that general

prescriptions about policy responses at the local level are impractical (a theme we return to in section 'Fisheries and Poverty Reduction: the Macroeconomic Dimension' of this review).

Second, and implicit from the above discussion, is the truism that fisher households/communities are not all equally vulnerable. Salagrama [29], for example, provides a salutary tale (often repeated elsewhere) of how the diffusion of new technologies into the fisheries sector in the Indian state of Orissa during the 1990s 'benefited a few people, while the large majority joined the growing class of daily wage earners'. More efficient (and expensive) fibreglass-reinforced plastic (FRP) craft displaced traditional wooden designs, benefiting those households able to purchase the former (while fisher households unable to upgrade to FRP craft experienced reduced catches and incomes). Paralleling this, the introduction of synthetic nets also spelt ruin for a large majority of traditional net makers (generally women and old retired fishers) who were now obliged to seek out alternative means of subsistence. The concomitant improvement in transportation and communications systems, while reducing the isolation of many small-scale fishing communities, wrought equally devastating change upon the livelihoods of local artisanal fish processors, who now found themselves unable to compete with the influx of vehicles and the trader-financiers who paid premium prices for the fish landed. The impact of this change was also uneven across fisher communities. The most affected, Salagrama [29] reports, was Pentakota village: where declining catches caused several fishers to decamp surreptitiously to distant states as a debt-avoidance strategy, men started working for the first time outside fisheries (in the local cashew-nut plantations), and 'people died heartbroken over the loss of their livelihoods'.

Third, although commencing work outside the fisheries sector was a relatively novel experience for Pentakotan fishermen, for many small-scale fishers survival demands they (or their household) participate in a variety of income-generating activities. Sathiadhas *et al.* [28], for example, reveal that while fishing and fishing-related activities contributed just over half of household income among the households sampled in their Kerala study, this was supplemented by coconut collection, rice and vegetable cultivation and livestock product sales. This division of labour is not new. Eggertsson [30] has noted that while Iceland has been renowned for its rich fisheries since the Middle Ages, fishing was invariably only a part-time activity for farmers in 'pre-modern' Iceland. Similarly, while Bonfiglioli and Hariri [31] assert that fishing remains a full-time exclusive activity for contemporary Yemeni fisher communities along the Red Sea, owing to the extremely limited alternative employment opportunities on offer, only two-thirds of household income in San Salvador in the Philippines is derived from fishing [32]. Jinadu [33], furthermore, questions the value of dichotomising households into artisanal, small-scale and peasant

fishers, given that many West African households are neither full- nor part-time, but rather occasional fishermen. The same is true for much of the monsoon-affected regions of Asia, where many households become full-time seasonal fishers on the floodplains during the rainy season [34]. Fishing then is just one component (whose contribution not only varies both between and within communities, but also fluctuates from week to week, season to season and even year to year) of complex, and frequently highly diversified household livelihood strategies.

While Béné's [5] search for a new poverty-oriented fisheries development paradigm did not explore differences in vulnerabilities and the (related) reliance on fishing activities of 'fisher households', this was redressed in his later work for FAO. *Small-Scale Fisheries Assessing their Contribution to Rural Livelihoods in Developing Countries* [35] recognizes vulnerability, albeit in a somewhat tautological fashion '... fishing activity may be seen as a source of vulnerability, where vulnerability becomes a source of poverty: people are more prone to poverty because they are more vulnerable; and they are more vulnerable because of the type of activities they pursue, namely fisheries'. Similarly, FAO [36] acknowledges that 'fishing is not a full-time occupation but represents one component of multi-activity livelihood strategies developed by individuals and households', which can help reduce vulnerability through risk-spreading. The importance of vulnerability as a key dimension of fisherfolk's poverty – and of the heterogeneity of vulnerability within fishing communities – was brought into stark relief by the devastating impacts of the 2004 Asian Tsunami on coastal communities [37]. Not only were the poor disproportionately affected, but caste discrimination and other mechanisms of social exclusion also meant that the poorest and most vulnerable benefited least from subsequent disaster relief and rehabilitation efforts. Similar findings have been reported with respect to vulnerability to flooding in Andhra Pradesh, India [38].

In a parallel development, Smith *et al.* [39] have produced a framework which fuses a broader, multi-dimensional conception of poverty into the livelihoods literature on household responses to both covariant risk and the local institutional and policy environment. This enables them to not only begin to capture the diversity (in terms of wealth, social status and fishing practices deployed) within (and between) fishing communities stemming from differences in asset endowments, fishing methods, resource rights, and the livelihoods strategies employed, but also emphasize the role of markets and the macro-economic environment in helping to assuage fisher poverty. These ideas both reflect and reinforce the earlier work by Allison and Ellis [40] who regard the livelihoods approach (LA) as bringing a fuller 'understanding of fisherfolk's adaptive strategies into the policy arena of small-scale fisheries management in low income countries'.

Table 1 The livelihoods approach (LA) framework

A	B	C	D
Livelihood platform	Access modified by	In the context of	Resulting in
Assets	<i>I. Social relations</i>	<i>I. Demographic and technological change</i>	Livelihood strategies
Natural capital	Gender	Population growth	
Physical capital	Class	Migrational trends	
Human capital	Age	Technological change	
Financial capital	Ethnicity	<i>II. Policy changes</i>	
Social capital	<i>II. Institutions</i>	Global	
	Rules and customs	Protocols/Conventions	
	Land and sea tenure	Macro-policy	
	Markets	Micro-policy	
	<i>III. Organizations</i>	<i>III. Shocks</i>	
	State government	Storms	
	Local administrations	Recruitment failures	
	NGOs	Diseases	
	Community Associations	Civil wars	

Fisher Livelihoods

The LA, although particularly pertinent in the case of fisher households for the reasons alluded to in the preceding sub-section, has only recently infiltrated the literature analysing fisher poverty. Instrumental in this regard has been the work of the Sustainable Fisheries Livelihoods Programme (SFLP, 1999–2006), a major fisheries development and management project extending across 25 West African countries, which sought to better understand the nature of small-scale fishery production systems: and thereby more effectively target development intervention and community-level poverty reduction strategies [41] in a region where seven million people directly depend on marine/freshwater fisheries. Starting from the premise that the most robust livelihood systems exhibit a combination of low sensitivity (to covariant risks) and high resilience (the ability to recover swiftly from unexpected events), livelihood analysts seek to disentangle the complexity of individual and/or household survival strategies. Central to this approach is the notion that ‘the crucial determinants of households’ ability to achieve increased well-being are their access to capital assets ...’ [42]. These assets which, in Allison and Ellis’s parlance [40], form the livelihoods platform, are broken down into five categories (Table 1, column A).

Clearly, the nature of these assets will vary from context to context; the natural capital accessed, the physical capital controlled, and the social capital enjoyed by the *kror bamphoi* in the lower Khmer villages [26], for example, is markedly different from that encountered among the fisher-farmer households of Orissa [29]. However, access to these assets (whether in the lower Khmer villages or Orissa’s coastal regions) is nevertheless conditional upon prevailing societal and institutional constraints and opportunities. Hapke’s work in Kerala [43],

for example, describes how the interplay of gender and caste-religion (column B) in the context of economic transformation (fishery mechanisation and growing Gulf migration) and ecological crisis (overfishing) (column C) has wrought profound change in household livelihood strategies (column D). No longer do women from non-boat owning households dry fish for non-kin boat owners but, in those instances where migration income has permitted, many households deliberately withdraw women from the fish economy, owing to its perceived low status. Similarly, earlier work by Bort [44] has shown how the mechanization of plantation rice and sugar production in Panama largely expunged the demand for peasant labour (human capital in livelihood terms – column A). This, in conjunction with an open access coastal waters regime (column B) in the context of a growing international market for shrimp (column C), precipitated a sharp influx of displaced households into the artisanal coastal shrimp fishery. The outcome (the number of participants in the fishery increased more than eight-fold within a generation) represented a sharp re-alignment in local livelihood strategies (column D).

The livelihoods approach has gained increasing currency as an analytic framework in the socio-economic literature on small-scale fisheries. Pivotal in this respect was Neiland and Béné’s text on *Poverty and Small-scale Fisheries in West Africa* [45]. Drawing together early findings from the SFLP programme, contributors mapped out the scale and nature of poverty within West Africa, the multi-faceted dimensions of poverty within the artisanal fishing communities of the region, and how the LA could be modified and thence applied in helping devise optimal poverty-reducing policy interventions. Failler and Kane [46], for example, used the LA to delineate strategies to support the Dionewar and Foundiougne communities in the Saloum delta of Senegal; Satia *et al.* [47] reconcile the

LA with co-management arrangements in Aby Lagoon (Côte D'Ivoire); while Horemans [48] uses the five asset categories identified by livelihoods analysts to diagnose potential local policy interventions – and then links this diagnosis to actual SFLP community projects implemented.

Subsequently, there has been a proliferation of studies embracing the LA within the field of fisheries. The Asian Development Bank [49], for example, has applied the framework to small-scale freshwater aquaculture development, asking how fish farming can contribute to livelihoods (and thereby reduce poverty). Muir [50] details how people living on Asia's floodplains and deltas are increasingly integrating pond aquaculture into their small-holder farming systems – as well as continuing to engage in capture fisheries in rivers, irrigation and drainage canals and floodplain lakes. Diei-Ouadi and Mensah [51] and Neiland and Béné [52] have focused on livelihoods and trade, examining the respective roles played by exports of processed fish and local fish marketing channels in community livelihood strategies across selected West African countries. Meanwhile, Allison [53] has argued that the diversification and risk-spreading behaviour that characterizes the LA to fisheries in the developing world is equally applicable in the context of European inshore fisheries.

In the Asia-Pacific region, the STREAM Initiative held a series of international training workshops in 2004/05 so as to develop and document mechanisms for training in livelihood approaches and analysis (and to build national capacity to conduct livelihoods analysis) as part of its livelihoods programme, and a number of regional publications have ensued [54]. In addition, Livelihoods Connect [55] acts as a global repository for a variety of materials oriented to creating sustainable livelihoods to eliminate poverty (although not all are relevant to fisheries/aquaculture), while the DfID-funded Fishery Management Science Programme (FMSP) provides an incisive four-page policy brief on fisheries and livelihoods which summarizes contemporary knowledge on the theme [56]. The latter document, while acknowledging that the LA is now beginning to receive the research attention it merits, rather significantly also signals the need for further work to promote: '... the inclusion of fisheries in [national] poverty reduction strategies through recognition of their importance to the livelihoods of the poor'.

Fisheries and Poverty Reduction: the Macroeconomic Dimension

Historically, although many articles have documented the dynamic growth in marine capture fisheries and aquaculture in the post-war period (see, for example [57, 58]), and some have commented on the contribution of fisheries development to economic growth (see, for example [59–61]) and trade expansion (see, for example [62, 63]),

rather fewer have examined the role fisheries development can specifically play in poverty reduction at the national level.

These latter articles generally refer somewhat indirectly to poverty reduction via their emphasis on the sector's contribution to domestic nutritional requirements and/or food security. Kent [64], for example, expresses concern that decreasing fish supplies at the national level (whether the result of overfishing and/or increased fisheries exports) will increase domestic fish prices, with adverse nutritional consequences for the poor who depend on fish as a major source of animal protein. To emphasize his point he notes that per capita supplies fell by more than 25% in 24 countries (six from Sub-Saharan Africa) over the period 1978/80 and 1988/90. FAO [11] similarly note the nutritional value of fish in terms of food security before going on to identify differing ways in which small-scale fisheries contribute to household poverty alleviation and support food security objectives at the national (and household) level. While Heck and Béné [65] do not focus explicitly on the fisheries-poverty nexus, in analysing the potential contribution of African fisheries to the local attainment of the MDGs they illustrate how fisheries can play an integral role in advancing the socio-economic and human development agenda.

Other authors have focused on the specific role aquaculture can play in enhancing national food security (see, for example, [66, 67]). While Hishamuda and Ridler [68] emphasize the potential for commercial aquaculture development in Africa to enhance food security indirectly through its contributions to national and household incomes, Zwirn [69] cautions that prospects for improved Egyptian food security via yield and productivity gains in aquaculture may be frustrated by equity and political access problems. Ahmed and Lorica [70] examine aquaculture's potential for enhancing food security in Asia. Positive income, consumption and employment effects confirm the sector's potential to feed through into poverty reduction – although the authors warn that national aquaculture policies will need to 'address the food security and poverty questions more sharply than has been done at present'. An analysis of the impacts of aquaculture in the Philippines [71] is much more encouraging, showing that coastal aquaculture, both commercial and small-scale, has created employment opportunities for the poor and has contributed significantly to reducing both poverty and inequality in coastal communities.

The policy issue is also to the fore in the empirical work of Heady [72] and Daniels [73] who show how particular policies (gear restrictions in the former, rights redistribution in the latter) could impact upon poverty in inland fisheries in Bangladesh and South African coastal fisheries respectively. IMM [74] also link poverty to policy, but this time the spotlight is on the post-harvest sector and the challenge of developing field tools that

improve understanding of (and inform policy in) the sub-sector.

FAO too, concerned that governments hardly considered the fisheries sector in the process of policy and strategy formulation for rural development, and that fisheries and aquaculture were (often) not seen as relevant in the context of poverty alleviation, commissioned a global study to discover the extent to which the sector appeared in national Poverty Reduction Strategy Papers (PRSPs), National Development Plans (NDP) and donor support documents [75]. For this, 281 national or donor support strategies (85 PRSPs/NDPs, 196 donor support programmes) were analysed using a four-point content analysis technique for evidence of fisheries issues, fisheries actions, sectoral involvement in the policy-making process, and linkages between fisheries and poverty. In general, the latter theme was less effectively mainstreamed into national policy documents than the other three themes, ten countries being adjudged to have elaborated upon the linkage, and just one, Cameroon, being cited as 'best practice' (in contrast, 46 countries [54% of sample] failed to acknowledge any link between poverty and fisheries). Although these findings were not wholly unexpected, given the diminutive size of the sector in countries like Nepal and Bolivia, the oversight was more surprising/preoccupying (as the FAO circular [75] went on to point out) in countries where the sector is an important contributor to daily animal protein consumption (Tanzania) and/or primary exports (Thailand), and/or is an important employer (Ecuador), or where the coastal state suffers from endemic rural poverty (Guinea-Bissau). This research subsequently provided the inspiration for a series of regional analyses examining poverty and policy in the context of fisheries and national development planning in Asia, Africa and Small Island Developing States, as well as articles offering a more general overview of the mainstreaming of fisheries into PRSPs and the development strategies of major fish producing nations [76–79]. It has also triggered interest at the World Bank into the more effective embedding of fisheries into national poverty reduction strategies, and by extension, macro-economic development plans [80].

The research moreover also highlighted that while women often play an important/critical role in small-scale fish supply chains across the developing world, this role had nevertheless largely been ignored in the formulation of national poverty reducing strategies. Equally, the circular [75] suggested too that there was a need to attune the fisheries discourse so as to ensure the more effective promotion of pro-poor (fisheries) development policies. Recognition that fisheries has a strong potential for pro-poor growth led the OECD [81] to counsel politicians and fisheries managers that if this were to be the case then; (i) industrial fishing activities must not harm the poor, (ii) a greater share of fisheries profits/rents must be captured through taxes and (iii) fishery revenues generated must be ploughed back into pro-poor expenditures. Similarly

focused research by Macfadyen *et al.* [82], which investigated the linkage between the international trade in fisheries products and the livelihoods of poor aquatic resource users in Asia, further identified 14 criteria necessary to ensure that trade in shrimp and ornamental fish products is pro-poor. In a similar vein, Nomura [83] has suggested six general conditions (preferential access to fishery resources for small-scale fishers, decentralization and sharing of management responsibilities, adoption of rights-based management, diversification of livelihoods and improved post-harvesting, enhanced integration/linkages with other economic sectors and additional financing) which may help to deliver a pro-poor fisheries management policy. To date, however, little research has been undertaken to examine whether contemporary fisheries policy across the developing world is indeed adopting a more pro-poor stance.

Nevertheless, while macro- and sectoral policy can create an improved scenario for poverty reduction within the fisheries sector, macro- and sectoral policy alone will generally be insufficient by itself, and specific local policy interventions may also be necessary.

Fisher Poverty and Local Policy: why a Heterogeneous Response is Needed

It is apparent from the earlier discussion that the subtleties and complexities of fisher poverty at the local level are unlikely to be resolved by a homogeneous national policy response. A 'one size fits all' approach to poverty reduction is too crude, and will mostly fail. As Allison and Ellis [40], Smith *et al.* [39] among others have noted, effective interventions require a more nuanced (local) knowledge of the particularities of poverty facing people who fish, or who are dependent on fishing for all or part of their livelihood. The nature of the risks and opportunities people face will be a complex product of the ecological attributes of the fishery, markets, the social dynamics that influence access to fishing and associated assets (e.g. boats, land and infrastructure), and their dependence on fishing. Just as the vulnerabilities and nature of poverty will vary enormously, so must the policy responses designed to meet the challenge. For example, policies to enhance fisheries management and reduce poverty in Cambodia's Tonle Sap Lake fisheries will be very different from those designed to improve the lives of households dependent on *bêche de mer* (sea cucumber) fisheries in the Solomon Islands.

The fisheries of the Tonle Sap are extremely complex. The production of the system is driven to a large degree by the timing and magnitude of flood pulses in the main channel of the Mekong River [84]. This ecology is vulnerable to modification from water appropriated for irrigation and hydropower, from alteration of water flows from infrastructure, as well as habitat destruction in seasonally flooded wetlands. Just as the ecology plays out

over a large scale, so too do the social and management processes. The majority of fishers are seasonal or part-time, and management authority is distributed among community organizations, private lot concessionaires, and national and sub-national authorities. Overlapping and often ambiguous mandates operate at many scales (see, for example [85–88]). Consequently, as Andrew *et al.* [89] note, policy interventions directed to clarify (and reconcile) the scales of power, responsibility and accountability would be better rewarded than more narrowly focused interventions intent on limiting catches or fishing effort.

In contrast, the major threat to the *bêche de mer* fishery comes from catching too many animals. Fisheries for sea cucumbers in the Solomon Islands, as in many other developing coastal states, are in crisis (see [90, 91]) as a combination of commercial value, and the preferred shallow water habitats and sedentary nature of the species makes them vulnerable to over-harvesting. The threats are therefore largely internal to the domain of the fishery, and solutions will involve management interventions to limit fishing. Restocking may be of value when placed within broader management initiatives (see [92, 93]). Because entitlements to fish are relatively secure and traditional social institutions are intact (but central government is weak) in many places in the Solomon Islands, promoting a full range of adaptive co-management approaches which build on existing local institutions may be best rewarded.

The above examples of two quite radically different fishery systems make the contrast in terms of necessary policy interventions almost trivially obvious. Nevertheless, the need for tailored policy responses is no less important when the differences are less marked. For example, as customary tenure is contested in some places in the Solomon Islands [81] co-management regimes based on local custodial responsibility may not be as effective in these locales. There is an ongoing need, then, to synthesize and refine the various typologies and conceptual frameworks presently proposed [35, 39, 40, 95–99] so as to better analyse local realities, and thereby identify appropriate entry points for effective local policy interventions. Although there are many frameworks for analysis of fishery systems, schemes or frameworks to guide the scientific advisory process and policy/management implementation that follow are poorly developed. This conclusion is particularly true in the context of devising locally-appropriate poverty reduction strategies for implementation in small-scale fisheries across the developing world [89, 100, 101].

Conclusion

Based on a review of the literature on poverty in fisheries and attempts to reduce it, it seems that income poverty may not always be the most significant dimension of economic and social deprivation in fishing communities.

Consequently, there is an imperative to develop more appropriate frameworks to guide our research on understanding both the complexity and drivers of poverty, and to inform policy responses at scales appropriate to the context-specificity of many drivers of both poverty and resource degradation in fisheries.

However, understanding the extent, the multiple dimensions and the drivers of poverty among small-scale fishers may often seem a subsidiary problem to fishery sector management and governing agencies faced with a (fisheries) resource ‘crisis’. Indeed, the World Bank’s ‘Saving Fish and Fishers’ [2], for example, tends to regard the latter simply as a by-product of the former. Yet, in the context of poverty, this linear causality may not apply. In the small-scale fisheries sector across the developing world (where participatory styles of governance are increasingly advocated) poverty and the related dimensions of human insecurity (vulnerability, social exclusion, etc.) may constrain fishers’ ability, and reduce their incentive to engage with state agencies in the co-management of fisheries. In turn, weakly governed fisheries erode the resilience of fishing communities by exacerbating poverty, vulnerability and resource degradation [89].

Based on these propositions, two recent FAO policy documents [102, 103] claim that both sustainable fisheries and goals related to poverty reduction can be more readily achieved by reducing fishers’ vulnerability and strengthening their claims to basic human rights. These are plausible promises, which resonate with thinking in the broader environment-development field: but, at present, they lack empirical testing. The key research task is therefore to examine whether poverty reduction, in the form of vulnerability reduction or promotion of social inclusion, is indeed compatible with (or even necessary) for improved fishery governance.

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AQ1: Please provide the page range for ref [12], [13].

AQ2: Please update [89].