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1 **Environmental fixes and historical trajectories of marine resource use in Southeast Asia**

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5 **ABSTRACT**

6 This paper emphasises the long-term historical trajectories of marine resource use in the
7 Philippines through an examination of successive environmental fixes. Drawing on
8 qualitative data from coastal Mindoro province, the paper shows how the technological
9 intensification and geographical expansion of fisheries, the development of aquaculture and
10 the promotion of tourism represent three forms of environmental fixes that aim to address the
11 problems caused by marine resource declines and subsequent lack of availability of means of
12 production. All three fixes have struggled to reduce environmental pressure or provide a
13 long-term basis for livelihoods. The paper argues that viewing how successive types of
14 environmental fixes unfold over long periods of time highlights how marine resource declines
15 are part of much wider economic and historical processes, with consequent implications for
16 livelihoods and governance.

17 **1. INTRODUCTION**

18 A central challenge facing coastal communities globally is how to address widespread
19 declines in marine resources (Pauly and Zeller 2016). Such resource declines have significant
20 impacts on livelihoods and food security (Golden et al. 2016), and are experienced
21 particularly strongly in developing countries such as the Philippines, where viable alternative
22 livelihoods may be limited, and poverty rates are often high (Eder 2009; Jentoft and Eide
23 2011). Governments and non-government organisations (NGOs) have aimed to address

24 marine resource declines through governance interventions ranging from spatially-based tools
25 such as marine protected areas (MPAs), to national legislative reform, to regional fisheries
26 agreements (Campbell et al. 2016; Pomeroy 2015). Yet such governance interventions, and
27 the academic frameworks that underpin them, rarely directly address the capitalist processes
28 that drive marine resource use (Newell 2011). Instead, capitalism is usually taken as a
29 broader structural norm that goes unquestioned.

30 In this paper I argue that patterns of marine resource use in developing countries have
31 proceeded by a series of environmental ‘fixes’ (Castree 2008; Bakker 2009) that are central to
32 the nature of capitalism. Building on the work of Harvey (1982), the notion of environmental
33 fixes shows how capital seeks to temporarily overcome environmental crises through a range
34 of short-term solutions that allow it to continue to accumulate. As critical scholars on
35 capitalism argue, the dynamic of accumulation and ‘ceaseless growth’ is central to capitalism
36 (Marx 1976; Harvey 2010), and depletes the natural resources that such accumulation is
37 ultimately based on (O’Connor 1988; Moore 2015). Varied forms of environmental fixes
38 have emerged as an effort to solve the problem of depleting natural resources: from
39 geographical expansion of production to other locations, to technological development, to
40 market-based conservation (Castree 2008; Büscher and Fletcher 2014; Ekers and Prudham
41 2015).

42 I focus on three different types of marine resource use through the lens of environmental
43 fixes, exploring how capitalism is central to their development over time: fishing, aquaculture
44 and tourism. These three shifts reflect broader historical patterns of human engagement with
45 the natural environment: seeing nature progressively as a source of extraction (fishing), as a

46 site for cultivation and farming (aquaculture), to an object for contemplation (tourism)¹.
47 While marine resources in capture fisheries and aquaculture are consumed as food, in tourism
48 they are marketed as aesthetic objects. Over the course of the twentieth century, small-scale
49 and commercial fisheries alike rapidly intensified in order to overcome the limits to increased
50 production, expanding geographically and with new technology. And while capture fisheries
51 remain highly significant, their capacity to generate new value is declining. Aquaculture and
52 tourism are two more recent forms of marine resource use that have flourished as fixes to the
53 problems of marine resource decline, allowing capital to continue to accumulate. Versions of
54 these three fixes represent dominant trends for coastal livelihoods in much of Southeast Asia
55 (Butcher 2004; Fougères 2008; Marschke and Betcherman 2016).

56 The next section develops the notion of environmental fixes and discusses how it relates to
57 dominant framings of resource decline. After outlining the background to the fieldsite and
58 introducing the research methods, I then present how these environmental fixes have
59 historically manifested in the Philippines at the national and community scales. I argue that
60 current problems of resource decline can be viewed as the outcome of a long-term historical
61 trajectory of marine resource use involving multiple environmental fixes. I conclude by
62 discussing the consequences of these environmental fixes for livelihoods and governance.

63 **2. MARINE RESOURCE GOVERNANCE AND ENVIRONMENTAL FIXES**

64 Policymakers in Southeast Asia and beyond have responded to the problem of declining
65 marine resources through a wide range of initiatives, especially since the 1980s and 1990s
66 (Ratner et al. 2014; Pomeroy 2015). Co-management, ecosystem-based fisheries
67 management, marine spatial planning and resilience, for example, are influential governance

¹ There are many related approaches to describing such historical shifts, from Moore's (2015) notion of commodity widening followed by deepening, to ideas of first to third nature (e.g. Dressler 2011) that stretch back to the Roman philosopher Cicero (2008).

68 frameworks that have led to significant legislative reform (Pomeroy et al. 2010; Evans et al.
69 2011; Ratner et al. 2014). These related governance frameworks have also led to significant
70 outcomes – for example, the Philippines has now established more than 1700 MPAs across
71 the country (MPA Support Network 2014). However, these interventions for environmental
72 sustainability conventionally focus on the site of fisheries production and the resource users
73 that are being managed, and until recently have rarely directly addressed the intimate
74 relationship between fisheries and capitalism (Davis and Ruddle 2012).

75 This lack of a focus on capitalism in both governance practice and the fisheries governance
76 literature has been changing in recent times, in particular with the development of ‘market-
77 based solutions’ to the problems of overfishing. An emerging governance trend is to promote
78 market-based tools such as certification, sustainable seafood campaigns and Fishery
79 Improvement Projects in order to create more sustainable markets (Barclay and Miller 2018).
80 In the environmental science literature, markets are now increasingly recognised as central
81 drivers of the state of fish biomass, and as key to understand if fisheries management is to
82 improve (Cinner et al. 2013). There is also a growing literature on fishery value chains and
83 seafood trade in developing countries (e.g. Wamukota et al. 2014; Crona et al. 2015;
84 Kittinger et al. 2015; Béné et al. 2016).

85 Yet despite this recognition of the importance of markets in the more policy-oriented
86 governance literature, there is little critical interrogation of the more fundamental capitalist
87 processes at play (Campling et al. 2012; Davis and Ruddle 2012). Instead, the wider capitalist
88 system is taken as an unquestioned reality, and the goal is largely restricted to working with
89 markets to soften their edges. In part this is related to language: ‘markets’ tend to represent a
90 more neutral description of the economy, while the term ‘capitalism’ implies opposition to it
91 (Newell 2011: 5). Similarly, although there is increasing interest in the field of marine
92 historical ecology (Kittinger et al. 2014; Schwerdtner Mánêz et al. 2015), the emphasis in

93 these studies is rarely focused on economic histories of marine resource use, and more often
94 on understanding ecological baselines or traditional management institutions.
95 Correspondingly, studies that do deal with economic histories of marine resource use (e.g.
96 Roberts 2000; Butcher 2004) rarely directly address the capitalist processes underlying these
97 patterns.

98 In contrast, critical scholarship on historical forms of capitalism and natural resource use has
99 drawn closely on the work of Marx, viewing capitalism as an historically specific mode of
100 production. A key emphasis of this historical materialist perspective is on the ways in which
101 capitalism must dynamically shift in order to overcome limits to the flow and growth of
102 capital. As Harvey notes, there are a range of potential bottlenecks to the flow of capital that
103 can precipitate a crisis (2010). There is a large theoretical literature concerned with the crisis
104 of over-accumulation that occurs when capital produces more than what can profitably be re-
105 invested, but this is not the focus of this paper. Instead, I focus on the more straightforward
106 crisis of lack of availability of the means of production – in other words, declining marine
107 resources. As a range of authors in the Marxian tradition have articulated from standpoints
108 with different emphases, capitalism relies on a natural resource base, but in its need for
109 ceaseless growth, inevitably degrades and depletes the very resource base it requires
110 (O'Connor 1988; Moore 2015).

111 Capital responds to bottlenecks and crises such as those induced by degradation of the means
112 of production via various 'fixes' that temporarily resolve the problem, but do not address the
113 'systemic risks' (Harvey 2010). Harvey's notion of the 'spatial fix' to describe 'capitalism's
114 insatiable drive to resolve its inner crisis tendencies by geographical expansion and
115 geographical restructuring' (2001: 24; see also 1982) was the first and most fundamental
116 development of this notion, but researchers now use the term 'fix' to describe various ways in
117 which capitalism seeks to temporarily overcome environmental crises (Ekers and Prudham

118 2015). Castree (2008) highlights four types of ‘environmental fixes’ that neoliberal
119 approaches to the governance of natural resources generate: market-based conservation and
120 management; creating new markets from the natural environment; the intensification of
121 existing resource-use patterns for short-term profits; and minimising the role of the state in
122 the governance of natural resources. Thus, environmental fixes may simply intensify short-
123 term extraction, or are able to reduce pressure on natural resources for at least some period of
124 time. Frequently, such fixes are centred around the development of new technologies (Clark
125 and York 2012). Environmental fixes, from this perspective, are not a ‘conscious’ effort to
126 improve the environment, and are not necessarily driven only by the state. There are many
127 other ways to describe the three environmental fixes I focus on in this paper: fisheries growth
128 as national or community development, or as a response to perceived under-exploitation, for
129 example, or aquaculture as a response to food security needs. The value of the lens of
130 environmental fixes is that it shows how they are all connected through underlying processes
131 of capital accumulation.

132 Existing scholarship on the political economy of fisheries and the environment, while not
133 always using the language of environmental fixes, has illuminated some of the underlying
134 processes taking place. The first type of fix to the problem of marine resource decline
135 involves the intensification of fishing effort via geographical expansion and technological
136 development. For example, Clausen and Clark (2005) highlight how overfishing is ‘the
137 product of competitive markets propelling technological advance, as capital sought to
138 surmount social and natural barriers to accumulation’ (440; see also Longo et al. 2015).

139 Similarly, Mansfield argues that the crisis of overfishing of capture fisheries is a problem
140 caused by the industrialisation of fisheries for economic development, not by the apolitical
141 ‘tragedy of the commons’ model (Mansfield 2011a). Such intensification of marine resource
142 extraction has been progressively taking place over many decades, globally (Roberts 2000).

143 Recent research suggests that from 1950 global catches increased steadily, peaked in 1996,
144 and have been declining strongly since (Pauly and Zeller 1996).

145 The decline of wild capture fisheries has helped stimulate a second type of fix, centred
146 around aquaculture. Aquaculture is a ‘technological fix’ that seeks to overcome the capitalist
147 crisis of overfishing of wild capture fisheries by developing new ways of producing fish
148 (Clausen and Clark 2005; Mansfield 2011b; Saguin 2015). Growing particularly fast since the
149 early 1990s, aquaculture now provides roughly half of the world’s food fish, and has
150 contributed virtually all the growth in global availability of fish since around 2000 (Troell et
151 al. 2014). The logic is that by systematically farming fish, not simply extracting them directly
152 from nature, societies will be able to keep producing fish into the future. While aquaculture
153 currently still relies heavily on wild capture fisheries as feed, the goal is to progressively
154 develop new feed technology that will allow such farming to become more sustainable in the
155 long-term.

156 While the intensification of fisheries and the development of aquaculture are well-understood
157 as individual environmental fixes, scholars on the political economy of fisheries have yet to
158 consider the implications of tourism as an additional environmental fix for marine resources.
159 Eco-tourism, for example, creates a new market by stimulating new ways of valuing (marine)
160 resources and generating new accumulative possibilities (Fletcher and Neves 2012: 65).

161 Through utilising natural resources in an apparently more sustainable way, ecotourism can be
162 seen as a third type of fix for the problems generated by environmental decline (Fletcher
163 2011; Fletcher and Neves 2012). Fishers involved in unsustainable extractive livelihoods are
164 encouraged to transition to non-extractive livelihoods centred around maritime tourism
165 (Fabinyi 2010). However, maritime tourism can also stimulate further extraction of marine
166 resources as food for tourists. It is important to note, therefore, that these environmental fixes
167 do not simply supersede each other as linear chronological phases, but can co-exist and inter-

168 relate. Similarly, where the new capital comes from to generate these environmental fixes,
169 and the effects that they have on labour and marine resource use remain highly variable in
170 different settings (Bernstein 2010). The capacity of environmental fixes such as these to
171 specifically resolve resource declines or to provide strong livelihood support is very much
172 unresolved: the very use of the term fix suggests that ‘as in the case of the drug addict, the
173 resolution is temporary rather than permanent, since the craving soon returns’ (Harvey 2001:
174 24).

175 To date, most critical studies of environmental fixes in the marine resource realm have
176 focused on the related but distinct issue of neoliberal fisheries governance, in both developed
177 (e.g. Mansfield 2004; Carothers and Chambers 2012; Silver and Hawkins 2014) and
178 developing countries (e.g. Seki 2009; Segi 2014). Such analyses are more often directed
179 towards the narrower question of specific types of state governance interventions, such as
180 MPAs, in the contemporary period. In this paper, I adopt a broader lens to examine the
181 historical development of environmental fixes. An emerging political economy literature on
182 marine resource use has provided significant insights about the processes underlying other
183 environmental fixes for marine resources, which include geographical expansion,
184 technological intensification (e.g. Campling 2012; Clausen and Clark 2015), and aquaculture
185 (e.g. Mansfield 2011b; Saguin 2015). However, fewer studies have considered how multiple
186 types of environmental fixes, additionally coastal tourism, unfold over time, or examined in
187 detail the implications for livelihoods and governance.

188 The contribution of this paper is twofold. Firstly, I show how current patterns of marine
189 resource use and the current state of marine resources can be explained by long term
190 historical trajectories composed of multiple environmental fixes. From this perspective,
191 recent governance interventions are viewed not in isolation as examples of neoliberal
192 governance, but as part of much broader historical processes of capitalism. Secondly, I take

193 the pragmatic dimensions of such an analysis seriously by considering the implications of
194 multiple environmental fixes for livelihoods and current dominant governance models for
195 fisheries in Southeast Asia. Declining marine resources have the potential to significantly
196 negatively impact livelihoods through reducing both income and fish to eat. Examining how
197 historical trends of environmental fixes affect coastal livelihoods is an important step to
198 understand the prospects of changing such trajectories. I analyse the experience of the three
199 fixes I focus on (fishery expansion and intensification, aquaculture [seaweed farming], and
200 tourism) at multiple scales: firstly analysing the development of these fixes at the national
201 scale of the Philippines, highlighting the widespread nature of these processes and their
202 manifestation in national policy, and then analysing trends and consequences at the local
203 community scale.

204 **3. PHILIPPINES**

205 **3.1 Fishery intensification**

206 Fisheries in the Philippines have geographically expanded and intensified over long time-
207 scales. Before the arrival of the Spanish, coastal groups across the country were long
208 involved with fishing, using diverse gears (Sampang 2007). Until the second half of the
209 twentieth century, however, fishing activities mostly remained relatively small-scale. During
210 this period, fish corrals remained the most important type of fishing gear in most coastal
211 communities of the Philippines (Butcher 2004: 112-113). During the 1930s, larger Japanese
212 fishing vessels began to work in the Philippines. Soon after World War II, the Philippine
213 fishing industry expanded rapidly, driven by expanding middle-class demand from countries
214 such as the US, and state subsidies as part of broader national development goals in the
215 Philippines. In particular, the number of trawling and bagnet (*basnigan*) vessels increased
216 dramatically, and accounted for most of the total commercial fishing landings during the

217 1950s (Butcher 2004: 184-185). Trawling indiscriminately dragged trawls along the sea floor,
218 while bagnet vessels used lights (first pressure lamps and later electrically powered) to attract
219 large numbers of pelagic fish that were then hauled up with the bagnet (Spoehr 1980). Other
220 major types of commercial fishing techniques that began to emerge in the postwar period
221 included purse seines, used to catch pelagic fish, and the notorious *muro-ami* net fishery,
222 which was eventually banned because of its negative environmental effects and its
223 association with child labour. Social relations in these fisheries became more structured and
224 oriented around formal contracts, with fishers spending long periods of time at sea.

225 At the same time, small-scale fisheries² were also being intensified through access to more
226 efficient technology and gear such as boat engines, fine mesh nets, cyanide and dynamite. For
227 example, Akamine describes how the sea cucumber fisheries of the Philippines changed from
228 skin diving to capture one highly-valued species in the 1970s, to using air pumps and
229 electronic fishfinders to dive 50-60m to capture more than 20 species by the 1990s (Akamine
230 2004). While in many cases remaining small-scale, such fishers became more closely
231 connected to international markets, and increasingly oriented their livelihood activities
232 around fisheries that generated high prices (Fabinyi et al. 2012).

233 These technological developments took their toll on the fisheries, and fishers had to
234 continually seek out new geographical frontiers and adopt new technology in order to
235 maintain catch rates. Migration of small-scale fishers to coastal locations such as Palawan
236 and Mindanao increased rapidly in the postwar period, partly in response to better fishing
237 conditions (Eder 2008). Butcher (2004) and Christensen (2014) describe how for the fisheries
238 of Southeast Asia and the Indo-Pacific respectively, exploitation followed a three-stage

² In the Philippines, 'commercial' fishing vessels are defined as those greater than three gross tons, and are only allowed to operate in waters more than 15km from the shoreline. The waters within 15km from the shoreline are reserved for 'municipal' fishers, i.e. small-scale fishers.

239 process: from the advent of industrial fishing, to its subsequent expansion across the region,
240 to the ‘closing of the frontier’ involving ‘stagnating or declining harvests as the limits to
241 growth are reached’ (Christensen 2014: 22).

242 These processes of geographical expansion and technological intensification have led to a
243 current situation of fisheries crisis in the Philippines. Small-scale fishers across the country
244 report significant and sustained declines in average daily catches (Muallil et al. 2014). The
245 FAO’s profile on Philippines fisheries notes that: ‘all of the country’s main fish species and
246 marine organisms are showing signs of overfishing...’ (FAO 2014). A recent national review
247 concluded that ‘fish catch has not increased over time (and in fact, has decreased for several
248 provinces), despite continuously increasing fishing effort in the country and the increasing
249 number of registered municipal and commercial fishers in the Philippines... Philippine
250 fisheries production is declining, with the high production volume of the aquaculture sector
251 (i.e., mostly seaweeds) masking the stagnating or declining fish catch of most capture
252 fisheries in recent times’ (Anticamara and Go 2016).

253 As a response to the declining returns from fishing, aquaculture and tourism have emerged as
254 environmental fixes. As aquaculture and tourism are more recent and still far smaller in scale
255 than fishery intensification, these next two sections are briefer. While other forms of
256 aquaculture are dominant in other neighbouring countries (e.g. pangasius in Vietnam),
257 seaweed farming dominates in the Philippines.

258 **3.2 Seaweed farming**

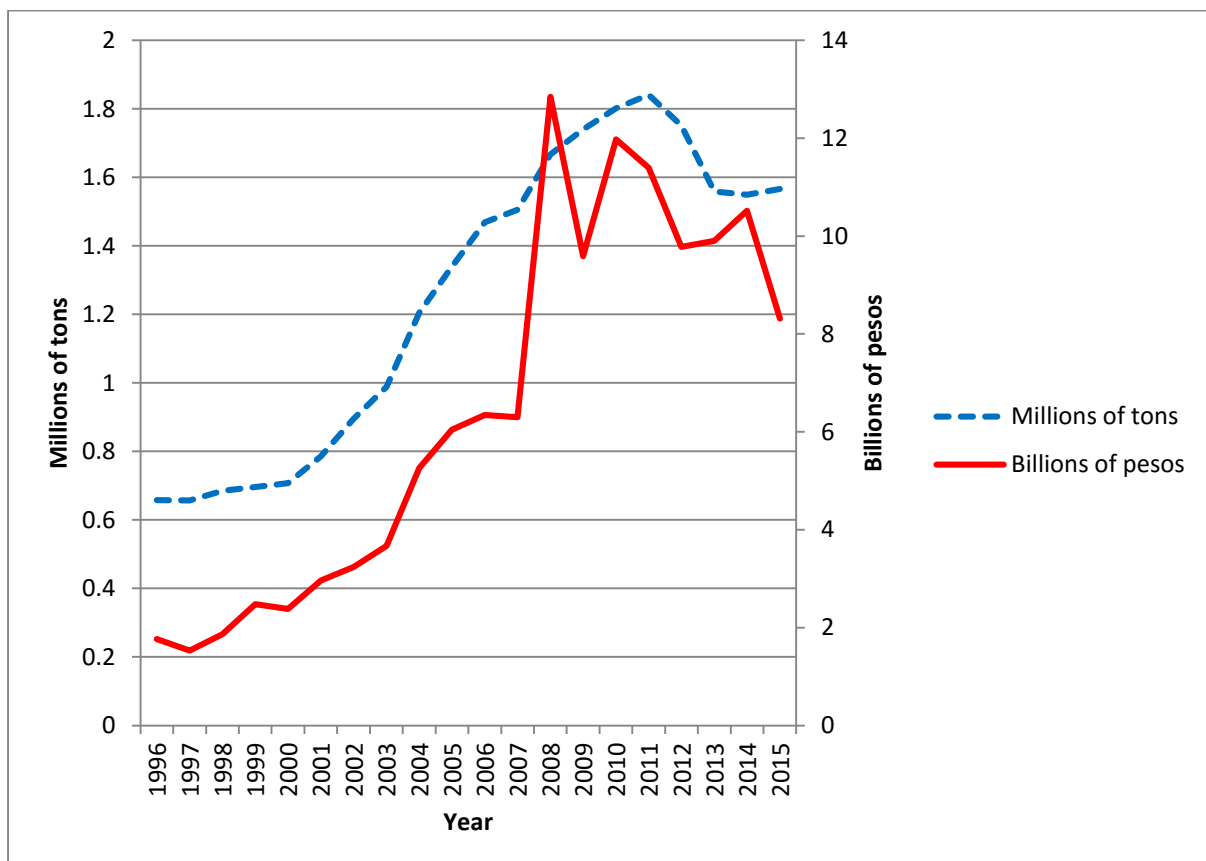
259 Seaweed production in the Philippines is mostly concentrated on the production of seaweeds
260 for the production of agar and caraganeen products, which are then used in a wide variety of
261 other products. Most production is of the genus *Kappaphycus*, with some production of other
262 genera such as *Eucheuma* and *Gracilaria* (Hurtado 2013). Production is concentrated in

263 Western and Southern Philippines; the majority of operators are small in scale (around
264 0.25ha) while there are also some large-scale farms in Mindanao (BFAR 2016: 127). Driven
265 by both strong market demand and policy support, production has consistently expanded
266 (Figure 2), to the point that seaweed farming dominates the aquaculture sector as a whole in
267 the Philippines (Bureau of Fisheries and Aquatic Resources [BFAR] 2016). Although
268 production has declined from the peak of 2011 due to outbreaks of disease and typhoon
269 damage (BFAR 2016: 37), the BFAR has a goal of increasing production by 25% from 2016-
270 2020 (BFAR 2016: 38). Seaweeds have been identified as a ‘priority commodity’, and the
271 state has strongly supported the expansion of the sector through ongoing funding for research
272 and development since at least the early 1990s (Sastrillo 2002). The BFAR, for example, has
273 a program designed to support fishers wishing to engage in seaweed farming that has
274 expanded since the late 2000s, providing equipment such as ropes and seedlings as well as
275 technical training.

276 Seaweed farming has received such strong support because it is seen as a relatively
277 environmentally-friendly activity that does not increase pressure on fish stocks, and that
278 supports livelihoods. The BFAR views seaweed farming as a highly valued export
279 commodity that can generate livelihood support (BFAR 2016), while the Department of
280 Social Welfare and Development has also promoted it as a more financially sustainable
281 livelihood activity than capture fisheries for residents on social welfare support (Klein-
282 Lankhorst et al., unpublished data). Environmental NGOs have also viewed seaweed farming
283 as a more environmentally friendly livelihood activity than capture fisheries (Hill et al. 2013).
284 As a result, Philippine policymakers and other organizations wishing to reduce fishing
285 pressure have heavily promoted seaweed farming. Seaweed farming is thus seen as one
286 among many environmental fixes that ostensibly will allow continued generation of income
287 and growth, but presumably in a more ‘sustainable’ manner than fisheries.

288 However, studies in several parts of Southeast Asia have suggested that fishers do not
 289 transition seamlessly into seaweed farming. Sievanen et al. (2005), for example, found that
 290 fishers typically adopt seaweed farming as a small-scale supplemental livelihood, not as an
 291 alternative livelihood. As such, changes in social relations also tend to be more limited.
 292 Furthermore, when Hill et al. (2013) examined the link between seaweed farming and fisher
 293 numbers in an area of the Visayan group of islands, they found that fisher numbers did not
 294 decrease and in some cases even increased. While seaweed farming has become more
 295 important over time in the Philippines, therefore, questions remain about the efficacy of its
 296 touted environmental and social effects.

297



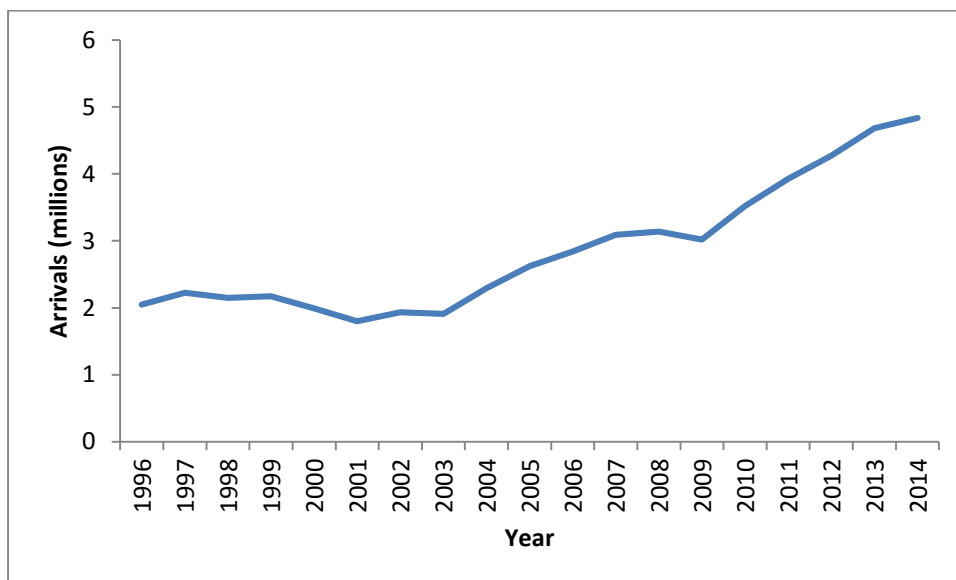
298

299 **Figure 2: Annual production of seaweed in Philippines by volume and value**

300 **Source: (Philippine Statistics Authority 2017a).**

301 **3.3 Tourism**

302 The Philippines government has strongly promoted tourism as a strategy since the 1970s. In
303 its 2004-2010 Medium Term Development Plan, the national administration included a
304 strategy to achieve 5 million annual tourist arrivals by the year 2010 (Maguidad 2013). While
305 the country was unable to achieve this level of tourists by 2010, the tourism growth rate is
306 still impressive (Figure 3). And the government sees further potential in expanding the
307 tourism industry given its relatively minor share of the overall Southeast Asian market
308 (Maguigad 2013).



309

310 **Figure 3: Tourism arrivals in Philippines.**

311 **Source: (Philippine Statistics Authority 2017b)**

312 Coastal and marine tourism forms a large part of the tourist attractions of the Philippines. The
313 official website of the national campaign for tourism, for example – ‘It’s More Fun in the
314 Philippines’ – (Department of Tourism 2017), highlights coastal activities such as the
315 beaches of Boracay and the dive tourism of the Visayan islands. Public and private
316 investments are rapidly transforming the landscapes of ‘hot’ coastal regions (Fabinyi 2010).

317 These range from small-scale household enterprises to high-end hotel chains, financed by
318 capital from Manila, elsewhere in Southeast Asia and beyond. Tourism is often been
319 explicitly planned by government and NGOs as a livelihood in coastal areas of the
320 Philippines, designed to reduce pressure on marine resources by shifting fishing livelihoods
321 to more sustainable uses. Many studies have suggested that the user fees generated through
322 marine protected areas linked with dive tourism can successfully compensate local fishers,
323 lead to new livelihoods and improve the management of coral reef fisheries (e.g. Depondt and
324 Green 2006). Apo Island in Negros Oriental is commonly highlighted as a model for how
325 fishers can potentially make more money via marine conservation and dive tourism when
326 compared to fishing (Alcala and Russ 2006). The strategy of promoting tourism as a part of
327 marine conservation and management programs is now widely employed in the Philippines
328 and the wider region, linked also to the new rhetoric surrounding the ‘Blue Economy’
329 (Barbesgaard 2016). In this way, tourism is seen as an ‘environmental fix’, offering the
330 potential for improved incomes and growth but in a more sustainable way than fishing.

331 However, critical studies have contested this assertion, highlighting both the level of
332 environmental degradation that can also arrive with tourism (Trousdale 2006), and the lack of
333 financial benefits for fishing communities. While the rhetoric may often be about ‘eco-
334 tourism’, promoting jobs and preserving the environment, in practice tourism is often simply
335 tourism that involves the environment. Many households with insecure land tenure or strong
336 rights, for example, are facing challenges to their residence rights as coastal developments
337 raise the price of coastal land, facilitating new coastal developments that squeeze out some
338 local residents (Fabinyi 2010; Dressler 2011; Knudsen 2012). Those with stronger land
339 tenure can therefore benefit more from the development of tourism. The introduction of
340 MPAs as part of a tourism development strategy by local governments can also be perceived
341 negatively by fishing households (e.g. Oracion et al. 2006).

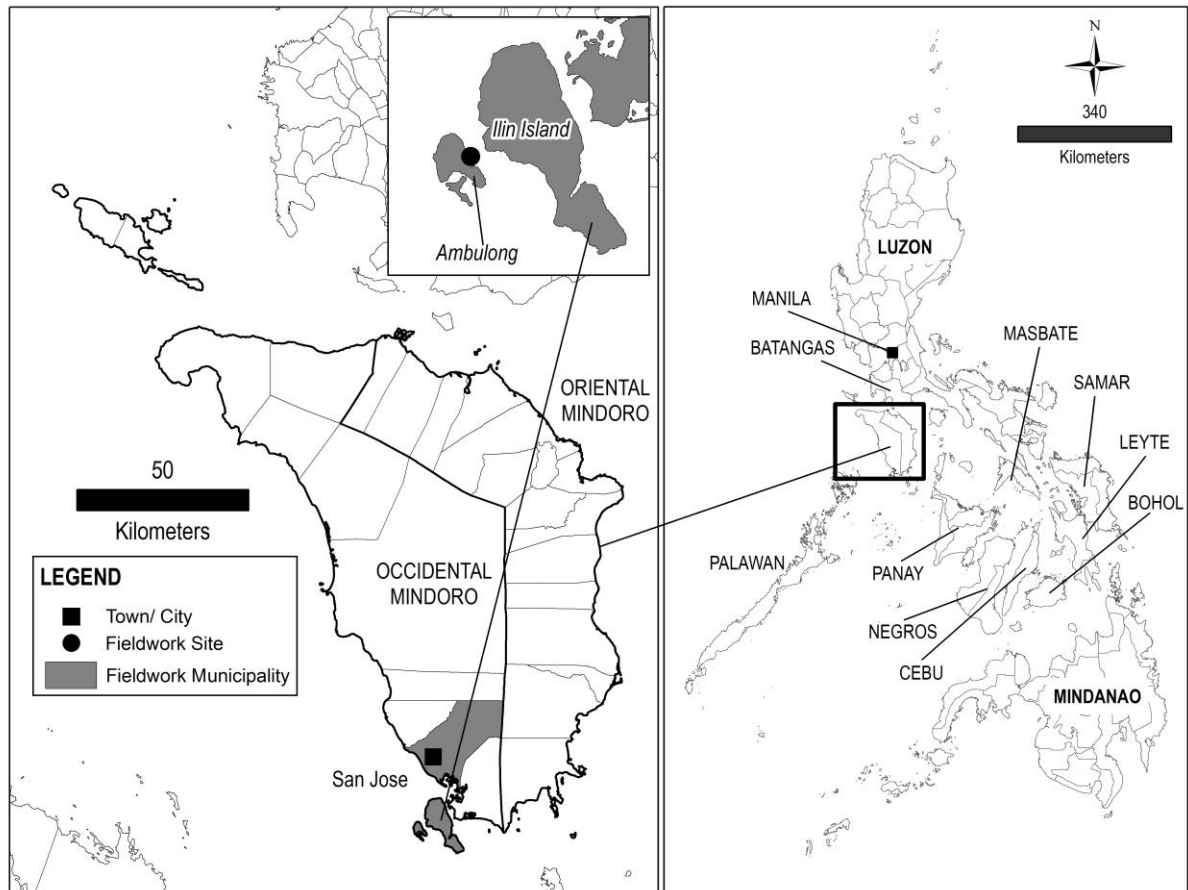
342 The expansion and intensification of fishing, seaweed farming and tourism are all central
343 ways in which circulations of capital attempt to generate value from marine resources. And
344 while the broad trajectory is to shift from extraction of marine resources to farming (seaweed
345 farming) and contemplation (tourism) of marine resources, these processes are inter-related,
346 and the outcomes at the local scale are highly uneven.

347 **4. AMBULONG**

348 **4.1 Background and Methods**

349 The island of Ambulong is part of the municipality of San Jose, which is located in the
350 province of Occidental Mindoro (Figure 1) and has a population of 143,430. Ambulong is a
351 small island of 1033 ha lying approximately 15km from San Jose town, with a population of
352 3525 (508 households). Residents are composed of migrants who arrived and settled the
353 island in the early twentieth century from different parts of the Philippines. As a community
354 with fishing, seaweed farming and tourism present to varying degrees, Ambulong is an ideal
355 site to study the interaction of these livelihood activities over time.

356



357

358 **Figure 1: Map of study site**

359 This paper draws on data from a mixed-methods approach over three fieldtrips to Ambulong
 360 in August 2014, March 2016 and June 2017. I worked with the largest community in
 361 Ambulong, which is administratively divided into two *sitios* and three *puroks*, but which
 362 forms one geographical community of 348 households with a population of 2465 along the
 363 eastern coast of the island, and which is locally referred to (and hereafter in this paper) as
 364 ‘Ambulong’. In 2014 and 2016, fieldwork centred around semi-structured interviews with
 365 residents in Ambulong (n=30), one focus group with elderly residents that focused on
 366 historical settlement and livelihood change, and four semi-structured interviews with key
 367 informants in San Jose town (government officials from the Bureau of Fisheries and Aquatic
 368 Resources and the fishport, a fish trader, and a commercial fishing captain). These semi-
 369 structured interviews and the focus group discussion were supplemented with numerous

370 unstructured interviews and observations of livelihood activities in Ambulong. The topics for
371 these interviews in 2014 and 2016 in Ambulong focused on life histories of individuals and
372 households, community patterns of marine resource use and trade and livelihood change over
373 time; and contemporary possession of assets, livelihood strategies, and social differentiation
374 within Ambulong. Income class was not explicitly considered in these interviews as a discrete
375 variable; instead, poverty was described through descriptions of experiences, household
376 assets and fish catches. Households were selected based on snowball method to encompass a
377 range of different livelihood activities (e.g. different fishing methods). In 2017 I undertook 70
378 further interviews with female household heads, asking about food and water insecurity.
379 household finances and livelihood activities. A female research assistant from the local
380 community assisted with these interviews. Interviewees were selected through purposive
381 sampling to include households of different types of fishing gears.

382 Four key informant interviews were also conducted with local leaders and health workers in
383 the community, focusing on community engagement with NGOs and government policies
384 and projects for food and water insecurity. Observations were also undertaken of livelihood
385 activities such as fishing and seaweed farming. Numerous unstructured interviews on these
386 topics with male fishers (ranging from short conversations to extended discussions of an hour
387 or more) were also undertaken.

388 All interviews were conducted in Filipino, which is the national *lingua franca* and spoken by
389 community members. Informed consent was obtained from all participants. Detailed
390 fieldnotes were taken each day during fieldwork, and these fieldnotes were subsequently
391 manually qualitatively analysed for key themes that emerged (Bernard, 2006). Statistics on
392 fisheries were also obtained from relevant government offices. The paper also draws on
393 insights from long-term ethnographic research in other parts of the coastal Philippines,
394 mostly in neighbouring Palawan province (e.g. Author XXXX).

395 4.2 Fishing

396 The development of fishing in Ambulong, San Jose and Mindoro more broadly is closely tied
397 up with wider histories of migration and economic development. The indigenous Mangyan
398 groups once were the majority population in the island of Mindoro, but from the early
399 twentieth century, migrants to what was then the relative ‘frontier’ environment of Mindoro
400 arrived from varied regions. They included Tagalogs from Batangas and Central Luzon,
401 Ilocanos and others from the Visayan group of islands (Helbling and Schult 1997). Migrants
402 settled heavily in the coastal and agriculturally productive lowlands of the Island, while
403 Mangyan groups became marginalised upland (Lopez-Gonzaga 1984). The very settlement of
404 coastal areas of Mindoro can therefore be seen as part of the intensification and expansion of
405 fishing practices described earlier at the national scale.

406 Initial settlement of Ambulong took place in the 1910s from nearby islands such as Ilin,
407 Panay, Cuyo and Agutaya (Candelario undated). Fishing was centred around the use of hook
408 and line, made from natural fibres, and various types of fish traps (*baklad* and *bubo*) made
409 from local materials such as bamboo. By the 1950s and 1960s, more migrants from the
410 Visayan group of islands began to settle in Ambulong for better livelihood opportunities.
411 They brought with them nylon nets of increasing technological complexity (e.g. driftnet,
412 bottom-set gillnet, 3-ply, fine mesh nets), and began to use motorized boats and introduced
413 ice-boxes. Elderly residents explained that at this time most fishing was done very close to
414 shore, and fish were common and easy to catch. Some fish were sold to the San Jose market,
415 or bartered for rice.

416 From the 1970s migration increased greatly, as did the arrival of many large commercial
417 boats based in Manila. The 1980s saw a further increase and intensification in marine
418 resource use. High-value commodities such as sea cucumbers began to be traded intensively.

419 The regional town of San Jose began to be developed as a hub for commercial fishing, and
420 local Ambulong residents began to work on commercial hook and line (*cascasan*, targeting
421 groupers) and bagnet (*basnigan*, targeting small pelagics) boats that operated around Mindoro
422 and in Palawan waters. Destructive fishing techniques such as dynamite and cyanide fishing
423 were also practiced intensively during this time – another example of new technologies. Since
424 the 2000s, two other forms of illegal commercial-scale fishing have emerged to become the
425 dominant types of fishing in the area. *Lintigan* is a modified form of *muro-ami* fishing, using
426 a large net and scare lines, which is allegedly widely practiced inside municipal waters close
427 to shore in Ambulong. Compressor fishing is another illegal form of fishing that has recently
428 become more popular. This latter form of fishing uses large numbers of spearfishers who use
429 hookah (compressed air) to dive at night. There are now 121 commercial fishing boats
430 registered in the municipality of San Jose (BFAR personal communication), many of which
431 fish around Ambulong.

432 As with many coastal communities of the Philippines, small-scale fishers resident in
433 Ambulong currently practice a wide range of fishing activities to catch a diversity of species
434 in different seasons. At the lowest level of capitalisation are fishers who use boats with no
435 engine and simple gears (e.g. hook and line) to catch very small numbers (e.g. <10kg/day) of
436 fish such as threadfin bream (*Nemipterus* spp). Boats with engines use crew of 2-4 people to
437 use bottom-set gillnets to target fish such as fusiliers (*Caesio* spp) and small mackerel
438 (*Rastrelliger*), or driftnets to target larger fish such as garfish (*Belone belone*). Most of these
439 fish only fetch a price of between PHP³20-P50/kg when sold in San Jose town. Spearfishing
440 and gleaning are also common, and fishers will occasionally catch small quantities of higher-

³ During the last period of fieldwork in May-June 2017, USD1 = PHP49.

441 value species such as octopus, lobster, squid and groupers. These fish are traded locally to
442 San Jose town.

443 A common theme among fishers in Ambulong was the decline in local fish catches. Gillnet
444 fishers, for example described how in the 1980s and 1990s they could frequently catch more
445 than 100kg per trip, whereas now they will be doing well to catch more than 20kg. Similarly,
446 one hook and line fisher noted that in the 1990s he used to be able to catch up to 25kg,
447 whereas now he regularly caught between 2-10kg. Official statistics from the municipal
448 office of the Department of Agriculture state that daily fish catch rates for motorized boats in
449 Ambulong are now from 5-10kg (lean season) and 10-30kg (peak season). Fishers reported
450 that catches of higher-value commodity fish such as groupers had also declined significantly
451 – one fisher noted how there used to be more buyers in San Jose town for live groupers, but
452 that because of a lack of supply several of them had stopped buying. Other valuable species
453 such as sea cucumbers were reported to be entirely fished out. The only means to obtain high
454 fish catches in the waters around Ambulong is now through large-scale commercial fishing,
455 of which the majority is allegedly composed of illegal gears such as *lintigan* and compressor.
456 The lack of opportunities for fishing in Ambulong itself has meant that many residents now
457 look for employment opportunities on other commercial vessels based in San Jose town that
458 travel to the South China Sea to target groupers.

459 **4.3 Seaweed farming**

460 Seaweed farming had begun in Ambulong in the 1990s, but expanded recently with the
461 introduction of BFAR support from the 2010s. Those engaged in seaweed farming have small
462 plots (<1ha) lying close to shore and accessible by paddle boat. Seaweed is sold to buyers in
463 San Jose town. However, for a variety of reasons seaweed farming has been unable to
464 provide a comprehensive alternative livelihood for fishing. Some fishers we interviewed

465 simply advised that they preferred the occupation of fishing to seaweed farming: they had
466 grown up learning fishing, and it was what they were good at. More common were responses
467 that emphasised how seaweed farming was viewed as a ‘backstop’ or as a supplementary
468 livelihood to their primary livelihood of fishing. Seaweed farming is widely viewed as
469 insufficient to support a household on its own. Informants frequently noted the delayed returns
470 from seaweed farming (e.g. every three months during harvest time) as a major reason why
471 the income could not replace the ‘daily’ or ‘instant’ income from fishing (see also Hill et al.
472 2012). For those who had been supported by the BFAR, they suggested that this support ‘was
473 not enough’. According to local residents, the amount of support provided by the BFAR for
474 seeds, equipment and start-up capital is only enough for a relatively small-scale operation,
475 which does not provide enough of an income to be the sole livelihood activity of a household.
476 To set up a genuinely profitable business and succeed in seaweed farming still required extra
477 capital, which many fishers do not have access to. Furthermore, those residents who indicated
478 that seaweed farming was their primary source of income still conducted fishing as a
479 supplementary source of income.

480 Fishers also emphasised the vulnerability of seaweeds as a potential reason not to rely on
481 them. One harvester noted how he had made an investment of several thousand pesos in
482 seaweed farming, but a strong storm had wiped out his crop. Since then, he had made a
483 conscious decision to have a smaller crop of seaweeds and only use it as a sideline for his
484 more reliable business of fishing. Similarly, others had been negatively affected by disease
485 such as ‘ice-ice’ (a bacterial condition generated when seaweeds are stressed). Others noted
486 how the price of seaweed had dropped significantly from earlier years to the current price of
487 just PHP15 (fresh) and PHP30 (dried) per kg. Returns from this low price for harvesters were
488 further eroded by the cost of transportation into the municipal town of San Jose: PHP1/kg of
489 cargo and an additional PHP30 fare for each passenger. Harvesters also cited social

490 conditions of the island as a reason for low economic returns from seaweed harvesting.
491 Ambulong has a reputation for relatively high levels of social problems, and several
492 harvesters stated that theft was common. As one harvester described, ‘I need to make a
493 gamble on when to harvest. If I harvest too early, the seaweed isn’t mature and I won’t get a
494 good price. If I leave it too close to the best period for harvesting, someone else will steal it
495 and sell it as their own.’

496 Seaweed farming has generated some additional income for residents, and may have reduced
497 some fishing effort through diverting some labour into seaweed farming instead. However,
498 for a variety of reasons, seaweed farming has so far been unable to generate significant
499 livelihood change in Ambulong.

500 **4.4 Tourism**

501 The municipality of San Jose is currently trying to promote itself with a slogan of ‘more than
502 just a gateway’ to the more well-known nearby tourism hotspots of Coron in Palawan
503 province and Boracay in Aklan province. Coastal tourism is a large part of the push for
504 tourism, and the government is promoting activities such as beach-hopping, snorkelling and
505 kayaking. Since it began taking detailed records in 2012, San Jose municipality has taken in
506 an average of 49,786 tourists each year.

507 Ambulong’s experiences with tourism have been ambiguous. Between 1983-2000 there were
508 no resorts on the island, but in 2000 a beachside resort was developed that attracts mid-to-
509 high end tourists (USD130-200 per night). During the peak season of March to May they
510 employ about 45 employees and have a capacity of 200 guests. Guests pursue coastal
511 activities such as kayaking, staying in cottages over the water. Local residents of Ambulong
512 have several complaints about the nature of tourism in the area. The first complaint is a lack
513 of employment opportunities. During the construction period, many local residents were

514 employed. However since then, only two are currently employed in cleaning work; all of the
515 resort service jobs are migrants. Because the tourists are simply transported from San Jose
516 town to Grace Island resort without any interaction with the local community, there is no
517 opportunity to sell souvenirs or other products to the tourists. Food for the resort is all
518 imported from town, not from Ambulong. From this perspective, local residents are very keen
519 to participate in tourism, but have had limited opportunities to do so. However, the second
520 complaint is the active impact on fisherfolk livelihoods. After some complaints from tourists,
521 the resort banned one type of gillnet fishing, which involves thrusting a plunger loudly into
522 the water (*timbog*), from being used near the resort. Local fishers explained that this specific
523 location near the resort had previously been a favoured spot during rough weather as it was
524 sheltered. However, now when there are storms, there is nowhere for them to fish. The third
525 complaint relates to a dispute over their boundaries, as some residents allege that the resort
526 has extended its boundaries beyond their legal lot via land reclamation. Ultimately, therefore,
527 tourism in Ambulong has provided few economic opportunities and has actually negatively
528 impacted livelihoods. Tensions between the tourism and fishing sectors in Ambulong have
529 strong historical resonances: a resort was developed in Ambulong in the early 1980s by a
530 British resident with a Filipina wife. Following a dispute with some fishers about dynamite
531 fishing, they were both murdered in 1983.

532 The decline in fisheries stocks, and the failure of new livelihoods to adequately generate new
533 incomes in Ambulong has had significant impacts. The government's conditional cash
534 transfer program, designed to provide social assistance and break 'poverty cycles' (Philippine
535 Government 2017) for very poor households, is assigned to 37% of households in the island
536 overall, which is an indication of a very high poverty rate. Food insecurity (e.g. unable to buy
537 sufficient rice) is common among interviewed households. Several key informants suggested
538 that social problems such as heavy alcohol use, gambling and domestic violence had also

539 become more common. As the wife of a community leader noted: ‘husbands gamble their
540 meagre earnings and so will sometimes come home with no food for their families, wives
541 become upset, and the men take out their frustrations on them’.

542 Declining returns from local livelihoods has led families to view out-migration as an
543 adaptation option. As an elderly resident described: ‘the main obligation of the parents is to
544 provide their children with an education so that they can have a better life than them’. The
545 objective for many fishing families is thus to generate enough income for their children to
546 move away from Ambulong to somewhere they can find a better life, not based on marine
547 resources. This can involve moving to the municipal capital of San Jose town, where they
548 may find work as domestic help, or as labour on the many nearby tobacco or onion farms.
549 Others may find work abroad.

550 **5. DISCUSSION**

551 **5.1 Historical trajectories**

552 In this paper I have described the historical trajectories in marine resource use that have
553 unfolded in the Philippines at national and local scales. While Ambulong is not representative
554 of the wide variation in forms of marine resource use that take place across the country, it
555 does exemplify important processes that have taken place at the wider national scale. Since
556 the postwar period migration to coastal communities increased as the intensification of
557 fishing activities took place, both among commercial vessels and small-scale fishers.
558 Fisheries rapidly expanded in scope and composition, using new technologies and expanding
559 to new fishing grounds. Increasingly since the 1980s, however, fisheries catches have
560 provided limited returns. There is much local variation, but cases of declining or stagnating
561 catches in the face of increased effort are common across the country (Muallil et al. 2014;
562 Anticamara and Go 2016). The case study from Ambulong corroborates these national trends,

563 where there do not appear to be many new types of fishing that can be profitably exploited.
564 Fishers continue to make investments in and base their livelihoods on fishing, and large-scale
565 commercial fishing vessels financed by businesses in San Jose town and elsewhere continue
566 to operate. However, the limited numbers of marine resources now available in Philippine
567 waters simply mean that the environmental fix of geographic expansion and technological
568 intensification appears to be reaching its limits.

569 Through government, NGO and private sector support and investment, and fuelled by
570 ongoing and new types of demand for marine resources, new environmental fixes such as
571 aquaculture and tourism aim to make money without degrading the availability of the means
572 of production. However, in locations such as Ambulong, households have been unable to
573 share to any significant extent in these newer environmental fixes. Seaweed farming has so
574 far provided fishers with limited financial benefits, when it is adopted it is as a supplemental
575 rather than alternative livelihood, and consequently – corroborating the findings of several
576 other studies in Southeast Asia (Sievenan et al. 2005; Hill et al. 2012) – it has not appeared to
577 significantly reduce fishing pressure. And while there is also much variation in tourism across
578 the country, to date in Ambulong, tourism has been more of a mirage than a genuinely
579 accessible alternative livelihood. The limited experiences with tourism so far have not
580 provided significant extra employment or income-earning opportunities for local residents.

581 While there is undoubtedly much variability across the country, these newer environmental
582 fixes appear to be struggling in their capacity to reduce environmental pressure by drawing
583 labour away from fishing. Furthermore, while such fixes may be accumulating capital in
584 some cases (e.g. tourism in some parts of the coastal Philippines), such capital flows often do
585 not reach marginalised marine resource users. Increasing interest from states and investors in
586 the ‘Blue Economy’ (Barbesgaard 2016) suggest that new ways of financialising marine
587 resources will continue to be a powerful trend shaping the livelihoods of coastal residents in

588 the Philippines and elsewhere. Investments in these environmental fixes will continue, but
589 questions of how the availability of the means of production will be sustained, and how
590 financial benefits will be distributed will remain central.

591 From this historical perspective, the emphasis shifts away from viewing the environmental
592 and social problems associated with marine resource declines as one that can be primarily
593 addressed by technocratic governance models, such as marine protected areas or certification.
594 Furthermore, it also moves away from the focus of much critical social science literature on
595 the contemporary ideology of neoliberal fisheries governance. Instead, viewing how multiple,
596 successive environmental fixes have unfolded over long periods of time highlights how
597 marine resource declines are part of much wider economic and historical processes (Moore
598 2015), with consequent implications for livelihoods and governance.

599 **5.2 Insights for livelihoods and governance**

600 The failure of environmental fixes to absorb the excess labour created by the decline of
601 fishing may foreshadow potential social problems along the coasts in developing countries,
602 where labour can become 'surplus' to the needs of capital (Li 2010, 2011). Ambulong
603 highlights one potential livelihood pathway that may become more common: out-migration.
604 Indeed across the Philippines, the huge economic importance of remittances from overseas
605 workers are an example of this pathway at a larger scale. This trend of out-migration is an
606 example of the large-scale processes of agrarian change (e.g. urbanisation, de-localisation and
607 a shift to off-farm work) highlighted by scholars such as Bryceson (1996) and Rigg et al.
608 (2012). Across coastal Southeast Asia, similar trajectories of environmental fixes involving
609 fisheries expansion and intensification followed by stagnation and decline, followed by the
610 promotion of aquaculture and tourism are widespread (Fougères 2008; Belton and Thilsted
611 2014; Marschke and Betcherman 2016). While in some locations aquaculture and tourism are

612 undoubtedly thriving, in more difficult circumstances where aquaculture and tourism are
613 unable to effectively replace fishing livelihoods, out-migration may become a more common
614 strategy.

615 While the lens of environmental fixes highlights some of the structural processes underlying
616 marine resource use, applying these insights for improved governance is not straightforward.
617 This is in part related to the wider criticism that Marxist critiques, from the 19th century
618 publication of *Capital* to the more recent versions promoted by Harvey and others, have
619 excelled at diagnosing the problems of capitalism, yet struggled when it comes to providing
620 plausible alternatives that do not simplify the environmental behaviour of small-scale
621 producers, or their desires to engage with and negotiate wider capitalist relations (Walker
622 2009; Bernstein 2014).

623 However, there are several ways in which the lens of environmental fixes can potentially
624 contribute to improved governance. Examining the historical trajectories of marine resource
625 use, for example, has highlighted that out-migration from coastal areas with depleted marine
626 resources may become more common. The question of where these migrants will go and
627 what they will do will be crucial (Li 2010). By recognising the potentially limited future for
628 marine resource based livelihoods in some contexts, policymakers may be able to address this
629 through, for example, an expansion of the current cash transfer program (Philippine
630 Government 2017), or by providing other forms of livelihood support in urban areas. More
631 generally, the lens of environmental fixes provides an important corrective to perspectives
632 that advocate unquestioningly for market-based solutions to environmental problems (e.g.
633 Cunningham et al. 2009). It highlights that some of the market-based solutions to marine
634 resource problems commonly promoted by policymakers – aquaculture and tourism – have
635 strong limitations in terms of reducing marine resource use. Instead, they are actually part of
636 the wider capitalist processes that give rise to the problem of declining marine resources in

637 the first place (O'Connor 1988). In this sense, the lens of environmental fixes offers a wider
638 view of environmental change that highlights the larger systemic context of capitalism. It
639 shows that policymakers will need to think more creatively, beyond market-based ideals, if
640 improved environmental and social sustainability is to be attained. As is increasingly
641 recognised for climate change trends, the trajectory of capital accumulation is a broad
642 structural process that needs to be included in any assessment for improved governance of
643 marine resources.

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