



Food and Agriculture  
Organization of the  
United Nations

FAO  
FISHERIES AND  
AQUACULTURE  
TECHNICAL  
PAPER

ISSN 2070-7010

627

# Impacts of climate change on fisheries and aquaculture

Synthesis of current knowledge, adaptation and mitigation options



**Barange, M., Bahri, T., Beveridge, M.C.M., Cochrane, K.L., Funge-Smith, S. & Poulain, F., eds. 2018.**

*Impacts of climate change on fisheries and aquaculture: synthesis of current knowledge, adaptation and mitigation options.*

FAO Fisheries and Aquaculture Technical Paper No. 627. Rome, FAO.

# Chapter 2: Understanding the impacts of climate change for fisheries and aquaculture: applying a poverty lens

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*“No community with a sense of justice, compassion or respect for basic human rights should accept the current pattern of adaptation. Leaving the world’s poor to sink or swim with their own meagre resources in the face of the threat posed by climate change is morally wrong.”*

Archbishop Desmond Tutu – Human Development Report 2007/2008<sup>1</sup>

## KEY MESSAGES

- Climate change affects communities and livelihoods in fisheries and aquaculture, and efforts to adapt to and mitigate climate change must therefore be human-centred.
- Climate adaptation strategies must emphasize the need for poverty eradication and food security, in accordance with the Paris Agreement, the United Nations 2030 Agenda for Sustainable Development and other international instruments, such as the *Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication*.
- Measures to eradicate poverty and provide food security for people in fishing and aquaculture communities are also instrumental for climate change adaptation, and should be integrated in the formulation and implementation of national adaptation plans.
- Climate change adaptation for building resilience must be multi-dimensional and multi-sectoral to help people out of poverty and to prevent them from descending further into it.
- Capacity at national, regional and local levels of governance should be mobilized to facilitate adaptation to climate change for the poor and vulnerable.

<sup>1</sup> [http://hdr.undp.org/sites/default/files/reports/268/hdr\\_20072008\\_en\\_complete.pdf](http://hdr.undp.org/sites/default/files/reports/268/hdr_20072008_en_complete.pdf)

- To address climate change vulnerability, management systems must create opportunities for fishers, fishfarmers and fish-workers to remain flexible, and to be able to sustainably utilize diverse livelihood opportunities.
- Climate change adaptation should empower local stakeholders to allow for meaningful participation of the poor and vulnerable, and safeguard their human rights.
- Climate change adaptation measures must address issues of power imbalances and inequity disadvantaging the poor, as they relate to, for example, gender, labour conditions, tenure rights, market access, migration patterns and stakeholder conflicts.
- The impact of climate change and adaptation measures for the poor and vulnerable must be monitored at different scales and dimensions, focusing both on achievements, best practices and on possible maladaptation.
- There is a need for the countries to put a stronger emphasis on poverty and food security in the context of fisheries and aquaculture within their national determined contributions.

## 2.1 BACKGROUND: POVERTY IN FISHERIES AND AQUACULTURE

Approximately 11 percent of the world's population (about 767 million people) is living in extreme poverty (World Bank, 2016). In addition to low income, poverty is comprised of factors that together, in many instances, hinder the realization of human rights as originally stated in the *Universal declaration of human rights, the right to food guidelines* (FAO, 2005), the *Voluntary guidelines on the responsible governance of tenure of land, fisheries and forestry in the context of national food security* (FAO, 2012), and the *Voluntary guidelines for sustainable small-scale fisheries in the context of food security and poverty eradication* (SSF Guidelines; FAO, 2015). Among these are food insecurity and malnutrition, poor health, low levels of education, insecure tenure rights, marginalization, and political discrimination. Poor people typically lack representation in governance systems, which makes them vulnerable in ways that affect their overall well-being. In addition to this, their limited integration in the formal economy frequently results in their marginalization from the formal employment system and social programmes<sup>2</sup> (FAO, 2017a). Targeted programmes could better prepare them to respond and adapt to situations which otherwise reduce their abilities to engage in fishing activities, thus further aggravating their poverty and vulnerability.

Small-scale fishing and fishfarming communities<sup>3</sup> in developing countries are often marginalized and at the bottom of the socio-economic ladder. This is even the case in many countries where the overall indicators of human development are relatively good (Jentoft and Midré, 2011). Currently, there are insufficient sector-disaggregated data to calculate the exact share of fishery-dependent people within the above total populations in poverty. However, since more than 90 percent of those employed in the sector are engaged in small-scale fisheries, including processing and marketing, this is also where poverty is most prevalent (Béné, Macfadyen, and Allison, 2007). The situation has in many instances been improved by a combination of state support, public welfare programmes, engagement of civil society organizations, and collective action by the fishing population themselves (FAO, 2016a). Likewise, the recognition of the importance of small-scale fisheries for food security and poverty reduction led to the development and endorsement of the SSF Guidelines (FAO, 2015). Small-scale aquaculture producers and communities do not as yet have a similar instrument, but their contribution to poverty eradication and food security should not be ignored.

<sup>2</sup> Regional Fisheries Livelihoods Programme for South and Southeast Asia (RFLP) and the Sustainable Fisheries Livelihoods Programme (SFLP) in West Africa

<sup>3</sup> When referring to fisheries and aquaculture communities, it includes both inland and coastal communities, if not otherwise specified.

Both inland and marine fisheries and aquaculture operate at various scales with different degrees of labour intensity (FAO/NACA, 2012). In addition to full- and part-time employment, small-scale fisheries and aquaculture often provide vital supplements to other livelihood activities in times of difficulty or as a recurrent side activity. Fishing as seasonal employment frequently provides those in poverty with an extra income source. As recognized in the SSF Guidelines, small-scale fisheries are typically partly an informal sector, which provides operators with the flexibility needed to make harvesting a food security safety valve (FAO, 2017a). For it to serve such a function, in the context of climate change adaptation, flexibility should not be undermined as an important adaptive mechanism (Cinner *et al.*, 2018).

Adaptive capacity refers to strengthening resilience, reducing vulnerability and achieving robustness i.e. the ability of the system to withstand adverse conditions (IPCC, 2014a; Miller *et al.*, 2010). More specifically, climate resilience refers to the capacity of social, ecological, technical, or infrastructural systems to address challenges while maintaining the same function, structure and overall identity; and to respond to opportunities (IPCC, 2007). Adaptive capacity has a negative correlation with poverty and food insecurity. In other words, poverty can be an obstacle to adaptive capacity, which may be lower in poorer communities and in poor countries (IPCC, 2014b). Achieving adaptive capacity must go hand in hand with ensuring human rights and environmental justice (Schlosberg and Collins, 2014). This is also noted in the Paris Agreement (PA)<sup>4</sup> and its instruments such as the Nationally Determined Contributions (NDCs), as well as in the SSF Guidelines. In order to increase adaptive capacity to climate change, national governments are expected to adopt a legal framework for the mapping of climate change impacts on communities with a view to formulating nationally determined prioritized actions, as stated in the PA. They then need to take into account vulnerable people, places and ecosystems as well as building the resilience of socio-economic and ecological systems, including through economic diversification and sustainable management of natural resources (see Appendix 2.1).

This chapter addresses the specific poverty and vulnerability issues related to climate change in fisheries and aquaculture. It discusses how climate change challenges the resilience of local communities and peoples' capacity to cope and adapt. The chapter also contains an analysis of the extent to which poverty and vulnerability are highlighted in the climate change adaptation agenda at international and national levels with regards to fisheries and aquaculture. Finally, the chapter suggests possible pathways to address the nexus between climate change and poverty.

## 2.2 HOW ARE CLIMATE CHANGE AND POVERTY RELATED IN FISHERIES AND AQUACULTURE?

Small-scale fishers and small-scale aquaculture are particularly vulnerable to climate change (see e.g. Chapter 18). Their vulnerability is a result of both their geographical location as well as their poverty situation. Being located at the waterfront, fishing and fishfarming communities are exposed to climate related extreme events and natural hazards, such as hurricanes, cyclones, sea level rise, ocean acidification, floods and coastal erosion. Millions of people living in coastal and floodplain lowlands are unable to escape regular flooding. As reported throughout this volume, climate change impacts are harming human and natural systems including infrastructure, disturbing fish stocks, eroding natural resources and endangering species and ecosystems. These impacts also reduce resilience. Climate change is therefore a threat to human health, well-being, and livelihoods.

<sup>4</sup> Article 7(1). The IPCC defines adaptation as: "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2001a, Annex B). The term is not defined in the Agreement or UNFCCC.

The ability of individuals and communities to adapt to climate change depends on their vulnerability, exposure and adaptive capacity. In turn, this is related to their financial and social capital, such as social networks. Their exposure and vulnerability to climate change impacts is also related to the existing infrastructure and institutional framework, including government sponsored social safety programmes. Their adaptive capacity also depends on their ability to acquire assets, such as insurance, technologies, and knowledge (Béné and Friend, 2011; Fankhauser and McDermott, 2014). Those who are poor and vulnerable have fewer opportunities to access these resources, and thus are less able to adapt.

The poverty and vulnerability of fishers and fish-workers are also often linked to and determined by their political marginalization. They typically do not have a voice in the climate adaptation planning process, which reduces their short- and long-term resilience. Unequal power relations, such as the control exerted by intermediaries who buy the fish, provide credit, extend consumption loans, and offer land on which fishers can build their homes, contribute to their vulnerability and poverty status. In these transactions, fishers and fish-workers are easily trapped in a cycle of exploitative deals, which tend to undermine their capacity to respond to additional threats, such as those related to climate change (Kurien, 2014).

Predictions of the future impact of climate change on the poverty and vulnerability of fisheries and aquaculture arise out of climate change models, which indicate, for example, increased fish productivity at high latitudes and decreased productivity at low- and mid-latitudes, with considerable regional variations. By 2050, total maximum catch potential globally has been projected to decrease under climate change by 2.8 percent to 5.3 percent under representative concentration pathway (RCP)2.6 and by 7.0 percent to 12.1 percent under RCP8.5 from present yields, but with substantial variability across national exclusive economic zones (EEZs; see Chapter 4). The likely outcomes of these changes include:

- Shifts in fish distribution and migration behaviour.
- Disrupted traditional fishing patterns which will have to change, at least over a period of time, depending on how fast these shifts occur.
- Change in policies and regulatory systems to deal with climate change effects that will impact on fishing practices (see other chapters). These policies will affect poverty, food security, and equity within and among fisheries communities.
- Mobile, large-scale fleets will be able to better adapt to the shifts in fish distribution than small-scale, community-based fleets.
- Communities at lower latitudes will see their fish landings go down, while communities at higher latitudes will see them go up.
- Poor communities in the tropical south will suffer losses while communities in the north experience higher fishing pressure as fleets move there.

Shifting species distributions may cause fishers and fish-workers to migrate in search of livelihood opportunities elsewhere, where existing tenure systems and rights will be challenged. Fishfarmers have this opportunity to a lesser degree because they are less mobile.

### **2.3 IS POVERTY A CONCERN IN THE CLIMATE CHANGE ADAPTATION AGENDA IN FISHERIES AND AQUACULTURE?**

Having discussed the interaction of poverty and climate change in the context of fisheries and aquaculture, the next two sections draw on this background to explore whether the international climate change regime effectively addresses the nexus between climate change and poverty in fisheries and aquaculture. It starts by analysing the international level, then turns to the national level.

### 2.3.1 The international level

At the international level, the PA unites all parties in urgently addressing climate change and its impacts through an integrated approach. The Agreement enhances the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and aims to strengthen the global response to the threat of climate change in the context of sustainable development and efforts to eradicate poverty (Article 2(1), PA) (see Appendix 2.1 of this chapter). Although the PA does not explicitly address fisheries and aquaculture, it inherently speaks to them as it does to other sectors. This is also reflected in several NDCs, as well as submitted National Adaptation Plans (NAPs)<sup>5</sup>.

The Agreement emphasizes the intrinsic relationship between climate change actions and the eradication of poverty, as well as with food security and “the fundamental priority” of ending hunger (Preamble, PA). New climate change-related goals, such as the Sustainable Development Goals (SDGs)<sup>6</sup> and the recognition of climate change as a driver of disaster risk in the Sendai Framework for Disaster Risk Reduction<sup>7</sup>, are set in recognition of the urgent need to take more ambitious measures to prevent dangerous climate change, whilst also providing for closer integration with action on poverty.

A similar ambition appears in the latest reports by the World Bank (Hallegatte *et al.*, 2016) and the World Economic and Social Survey (WESS, 2016). The reports show that development strategies in the era of climate change require the planning and implementation of stronger and more cohesive transformative policies to reduce inequalities and focus on poverty eradication, food security and nutrition, and social development. Through the provision of resources and shock responsive policies that lower disaster risks and mitigate climate change impacts, communities and individuals can achieve the reduction of rural poverty (WESS, 2016).

The PA emphasizes the importance of securing the finance to achieve these goals (Articles 2 and 9) in an effort to close the adaptation deficit caused by the fact that poor countries are less able to take effective adaptation action, thus rendering them more vulnerable than rich countries (Fankhauser and McDermott, 2014). States should ensure that national laws governing adaptation address vulnerability and resilience (Article 7(9), PA). According to the PA, they also need to present concrete ideas of what building resilience requires in the context of climate change adaptation, and what it would take to implement them in specific contexts such as fisheries and aquaculture.

Responding to these agreements, the climate change adaptation agenda needs to mainstream development strategies at all levels, including at the international level, bearing in mind the Global Goal on Adaptation (Appendix 2.1) set by the PA (Article 7, PA). The Global Goal on Adaptation is reinforced by references to poverty and food security and the need to ensure human rights integration<sup>8</sup>. It emphasizes the strengthening of resilience and the reduction of vulnerability (Article 7, PA), the provision for transparency (Article 7(5) and Article 13, PA) and for public participation (Article 7(5) and Article 12, PA), as well as the call for states to respect, promote and consider human rights in addressing climate change (Preamble, PA).

<sup>5</sup> National Adaptation Plans (NAP) are “a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs”. The process to formulate and implement NAPs was formally established at the 16th Conference of Parties (COP16) of the UNFCCC in 2010 under the Cancun Adaptation Framework.

<sup>6</sup> <https://sustainabledevelopment.un.org/sdgs>

<sup>7</sup> [https://www.unisdr.org/files/43291\\_sendaiframeworkfordrren.pdf](https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf)

<sup>8</sup> Knox (2016) at paragraph 68: States must adopt a legal and institutional framework that assists those within their jurisdiction to adapt to the unavoidable effects of climate change.

Furthermore, parties are required to evaluate and respond to vulnerability<sup>9</sup> and take proactive measures to secure resilience and achieve robustness. The agenda must also be gender-responsive, participatory and involve an integrated approach laid down in Article 7(5) PA, and in the Gender Action Plan approved at the 23rd Conference of the Parties of the UNFCCC. Furthermore, adaptation responses in fisheries and aquaculture from a gender perspective should be integrated into the formulation and implementation of NAPs and other planning processes (FAO, 2018). Issues such as safety at sea, loss of livelihood, declining food security and coastal inundation fall within this framework. This agenda must be integrated across the various processes set under the international climate change regime (the UNFCCC and the PA), as part of the formulation and delivery of NDCs and as the operational arm to implement the adaptation component, NAPs. These nationally determined programmes should have explicit mechanisms to reach affected communities and individuals, enhancing their adaptive capacity, which simultaneously feeds back into the delivery of development policy at the national level. The contribution of every sector, including fisheries and aquaculture, therefore comes under renewed focus, as does the need to reduce vulnerabilities in all communities facing significant climate change impacts. To support fisheries and aquaculture in the formulation and implementation of NAPs (FAO 2016b), FAO is developing guidelines with the aim to inform those responsible for climate change adaptation processes and draw the attention of policymakers and government officers involved in the NAP planning and the fisheries and aquaculture community.

#### BOX 2.1

##### FAO guidelines on addressing fisheries and aquaculture in NAPs

The *Addressing fisheries and aquaculture in National Adaptation Plans - supplementary guidelines* (FAO, forthcoming) provide technical guidance on the integration of fisheries and aquaculture in the formulation and implementation of NAPs and serves as supplementary guidance to FAO's *Addressing agriculture, forestry and fisheries in National Adaptation Plans - Supplementary guidelines* (referred to as "NAP-Ag Guidelines"; Karttunen *et al.*, 2017). It aims to draw the attention of policymakers and government officers responsible for NAP planning and processes generally, as well as fisheries and aquaculture officers at country level, specifically. It collates and analyses relevant information from fisheries and aquaculture to support the sector's ability to take part in national climate change adaptation planning processes.

The fisheries and aquaculture NAP guidance aims to:

- assist fisheries and aquaculture institutions to map their knowledge into the climate change world and language and articulate their needs;
- ensure that the visibility and specificities of fisheries and aquaculture are captured in the process to formulate and implement NAPs;
- support the mainstreaming of fisheries and aquaculture in the NAP implementation; and
- more broadly, support adaptation planning within fisheries and aquaculture.

<sup>9</sup> Social vulnerabilities are as significant as economic vulnerabilities. Therefore innovative interventions are needed to provide protections across the specific set of challenges that fishers face in each national and local context.



The growing calls to focus development on increasing the adaptive capacity of communities in order to increase their resilience to climate change and to reduce poverty are reflected in the Nairobi Programme on impacts, vulnerability and adaptation to climate change. This programme, established under the UNFCCC, continues to provide input on best practices in adaptation (see Subsidiary Body for Scientific and Technological Advice (SBSTA) Draft Conclusions, FCCC/SBSTA/2017/L.7 of 16 May 2017<sup>10</sup>).

With regards to the PA, delivery of national adaptation policies is communicated within NAPs<sup>11</sup> or NDCs (Article 7(10) and (11)). NDCs are intended to reflect each state's common but differentiated responsibilities and respective capabilities, in the light of different national circumstances (Article 4(3)). The acknowledgement that the eradication of poverty is a key consideration (Article 4(1)) signals the importance placed on this international objective (first recital to the Preamble to Decision 1/CP.21). Some NDCs predate the adoption of the PA and therefore the approach taken in some current NDCs may not fully track all the language of the Agreement.<sup>12</sup> Under the PA, NDCs are to be renewed progressively every five years. As parties revise their NDCs, the emphasis placed on addressing food security and poverty can be progressively addressed and expanded.

A degree of differentiation in setting the framework for NDCs allows for the special status of vulnerable countries under the PA (Articles 4(6), 7(6) and the Preamble). Furthermore, the status of NDCs at the national level will be determined by national law, including any specific provision made under national climate change law. Constitutional and human rights protection of interests affected by the delivery, or non-delivery, of the NDC may also be addressed under national, as well as international law, taking into account the call for states to “respect, promote and consider” their human rights obligations in addressing climate change (Preamble to the PA).

### 2.3.2 The national level

As of September 12, 2017, 155 NDCs had been submitted to the UNFCCC. These describe actions to be implemented in order to mitigate and adapt to climate change. According to the PA, NDCs must address the climate change impacts on communities and livelihoods, and develop well-designed strategies to address them. An analysis of these commitments was conducted to identify if countries' proposed interventions within the fisheries and aquaculture sector were explicitly targeting the poor and most vulnerable<sup>13</sup>. The analysis shows that 49 countries make explicit links to SDG 1 (no poverty) and 101 countries refer to SDG 2 (no hunger) in their NDCs<sup>14</sup>, although this does not imply that they are all directly targeting poverty and food security in the fisheries and aquaculture sector. In fact, only seven NDCs refer explicitly to impacts of climate change on food security in the fisheries and aquaculture sector.

This analysis also assessed whether NDCs included pro-poor social policies and actions with regards to fisheries and aquaculture. Each NDC policy or action was then categorized according to several indicators related to poverty and vulnerability in the sector.

<sup>10</sup> <https://unfccc.int/sites/default/files/resource/docs/2017/sbsta/eng/107.pdf>

<sup>11</sup> NAPs were established under the Cancun Adaptation Framework. The earlier NAPA process was designed to identify priority areas for urgent and immediate needs in LDCs.

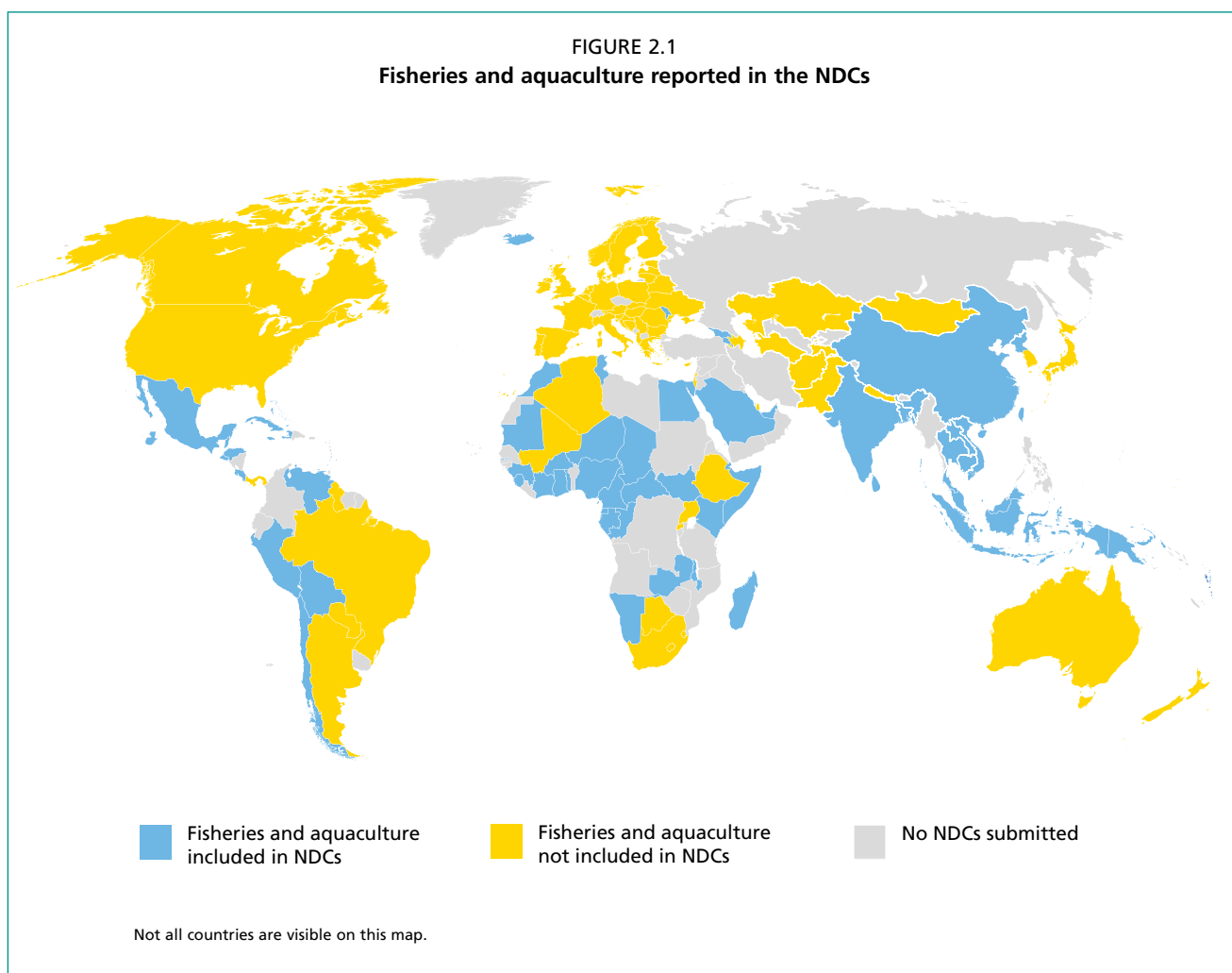
<sup>12</sup> NDCs are individual and voluntary commitments and goals for post-2020 climate action that both developed and developing countries submitted before or shortly after the COP21 in December 2015. At this time, since this was before parties ratified the Convention, the documents submitted were called intended national determined contributions (iNDCs), however, after the ratification took place, countries either re-submitted their iNDC as their NDC or they decided to submit an NDC different to the iNDC.

<sup>13</sup> Small-scale fishers are considered the most poor and vulnerable as explicitly recognized in the SSF Guidelines (FAO, 2015).

<sup>14</sup> <http://ndcpartnership.org>

Out of the 155 NDCs submitted, 87 address fisheries and aquaculture, of which 78 include climate change adaptation measures in the sector (see Figure 2.1). Notably, 23 countries in Asia and 23 in Africa, where the concentration of poverty is most prevalent, include fisheries and aquaculture adaptation measures to climate change in their NDCs.

The analysis also shows that out of the 78 NDCs focusing on climate change adaptation, 55 reported impacts of climate change on their fisheries and aquaculture sector, including impacts on fisheries resources and migration patterns with consequences for the sustainability of the fishery sector, livelihoods, human health and food security, to name some. Particularly, 16 NDCs mention how climate change impacts local communities, including migration and livelihood diversification, decreasing food production as a result of changing fish abundance, and the aggravation of fishers' poverty (see Box 2.2).



## BOX 2.1

**Examples of reported impacts of climate change in the NDCs**

- Lake Chad's reduction in size from 25 000 km<sup>2</sup> in 1960 to 2 500 km<sup>2</sup> today has considerably impacted crop and fish production, and forced inhabitants to migrate to wetter areas (Chad).
- The likely disappearance of more than half the coral cover will affect local populations that are dependent on those resources and who already live in poverty (Djibouti).
- Very significant decrease in agricultural yields, in fishing and aquaculture production, total or partial destruction of social infrastructure (schools, basic health centres) and aggravation of household poverty as well as food insecurity following cyclone events and social conflict caused by water scarcity (Madagascar).
- Communities are experiencing climate change impacts such as eroding shorelines and riverbanks, shortage of water, depleted fisheries stocks, reduced food production, large-scale flooding, increase in outbreaks of vector-borne diseases and sea level rise (Fiji).
- As a result of climate change, in rural outer islands the people have limited access to employment opportunities, effective transport, communication, and community services such as education and health – these factors, combined with a high dependency on subsistence agriculture and coastal fisheries, make rural communities vulnerable (Kiribati).
- Communities' livelihoods and infrastructure are impacted by sea level rise, sea surges, typhoons and rainfall intensity; water and food security issues from changing rainfall patterns and ocean acidification. Community well-being is also affected by rising temperatures, peak wind speeds and changes to ocean circulation patterns (the Marshall Islands).
- Exposure to the cyclical and adverse climate impacts of "El Niño", which affects primary sectors such as fisheries. Likewise, given the vulnerability of the sector and focusing on people and their livelihoods, the vulnerable populations that need to be addressed on a priority basis, include small-scale fishers (Peru).
- The increased coastal erosion, droughts, storms, floods and landslides of the last decade have severely impacted livelihoods (Saint Vincent and the Grenadines).
- Extreme temperatures, erratic rainfall, floods, drought, tropical cyclones, rising sea levels, tidal surges, salinity intrusion and ocean acidification are causing serious negative impacts on the lives and livelihoods of millions of people in Bangladesh, and are gradually offsetting the socio-economic development gained over the past 30 years (Bangladesh).
- The migration of tuna to deeper waters and the coral bleaching affecting the reefs are affecting the livelihoods of people (Maldives).
- Sea level rise, flooding, hurricanes, and other extreme events will affect the country, thus destroying the natural and cultural heritage along the coast (Cuba).
- The damage caused by hurricanes affects the fishing seasons, landing infrastructure and markets, resulting in wastage and loss of fish and revenue to fishers. Climate change, including increasing ocean acidification and changes in sea temperatures, are affecting fisher resources and migration patterns with consequent impacts on the sustainability of the fishery sector, livelihoods, human health and prospects for food security (Dominica).
- The National Adaptation Programme of Action targets particularly vulnerable groups in the coastal zone, such as poor communities in rural areas including farmers and small producers and people whose livelihood mainly depends on the use of natural resources (hunters, fishers, salt producers, etc.) (Guinea).
- The magnitude and frequency of natural hazards are expected to increase, especially impacting the most vulnerable populations in the country, such as indigenous peoples, small-scale fishers, women and children, with negative impacts on livelihoods, cultural identity and traditional and ancestral knowledge (Guatemala).
- Many fisheries- and fishfarming-dependent communities which live in precarious and vulnerable situations because of poverty and their lack of social services and essential infrastructure are already affected by climate change. The consequences felt on sustainability of aquatic ecosystems for fisheries and aquaculture are highly adverse (Sri Lanka).
- Vulnerability to sea level rise, inland flooding and other climate related events cause adverse impacts on the overwhelming majority of coastal populations. Extinction of species such as whales, dolphins and turtles, as well as coral bleaching and migration of some marine species and sea birds are expected (Qatar).

In response to climate change impacts in the sector, 43 NDCs explicitly include some form of social policies. Some of these policies include the promotion of income-generating activities linking climate change adaptation with conservation and poverty alleviation, livelihoods' diversification, early warning systems targeting the poor and vulnerable, and resilience building of coastal economies and the social capital of communities. These policies also aim to strengthen insurance schemes for fishers as well as micro-insurance for the private sector and vulnerable segments of the sector (see examples in Box 2.3).

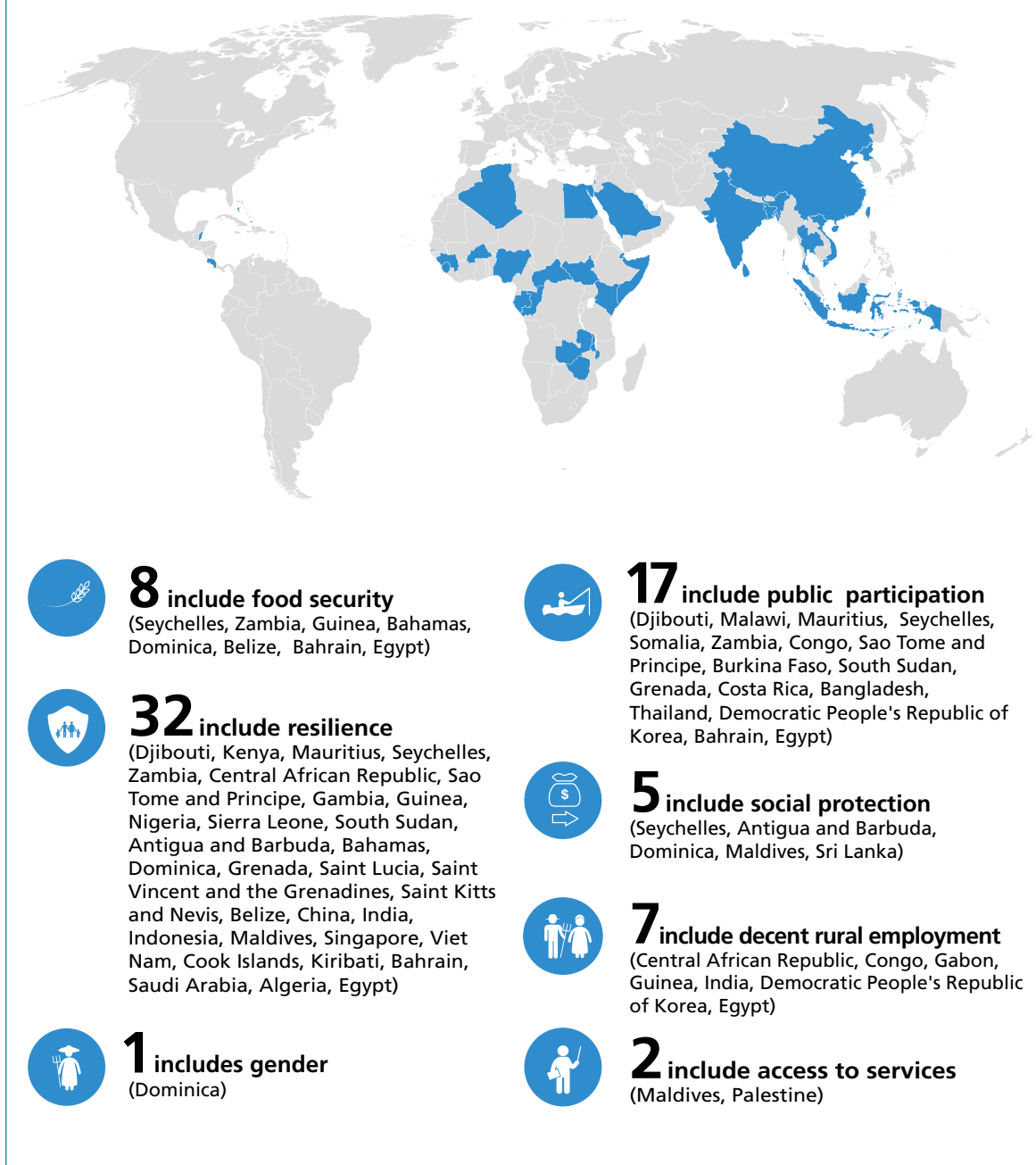
Out of the 43 NDCs mentioned above, 32 explicitly mention the resilience of the poor and vulnerable in fisheries and aquaculture (see Figure 2.2). It is important to note that many of the adaptation actions related to fisheries and aquaculture mentioned in the NDCs do not concretize how resilience building shall be implemented and who will be targeted. This omission may negatively affect the achievement of poverty eradication and resilience building in the sector.

Some examples provided in this chapter show NDCs making explicit linkages between poverty and climate change (see Box 2.3). These examples show how social policies can set the path for other countries and communities to develop similar strategies. However, the analysis of the strategies to respond to them shows that overall NDCs focus more towards the environmental aspects rather than on local livelihoods and food security. In general, the nexus between climate change and poverty is weakly addressed at the national level (Madhanagopal, 2018; Prowse, Grist and Sourang, 2009). This highlights the need for climate change adaptation strategies to be more human-centred.

It should be recalled that NDCs are subject to a comprehensive five-yearly global stocktake (Article 14(1) PA, see Appendix 1), conducted at the international level to assess collective progress, the first of which will be conducted by 2023. This may be the opportunity to incorporate specific targeted poverty eradication and food security strategies for fisheries and aquaculture into the NDCs.

FIGURE 2.2

Reported pro-poor measures to adapt to climate change in the fisheries and aquaculture sector within NDCs



## BOX 2.2

**Examples of pro-poor social policies related to climate change reported in the NDCs**

- Promoting and reviving income-generating activities linked to inland and coastal ecosystems, diversification of means of livelihoods, and improved access to fisheries resources (Central African Republic, the Democratic Republic of the Congo, Gabon, Malawi and Guinea).
- Capacity building in aquaculture and promotion of fish farming (Malawi).
- Protecting and enhancing resilience of coastal and estuarine/riverine economies and livelihoods, and supporting alternative livelihoods, if needed (the Gambia, India, Democratic People's Republic of Korea).
- Supporting and strengthening insurance schemes for fishers to cope with losses resulting from climate variability through minimum monthly income, and to recover the losses and damages induced by climate change on livelihood, properties, infrastructure and fisheries (Seychelles, Dominica, Maldives, Sri Lanka).
- Micro-insurance for private sector and vulnerable segments of society (farmers, fishers and fish-workers, women, and indigenous and vulnerable communities) (Antigua and Barbuda).
- Strengthening early warning systems and capacity building in coastal areas (Seychelles).
- Promoting food security and nutrition through feasibility studies as well as diversification and promotion of climate smart agriculture for fisheries production through the development of agro-ecological fishfarming harvest and post-harvest techniques (Seychelles, Zambia, Guinea).
- Formulating and implementing measures to enhance sustainable food systems that are climate resilient and build robust communities by strengthening their capacity to address risks to food security associated with changing precipitation patterns (the Bahamas, Dominica, Belize, Egypt, Bahrain).
- Promoting reef ecosystem recovery integrated with community building and development (the Bahamas, Dominica, Belize, Egypt, Bahrain).
- Facilitating capacity building through education, awareness and training programmes on climate change risks and resiliency measures in order to strengthen capacity at the community and sectoral level, within municipalities and local authorities, and the private sector (Dominica).
- Integrating the climate funding framework in the national plan and budget to disburse annual allocations for the implementation of mitigation and adaptation projects such as infrastructure and livelihood improvement projects including climate adaptation and livelihood protection (Bangladesh, Maldives).
- Developing a participatory and integrated marine conservation and coastal rehabilitation plan, increasing capacity to manage climate-related health impacts – including through development of health surveillance and early warning systems, systematic climate risk assessment and effective disease prevention and response measures to climate change related health consequences, and building regional climate resilience by serving as a knowledge hub to foster regional cooperation and exchange experiences on adaptation (Thailand).

## 2.4 FILLING THE GAP: COPING WITH CLIMATE CHANGE AND POVERTY

The content analysis of the NDCs suggests that a stronger emphasis on the impacts of climate change on poverty and food security is needed with regards to fisheries and aquaculture. The next global stocktake to assess the collective progress of the NDCs will take place in 2023, which will be an opportunity to incorporate specific targeted poverty eradication and food security strategies to fill this gap. The following ten key elements, taken from a global literature review of state-of-the-art approaches linking poverty reduction and resilience building undertaken for this chapter, suggest a pathway to address the poverty and climate change nexus:

**Enabling national legal and policy-making frameworks** are crucial for climate change adaptation. National pro-poor policies can help in lifting communities out of poverty through the targeted provision of services, among others, and to prevent the relapse of communities into poverty from climate change impacts. There is a need to assess to what extent rural development policies actually support small-scale fishers and fisheries communities, and to what extent they address the human dimension impacts of climate change in the sector. Also, the national institutional framework for emergency response and disaster risk reduction is an instrument to lift fisheries communities out of poverty. National reviews should examine the mandate and expertise of all fisheries agencies to assess the extent to which they are required to take climate change into account in making regulatory decisions. As a matter of national discretion, states could consider whether such agencies should be placed under a legal duty to ensure fulfilment of their NDC and NAP so far as relevant to fisheries and aquaculture.

**National alignment of the climate change agenda to the SDGs** is needed. Tackling climate change through a poverty lens is a key strategy for moving people out of poverty, and for preventing them from descending into it (Krishna, 2010), while at the same time, bringing people out of poverty is essential for making people and communities more capable of dealing with the impacts of climate change. Any strategy aimed at achieving the SDGs must in itself be environmentally friendly, with a minimum carbon footprint. Also related are improving education, awareness raising, and human and institutional capacity on climate change mitigation. Moreover, building capacity for climate change adaptation in least developed countries and small island developing states is important since they are particularly vulnerable.

**A holistic, human-centred approach to be resilient** is a route to enhance lives by saving livelihoods. Poverty eradication in the climate change context is not only essential in its own right, but as a means of enhancing the resilience of people and communities. Socio-economic development and climate change adaptation must go hand-in-hand. Climate change is a contributor to food insecurity and poverty, while at the same time, poverty and food insecurity reduce the capacity to adapt to climate change. Therefore, both issues need to be tackled simultaneously, and in an integrated fashion. This requires that climate change adaptation strategies are brought to the level of the affected people themselves, and their communities, where the impacts of climate change are felt and where actions are in urgent demand. This demand calls for a multidimensional and integrated approach to both poverty and climate change.

**Adding adaptation measures into poverty reduction strategies** is crucial to address the impacts of climate change on the poor and vulnerable. Adaptation strategies that simultaneously target poverty and food insecurity are needed at an international and national scale, and at all levels of governance. Notably, adaptive capacity must also include the local context, as this determines local communities' capacity to respond pro-actively on opportunities or challenges induced by climate change (Charles, 2012).

More specifically, climate change adaptation must provide answers to “‘of what,’ ‘to what,’ and ‘for whom’” questions (Whitney *et al.*, 2017). Addressing these questions should create a more transparent, enabling environment, including policies, which will permit the targeting of specific populations and specific objectives.

**In the absence of pro-poor targeted interventions**, climate change adaptation measures may reinforce the poverty cycle. This is for instance the case if the poor have no other option than to perpetuate the degradation of natural resources (Tandon, 2012). This is known as the resource dependency trap or cycle (Jentoft and Midrè, 2011), which climate change adaptation must aim to defeat. It is important to recognize that poor and vulnerable communities are at both the receiving and delivering end of climate change adaptation. They not only need external support but also their own collective adaptive capacity to become proactive. This would have to be done through a multidimensional and multi-sectoral approach that includes 1) social protection, 2) development approaches, and 3) resilience building programmes. The first two of these enable people to escape poverty, while the last prevents vulnerable people from descending into it (FAO, 2017b). Also important is to draw on multiple-disciplinary perspectives and knowledge bases, including indigenous and local knowledge, in order to reflect and learn from the full human experience of climate change (Allison and Bassett, 2015).

**Social protection schemes** that are risk-informed and shock-responsive, are key to reducing the impacts of climate change on the poor (Winder *et al.*, 2017). People without substantial or diversified resources are likely to be the most affected, as climate-related hazards can exacerbate their pre-existing, economic and social vulnerabilities. Poor and vulnerable fishers and fish-workers may have no other choice than to sell off productive assets, take their children out of school, and migrate (Béné, Devereux and Roelen, 2015; FAO, 2017b). This indicates the importance of insurance schemes, cash transfers, disability benefits, pensions, unemployment benefits, food transfers, among others (FAO, 2017a), to give people a better capacity and opportunity to adapt to climate change impacts (Winder *et al.*, 2017). The SDGs targeting the poor and vulnerable, recognize that social protection has a role in poor people’s asset accumulation through cash transfers and micro-credit (FAO, 2017b). It also reduces the risk that people take on when they invest in new opportunities (Hallegatte and Rozenberg, 2017).

**Recognizing the roles that women play** in securing essential community functions and services (including employment, food security, and household responsibilities), and in building and representing their communities, is essential both in terms of poverty reduction and climate change response. Women are mostly engaged in post-harvest work, as their work is centred on fish landing sites or local markets, where they are in charge mainly of selling and processing the fish. Given the marginalization of fishing communities, coupled with the lack of access to credit and capacity development experienced by women in the post-harvest sector, they are placed in a disadvantaged position. Climate change adaptation should not undermine women’s tenure rights in fisheries communities. Hence, the adaptive capacity of communities to climate change, as well as their resilience and well-being, are raised through women’s social and economic empowerment, entrepreneurship and leadership, and women should therefore be a beneficiary of capacity building as stated in the SSF Guidelines. The Gender Action Plan approved at the 23rd Conference of the Parties of the UNFCCC adopted a new roadmap to incorporate gender equality and women’s empowerment in climate change discourse and actions. It aims to increase the participation of women in all UNFCCC processes and seeks to create awareness of and support for the development and effective implementation of gender-responsive climate policy at the regional, national and local levels.



**Climate change adaptation in the fisheries and aquaculture sector is a governance challenge**, where the actors at different levels and sectors of government, civil society, academia and community organizations would need to engage in an interactive process through which pathways and policies are defined and implemented (Bavinck *et al.*, eds, 2011; FAO, 2018; Kooiman *et al.*, 2005). One may assume that climate change policies and actions may be as contentious in this area as in other areas of environmental policy and change, including in fisheries and aquaculture management. Given the complexity of climate change and poverty issues, there is a need for building partnerships to facilitate cooperation, coordination and policy coherence. There is also a need for strengthening and building institutions that establish shared and differential responsibilities and mandates. These governance mechanisms must reflect the holistic approach to climate change and poverty eradication, and secure equity while building resilient and robust communities.

**Governance mechanisms should empower communities** in order for them to become more resilient and robust, by facilitating collective action. This may be done, for instance, through community-based co-management arrangements, to strengthen their institutions and adaptive capacity (Cinner *et al.*, 2018). Governance mechanisms must also build institutional capacity at higher ecological and social scales (Whitney *et al.*, 2017). The state and civil society organizations have a role to help communities to become better equipped to adapt to climate change. In particular, these actors have a responsibility to develop resilience programmes and policies specifically targeting the poor and vulnerable in fisheries and aquaculture. Likewise, the WESS (2016) emphasizes that in the absence of far-reaching pro-poor transformative policies the goal of building climate resilience will remain elusive, and that poverty and inequalities will likely increase.

## 2.5 RECOMMENDATIONS

Drawing on the above key general elements of a “way forward”, the following specific points are suggested to enable a better linking of NDCs and the international climate regime to the fisheries and aquaculture sector, in the context of poverty and food insecurity:

- Given the importance of fisheries and aquaculture to poverty reduction and food security in many countries, there is a need for those countries to include, within the NDCs, their concerns and the adaptation requirements of their fishing and fishfarming communities. As specified in the PA, climate efforts are to take place on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty. Furthermore, the new standards introduced in the Agreement should assist states in avoiding maladaptation<sup>15</sup>.
- To avoid maladaptation, insurance schemes need to be encompassed by development programmes that entail social safety nets to protect the chronic and those in extreme poverty by increasing their resilience and robustness. This could include, for example, insurance through cash plus services<sup>16</sup>. Such programmes should also protect the not-so-poor from falling into poverty because of natural hazards. Global

<sup>15</sup> Defined by the IPCC as adaptation that increases rather than reduces vulnerability (IPCC, 2001b, p.990). Maladaptation refers to increased impacts of climate change on vulnerable areas and communities as a result of poorly designed and implemented policies to cope with climate change. Examples of maladaptation include promoting development in risk prone areas, as well as taking actions based on short-term political decisions, neglecting of known climatic variability, imperfect foresight, insufficient information, and over-reliance on insurance mechanisms.

<sup>16</sup> Strategies in which coherence and coordination between agricultural and social protection interventions can be strengthened. Cash plus encompasses a wide range of “plus” activities and linkages with the ultimate aim to integrate programmes across sectors and address different dimensions of poverty to more effectively support the poorest groups with the hope of inducing synergistic impacts (FAO, 2017b).

- insurance programmes that help countries to cope with massive natural disasters and/or pandemics that affect more than one country would also be needed.
- Countries should, where appropriate, explicitly link their mitigation and adaptation measures to their national policies on sustainable development in the fisheries and aquaculture sectors. These should all be inclusive and pro-poor, as indicated in the SSF Guidelines, recognizing the differential impact that climate change may have on fisheries and aquaculture communities.
  - Poverty and food insecurity represent a violation of human rights as recognized in the PA and other international instruments, such as the SSF Guidelines. Therefore, when taking actions to address climate change, national and international law should specifically include legal and other measures to protect and support the lives and livelihoods of fishers, fishfarmers, fish-workers as well as their communities.
  - Most NDCs do not specify mechanisms supporting the most vulnerable and poor to deal with shock and impacts of climate change, neither generally nor particularly with regards to fisheries and aquaculture. The NDCs should focus on priorities and actions that fill this gap in future revisions. In a fisheries and aquaculture context, this largely means directing policy measures at small-scale fisheries and small-scale fishfarming.
  - In addition to emphasizing ecological and natural aspects of climate change adaptation, NDCs would need to take social, economic, and institutional aspects into account. It is particularly important to assess the situation for those who are poor and vulnerable in fisheries and aquaculture. One implication of targeting the poor and vulnerable is to make policies that strengthen the resilience and robustness of local communities. In all of this, it is crucial to be gender sensitive, and to fully engage women in these processes.
  - Building resilience through collective action will require cooperation and coordination of climate related policies and actions. Therefore, communities need to be empowered legally, organizationally and with knowledge. Government agencies and civil society organizations have important roles to play in this regard. In particular, support could be provided to community-based fisheries management organizations to enable their direct involvement in assessment of vulnerability and of measures to secure climate resilience, including those addressed in the NDC.
  - Climate change-induced disasters in fisheries and aquaculture communities require an immediate humanitarian response in terms of relief, and robust infrastructure such as shelters. In a longer-term, these events also require efforts to create opportunities for people to build stronger, and more prosperous, communities and by that to become more self reliant. Communities must possess the capacity (assets, knowledge and skills) for climate related collective action. They also need the enabling institutional environment (such as legislation and mandates) to make their own adaptation decisions.
  - Climate change adaptation strategies must be developed and implemented in cooperation with affected communities and their organizations through transparent processes, allowing for meaningful participation of fisheries stakeholders, including the poor and vulnerable in the fisheries and aquaculture sector. In order to ensure the latter, states should develop relevant indicators, keeping sex disaggregated data to track the impacts of climate change on poor and vulnerable groups and geographical areas. Key issues of the fisheries and aquaculture sector should be part of the formulation and implementation of National Adaptation Plans in the countries.

## **2.6 ACKNOWLEDGMENTS**

The authors thank Chiara Villani for her support in the preparation of the maps.

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## APPENDIX 2.1

## Table of provisions of the Paris Agreement of particular relevance to addressing poverty, reducing vulnerability and promoting resilience

<p><b>The aim of the PA:</b></p> <p><b>Article 2(1)</b></p>	<p>The Agreement ...aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:</p> <p>a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;</p> <p>b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and</p> <p>c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.</p>
<p><b>Mitigation and the NDCs:</b></p> <p><b>Article 4(1) and (2)</b></p>	<p>1. In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.</p> <p>2. Each Party shall prepare, communicate and maintain successive Nationally Determined Contributions that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.</p>
<p><b>The global goal on adaptation:</b></p> <p><b>Article 7</b></p>	<p>1. Parties hereby establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2.</p> <p>2. Parties recognize that adaptation is a global challenge faced by all with local, sub-national, national, regional and international dimensions, and that it is a key component of and makes a contribution to the long-term global response to climate change to protect people, livelihoods and ecosystems, taking into account the urgent and immediate needs of those developing country Parties that are particularly vulnerable to the adverse effects of climate change.</p> <p>...</p> <p>5. Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socio-economic and environmental policies and actions, where appropriate.</p> <p>9. Each Party shall, as appropriate, engage in adaptation planning processes and the implementation of actions... which may include... c) The assessment of climate change impacts and vulnerability, with a view to formulating nationally determined prioritized actions, taking into account vulnerable people, places and ecosystems...and e) Building the resilience of socio-economic and ecological systems, including through economic diversification and sustainable management of natural resources...</p> <p>10. Each Party should, as appropriate, submit and update periodically an adaptation communication, which may include its priorities, implementation and support needs, plans and actions, without creating any additional burden for developing country Parties.</p> <p>11. The adaptation communication ...shall be... submitted and updated periodically, as a component of or in conjunction with other communications or documents, including a national adaptation plan, a nationally determined contribution...and/or a national communication...</p>
<p><b>The global stocktake and adaptation:</b></p> <p><b>Article 7(14)</b></p>	<p>14. The global stocktake shall:</p> <p>a) Recognize adaptation efforts of developing country Parties;</p> <p>b) Enhance the implementation of adaptation action taking into account the adaptation communication;</p> <p>c) Review the adequacy and effectiveness of adaptation and support provided for adaptation; and</p> <p>d) Review the overall progress made in achieving the global goal on adaptation.</p>

<b>Loss and damage:</b> <b>Article 8</b>	<p>1. Parties recognize the importance of averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage.</p> <p>2. The Warsaw International Mechanism for Loss and Damage associated with climate change impacts shall be subject to the authority and guidance of the Conference of the Parties serving as the meeting of the Parties to this Agreement and may be enhanced and strengthened...</p> <p>4. ...areas of cooperation and facilitation to enhance understanding, action and support may include:</p> <ul style="list-style-type: none"> <li>a) Early warning systems;</li> <li>b) Emergency preparedness;</li> <li>c) Slow onset events;</li> <li>d) Events that may involve irreversible and permanent loss and damage;</li> <li>e) Comprehensive risk assessment and management;</li> <li>f) Risk insurance facilities, climate risk pooling and other insurance solutions;</li> <li>g) Non-economic losses; and</li> <li>h) Resilience of communities, livelihoods and ecosystems...</li> </ul>
<b>Scaled up financial support:</b> <b>Article 9(4)</b>	<p>The provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation, taking into account country-driven strategies, and the priorities and needs of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change and have significant capacity constraints, such as the least developed countries and small island developing states...</p>
<b>Public participation and access to information:</b> <b>Article 12</b>	<p>Parties shall cooperate in taking measures...to enhance ...public awareness, public participation and public access to information, recognizing the importance of these steps with respect to enhancing actions under this Agreement</p>
<b>Transparency:</b> <b>Article 13</b>	<p>1. In order to build mutual trust and confidence and to promote effective implementation, an enhanced transparency framework for action and support...is ... established.</p> <p>5. The purpose of the framework for transparency of action is to provide a clear understanding of climate change action in the light of the objective of the Convention as set out in its Article 2, including clarity and tracking of progress towards achieving Parties' individual [NDCs], and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stocktake...</p> <p>6. The purpose of the framework for transparency of support is to provide clarity on support provided and received by relevant individual Parties ...and, to the extent possible, to provide a full overview of aggregate financial support provided, to inform the global stocktake...</p>
<b>The global stocktake:</b> <b>Article 14(1)</b>	<p>1. The Conference of the Parties serving as the meeting of the Parties to this Agreement shall periodically take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals...It shall do so in a comprehensive and facilitative manner, considering mitigation, adaptation and the means of implementation and support, and in the light of equity and the best available science.</p>