FISH: CGIAR Research Program on fish agrifood systems

Addendum: Flagship 2: Sustaining small-scale fisheries
31 July 2017

CGIAR | RESEARCH PROGRAM ON Fish

2.2 Flagship 2: Sustaining small-scale fisheries

2.2.1 Flagship project narrative

2.2.1.1 Rationale, scope

Background analysis. Fish is by far the fastest-growing animal-source food and is a critical contributor to global food and nutrition security (Beveridge et al. 2013; Troell et al. 2014; Béné et al. 2015), and demand for it is projected to continue to rise, particularly in Asia (World Bank 2013; OECD-FAO 2015). Despite the growth of aquaculture, capture fisheries will continue to supply most of the fish consumed in much of the developing world in the coming decades. The great majority of these fisheries are small-scale, operating in rivers, lakes and wetlands and in coral reefs and estuaries in coastal seas (World Bank/FAO/WorldFish 2012).

Small-scale fisheries (SSF) generate food and income, often where formal markets and supply chains function poorly. Pressures from within and external to SSF threaten sustainability and the equitable distribution of the benefits they provide. The complexity of SSF, both in their ecology and the social and institutional environments they operate in, has thwarted the search for universal solutions. The role SSF play in nutrition and livelihood security is poorly accounted for by national and regional fisheries, food security and development policy. This oversight is attributable, in part, to limited empirical evidence of the scale of SSF benefits, the consequences that would result from their dysfunction and a lack of solutions fit to account for contemporary social, ecological and economic tradeoffs. The provision of research-backed intuitional and technical solutions to secure and rebuild SSF for the millions of people who depend on them, is a significant and urgent challenge, and it is the central rationale for Flagship 2 (FP2).

Shifts in policy, discourse and investment represent emergent windows of opportunity for substantial improvement in food and nutrition security through more sustainable and resilient SSF. For example, commitment to Sustainable Development Goal (SDG) 14; a goal dedicated to sustainable use of ocean resources. Further, there is explicit focus on fisheries, marine and freshwater systems within SDG 1, SDG 2, SDG 6 and SDG 15. An additional sign is the commitment by 126 countries to the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (FAO 2015). There is an emerging shift in private sector and philanthropic investment priorities towards SSF and Civil Society Organizations have established a strong voice in guiding these investments towards human wellbeing. The challenge now is to ensure these windows of opportunity are not isolated incidents, rhetoric or lost opportunities, but that they lead to sustainable impact. To address this challenge, FP2 applies interdisciplinary research necessary to develop management, technology and governance innovations to translate these commitments into realized outcomes at scale.

Problem statement. Sustaining and increasing the contribution of SSF to poverty reduction and food and nutrition security requires addressing three interrelated problems. First, overharvesting caused by increased fishing to meet local and distant demand, combined with insecure resource tenure and competition with other users, has degraded the resource base of many SSF. Social and economic drivers outside the sector influence the availability of alternative livelihoods, while ecological drivers undermine ecosystem functions, notably for vulnerable inshore marine systems such as coral reefs. Second, the benefits accrued from inland SSF are increasingly threatened by changes in the broader landscape. These include infrastructure development (dams, irrigation systems, roads) that disrupts ecological flows and connectivity, and agricultural intensification and land-use conversion that reduce wild fisheries productivity in multiple-use systems such as rice fields. Third, even where local innovations address some combination of these threats in coastal or inland systems, there is inadequate policy recognition of the importance of SSF and poor alignment of efforts among diverse stakeholders to drive solutions at higher scales.

Scope and approach. FP2 aims to improve fisheries governance and rebuild system productivity—in both coastal and inland systems. Research advances will be made in marine (Cluster 1) and inland (Cluster 2) fisheries systems in focal countries to design and improve social, ecological and economic innovations to manage fisheries for optimal food security, promote sustainable and equitable resource use, improve gender and social equity in fisheries governance and

along value chains, and increase representation of SSF and innovations in coastal and inland system planning. Research insights will be drawn from across the contrasting systems within focal countries to develop tools, engagement processes, management models and policy innovations appropriate for cross-regional exchange and adaptation.

These streams of place-based research will be integrated with analyses of drivers of change affecting the future of SSF and their role in regional food systems (Cluster 3). Cluster 3 will complement the food and nutrition security and environmental sustainability outcomes from Clusters 1 and 2 to contribute to a higher profile of fish in health and development policy agendas, increase public and private investment in the development of sustainable systems, and position fish in domestic and intraregional food systems to deliver optimal nutrition, food and economic benefits and security. To realize these outcomes, FP2 focuses on eight interrelated hypotheses that concentrate on testing and refining novel management, technical and livelihood innovations, critically evaluating and refining change mechanisms and scaling strategies, and examine and respond to complexity within broader historical, cultural and political economy contexts and change (Table 2.1).

Flagship-specific hypotheses	Addressed in Cluster
Management and technology: Fisheries management and technology innovations can increase fisheries production, environmental sustainability and food security	1, 2
Livelihoods and markets: Livelihood and market innovations can build resilience in fishing communities	1, 2
Gender, equity and youth: Accounting for social differentiation in SSF and application of transformative approaches through innovations can accelerate equitable poverty reduction and food and nutrition security	1, 2, 3
Governance landscapes: Research insights and capacity building directed toward windows of opportunity can transform governance and institutions to amplify food security and sustainability outcomes from livelihood, governance and fisheries management innovations	1, 2
Capacity development: Investments in research, governance and strategic networking to build responsive and accountable institutions can accelerate, enhance and sustain equity, sustainability and food security outcomes	1, 2
Scaling through networks: The spread and outcomes of livelihood, governance and fisheries management innovations can accelerate and amplify through strategic investment in networks	1, 2
External drivers of change: New systems knowledge (food systems, trade, global environmental change) can promote capacity to adapt in local and regional innovations for SSF and build accountability toward SSF in the governance of tradeoffs and external drivers	1, 2, 3
Imagining alternative futures: Innovative scenario and foresight models, combined with effective multistakeholder convening, can help transform national and regional decision-making and policies toward more sustainable and resilient SSF	3

Table 2.1. (Previously Table 11) Flagship hypotheses.

FP2 focuses on regions where the largest numbers of poor people depend on fish for food and nutrition security and where our research can have impact through improved fish agri-food systems at scale. In Asia-Pacific, we will focus on inland and estuarine fisheries in Bangladesh, Myanmar and Cambodia and coral reef fisheries in Solomon Islands. In sub-Saharan Africa, we will focus first on inland fisheries and the small fish species that constitute the majority of catches, building on experience in Zambia and addressing the complexities of land use and governance of fisheries. We will initially focus our scaling research on coastal co-management in the Philippines and subsequently in Tanzania. Scenario and foresight development to engage with policy stakeholders will focus on trade along complex value chains in four areas: (1) the African Great Lakes region, (2) Mekong region, (3) Pacific islands food system and (4) Ganges-Brahmaputra Delta.

Grand challenges and Sustainable Development Goals. FP2 addresses food and nutrition security delivered through SSF within the grand challenge of *unsustainable harvest of fish from the oceans and from aquatic systems* (the only flagship

in the CGIAR portfolio to do so). FP2 contributes to addressing the grand challenges of *overdrawn and polluted water supplies, nutritious and diverse agri-food systems and diets*, and on *climate change* through analyses of vulnerability and adaptation and climate change implications of alternative uses of land and other aquatic resources.

FP2 contributes to a number of SDGs, particularly SDG 14 (conserve and sustainably use the ocean, seas and marine resources) and SDG 6 through protecting and restoring water-related ecosystems. Alongside investments in ecological sustainability goals, this flagship focuses on how these translate to reducing poverty (SDG 1), increasing food security (SDG 2), gender equality (SDG 5), and sustainable livelihoods and economic growth (SDG 8). SDG 8 recognizes the importance of Small Island Developing States and the particular development challenges they face.

2.2.1.2 Objectives and targets

The objective of FP2 is to secure and enhance the contribution of SSF to poverty reduction and food and nutrition security in priority geographies. To achieve this, fisheries need to be ecologically sustainable and governed for objectives of food and nutrition security and resilience of fishery-dependent households. FP2 will primarily deliver research outputs and outcomes in support of achieving system-level outcome (SLO) 1 (*reduced poverty)* and the enabling conditions for SLO 3 (*improved natural resource systems and ecosystem services*). Improved fisheries management will increase the productivity of SSF and the yield from them. Through improved availability of and access to safe, nutritious fish by poor consumers, especially women and children, FP2 will make secondary contributions to SLO 2 (*improved food and nutrition security for health)*.

The primary target beneficiaries of FP2 are the fishery-dependent households and communities in the places we work and the traders and consumers of fish they produce. Contributions to SLO 1 targets refer to people and households dependent on fishing and associated processing and trade as significant contributors to their income and livelihood. Contributions to SLO 2 targets similarly consider benefits for food and nutrition security realized by consumers at multiple scales, often distant from the source of fisheries. In the case of SLO 3, we measure the area of an inland water body, terrestrial agro-ecosystem (such as rice-fish systems) or coastal fishery under improved management.

Flagship-specific outcome targets and their contributions to SLO targets and sub-IDOs are summarized in Table 2.2; methods to determine outcomes targets are provided in Annex 3.11. In sum, outcome targets are built on evidence-based experience and emerging opportunities to achieve development outcomes at scale. For example, in Bangladesh collaboration with the government indicates commitments to livelihood improvements for 500,000 poor Hilsa (*Tenualosa ilisha*) fishers. These targets were determined collaboratively based on outcomes from preceding fisheries management innovations (Boosting Hilsa production; Khan et al. 2012) and analysis indicating involvement of 2.5 million people in the value chain (Mohammed et al. 2016). Further, government commitments to restore 285,800 ha of estuarine ecosystem and established partnerships provide the opportunity to apply tested and developing management innovations that ensure social and ecological outcomes. In Cambodia, management innovations have to date reached 3000 ha of rice field agro-ecosystems and contributed to increased income and fish consumption in 86,000 people (PCI 2016; Nuppun 2016). Government commitments and bilateral funding investments enable further expansion across 11,000 ha of rice fields for more than 75,000 households as direct beneficiaries by 2021. In the Great Lakes region of Africa, early research on intraregional fish trade provides the foundations to design and scale innovations through the four trade corridors across 21 countries, potentially reaching many millions of people (Ward 2015).

FP2 seeks to achieve SLO targets in focal and scaling countries and beyond. Investments in 2018–2019 will be in inland/estuarine fisheries in four countries (Bangladesh, Cambodia, Myanmar and Zambia) and two coastal systems (Solomon Islands and Philippines), building largely on existing bilateral projects. We will increase resources and investments in other African and Asian countries (initially focusing on coastal fisheries in Tanzania and Vietnam) in 2020 and beyond. Improved fisheries technologies and governance aim to deliver more nutritious food, higher income and greater social inclusion and distribution of benefits. Within households we will disaggregate and track progress for young people and women.

Research under FP2 is particularly significant for poverty reduction given many of the poorest and most vulnerable people in focal and scaling countries are dependent directly or indirectly on SSF. In making contributions to SLO 1 (*reduced poverty)*, we recognize the multidimensional nature of poverty and therefore the interrelated nature of the IDOs and sub-IDOs. Our approach considers three primary dimensions of poverty: (1) income and asset poverty, the condition in which individuals and households do not have access to sufficient means to sustain a decent standard of living (addressed through sub-IDO 1.3.2); (2) vulnerability, the result of people's exposure to risks, the sensitivity of their livelihood systems to these risks and their capacity to use assets and capabilities to cope and adapt (1.1.1, 3.3.1 and XC 1.1.4); and (3) marginalization or social exclusion (XC 2.1.3, XC 3.1.3).

Flagship-specific outcome targets by 2022 **PRIMARY (annual milestones included in PIM Table D)**	**Target geographies**
1 million fishery-dependent households have reduced poverty as a result of adopting improved fisheries management Addresses SLO target 1.1 and sub-IDOs: *Increased capacity to cope with shocks* *Increased livelihood opportunities (for men and women)* *Increased value capture by producers* *Enhanced capacity to deal with climatic risks and extremes* *Improved capacity of women and young people to participate in decision-making* *Gender-equitable control of productive assets and resources (and benefits in SSF)*	**Cluster 1** Solomon Islands and Tanzania (scaling investments in Philippines and Vietnam) **Cluster 2** Bangladesh, Cambodia, Myanmar, Zambia **Cluster 3** National and regional foresight and intraregional trade analyses across all countries in the Pacific region and regional trade analyses in the African Great Lakes region, Mekong Delta and Ganges-Brahmaputra Delta.
1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements Addresses SLO target 1.2 and sub-IDOs: *Increased capacity to deal with climatic risks and extremes* *Increased capacity to cope with shocks* *Increased livelihood opportunities* *Increased value capture by producers* *Improved access to financial and other services*	
2.1 million ha of aquatic and coastal marine habitat restored and under more productive and equitable management Addresses SLO target 3.3 and sub-IDOs: *Enhanced conservation of habitats and resources* *More productive and equitable management of natural resources* *Increased resilience of agro-ecosystems and communities, especially those including smallholders* *Conducive agricultural policy environment*	
Flagship-specific outcome targets by 2022 **SECONDARY (progress measured through CRP-level M&E)**	
0.3 million people, of which 50% are women, without micronutrient deficiencies as a result of increased consumption of fish sourced from small-scale fisheries Addresses SLO target 2.3	
0.6 million more women of reproductive age consuming an adequate number of food groups as a result of improvements in small-scale fisheries Addresses SLO target 2.4	

Table 2.2. (Previously Table 9) FP2 outcome targets by 2022.

FP2 investments for each sub-IDO are summarized in Table 2.3.

Sub-IDO name	Total	W1+W2 (%)	W3/Bilateral (%)
SLO-related			
1.3.2 Increased livelihood opportunities	$12.39M	$3.24M (26.2%)	$9.15M (73.8%)
3.3.1 Increased resilience of agro-ecosystems and communities, especially those including smallholders (see also XC 1.1.5)	$12.39M	$3.24M (26.2%)	$9.15M (73.8%)
3.2.1 More productive and equitable management of natural resources	$12.40M	$3.24M (26.2%)	$9.16M (73.8%)
Cross cutting			
XC 1.1.4 Enhanced capacity to deal with climatic risks and extremes (see also 1.1.1 and 3.3.2)	$5.17M	$1.36M (26.2%)	$3.81M (73.8%)
XC 2.1.1 Gender-equitable control of productive assets and resources	$5.17M	$1.36M (26.2%)	$3.81M (73.8%)
XC 2.1.3 Improved capacity of women and young people to participate in decision-making	$5.17M	$1.36M (26.2%)	$3.81M (73.8%)
XC 3.1.3 Conducive agricultural policy environment	$5.17M	$1.36M (26.2%)	$3.81M (73.8%)
Total (USD)	**$57.86M**	**$15.16M (26.2%)**	**$42.68M (73.8%)**

Table 2.3. (Previously Table 10) Investments by sub-IDO for FP2 for 2018–2022. (Note that only the most relevant sub-IDOs are listed—a wider set of sub-IDOs is addressed in collaboration with other flagships.)

The flagship will contribute to all four cross-cutting IDOs, in collaboration with FP1 within FISH and with the other Global Integrating CRPs, A4NH, CCAFS, PIM and WLE. Specifically, we address *enhanced capacity to deal with climatic risks and extremes* (XC 1.1.4; see also 1.1.1 and 3.3.2), *gender-equitable control of productive assets and resources* (XC 2.1.1), *improved capacity of women and young people to participate in decision-making* (XC 2.1.3) and *conducive agricultural policy environment* (XC 3.1.3). Integral to achieving each of the named sub-IDOs is also *increased capacity for innovations in partner development organizations and in poor and vulnerable communities* (XC 4.1.4).

Within SLO 3, we focus on the sub-IDOs that track attributes and outcomes of improved fisheries governance: *increased resilience of agro-ecosystems and communities* (3.3.1; see also XC 1.1.5), and *more productive and equitable management of natural resources* (3.2.1). FP2 also contributes to other sub-IDOs, such as *enhanced conservation of habitats and resources* (3.1.2) and *increased capacity for innovation in partner development organizations and in poor and vulnerable communities* (XC 4.1.4), but these are secondary to the named sub-IDOs.

By increasing the availability and accessibility of nutritious fish through improvements to resource management and value chains, FP2 research will also contribute indirectly to food and nutrition security SLO targets, and more specifically the sub-IDO for *increased access to nutrient rich foods*.

Outcome milestones are provided in the Performance Indicator Matrix (PIM Table D), and the program approach to outcome monitoring, evaluation and impact assessment is addressed in Annex 3.6.

2.2.1.3 Impact pathway and theory of change

Securing and increasing the contribution that fisheries make to poverty reduction, food and nutrition security and environmental sustainability requires management, technical, livelihood and market and governance innovations within SSF, as well as strategies to accelerate the spread of innovations and shifts in the governance of fish-agri food systems. FP2 develops, supports and refines innovations and modes of governance that have been shown to serve the welfare of the many, rather than to manage to economic or ecological optima susceptible to the capture of a few (Béné 2003; Béné et al. 2010; Cunningham et al. 2009). To realize and sustain development outcomes, governance of fish-agri food

systems must adapt and transform to provide, amid competing uses and interests in coastal and inland landscapes, a safe and equitable operating space for SSF.

The FP2 theory of change (ToC) reflects this multiscale approach (Figure 2.1) where hypotheses (Table 2.1) will be tested in the three interlinked clusters. Clusters 1 and 2 focus on coastal and inland/estuarine systems to develop innovations that, when taken up widely and supported by policy, increase productivity and sustainability and reduce poverty through livelihood opportunities in SSF value chains, which in turn yield improvements in food and nutrition security. Innovations address challenges such as suboptimal fisheries management, competition for land, water and fisheries resources, and landscape-scale environmental degradation. Cluster 3 integrates knowledge generated in Clusters 1 and 2, with the development of complementary regional analysis of trade, foresight regarding key drivers of change and scenarios that will be used to inform decision-making and policy transformation toward poverty reduction, food and nutrition security, and environmental sustainability.

Cluster 1 focuses on coastal systems of Solomon Islands, and scaling countries of Timor-Leste and Philippines, with an emphasis on developing management, fishing technology and livelihood innovations. These countries demonstrate high levels of livelihood and food security dependence on coastal systems and a policy environment (consistent with trends throughout the broader Asia-Pacific region) that strongly promotes decentralized co-management. The opportunity is to increase the performance of co-management models to realize productivity, food security and poverty alleviation potential. Simultaneously, this requires a strong focus on situating co-management (and its limitations) within a range of management and governance innovations responsive to contemporary challenges (e.g. demographic change, competition for fisheries resources and climate change. We will build on methods piloted by WorldFish to refine fisheries management, livelihoods fishing technologies that lead to increased ecological sustainability and enhanced production for food security. Improved opportunities for fishers to generate income will be built within fisheries value chains and, where appropriate, through complementary livelihoods outside the sector. To achieve impact at scale, innovations are spread through learning and governance networks. To ensure innovations are relevant, legitimate and effective, they are developed and taken up through partnership with governments, regional bodies, development agencies and civil society.

Cluster 2 focuses on SSF in multifunctional, estuarine and freshwater wetland landscapes in Myanmar, Cambodia, Bangladesh and Zambia. These countries exemplify high reliance on freshwater fisheries amid intensifying competition over water resources, conversion of key aquatic habitats and climate change destabilizing seasonal patterns and relatively strong government commitment to the sector. Cluster 2 delivers research to increase SSF productivity and species diversity in human modified multiuse landscapes, such as rice fields, wetlands and irrigation and hydropower reservoirs. Research focuses on refinements to ecosystem-based approaches to fisheries management and associate innovation for fish production in integrated or alternate production systems. Innovations are developed to account for competing demands and tradeoffs between the different uses of land and water within these landscapes and with a focus on building capacities to adapt to external drivers of change and natural seasonal and inter-annual variability. Associated governance reform will be achieved through partnerships (government agencies, donors, NGOs, communities) and convening structured dialogue to improve responsiveness of government development planning and decision-making to local needs and innovation potential. Horizontal and vertical uptake of management, technology and institutional models will be achieved through partnership, alongside research that employs, participatory analysis of stakeholder relationships and power dynamics (e.g., Ratner et al. 2014) and evidence of the efficacy of these innovations (e.g. Miratori and Brooks 2015).

Cluster 3 focuses on research with regional perspectives that will be critical to sustain and transform the role of fisheries in poverty reduction and food and nutrition security. Research at this scale will develop robust scenario and foresight analysis tools applied to four regional systems, and it will be developed and analyzed collaboratively within multistakeholder dialogue and policy consultation. In the African Great Lakes fish trade corridor and the Mekong Delta, we will examine how domestic and intraregional trade affects capture fisheries production, resource exploitation and the distribution of livelihood and nutrition benefits of fish. Analysis includes value chains where aquaculture inputs are

derived from capture fisheries. Research on the agri-food system among Pacific islands will guide policy to better account for scenarios of ecological and social states influenced by climate change, economic development and demographic change. Cluster 3 identifies the macro-scale barriers and opportunities for innovations from Clusters 1 and 2 to have regional impact. Research is developed and interpreted through partnerships and convened dialogue to ensure relevance and legitimacy sufficient to challenge and guide the ways in which fish from SSF is positioned in fish-agri food systems at larger scales. Scenarios of fish in nutrition-sensitive food systems will be developed through joint analysis with FP1 and with global integrating programs within relevant agro-ecological systems.

FP2 invests substantially in four change mechanisms (Table 4; Figure 2.5) to ensure research outputs translate to research outcomes and, ultimately, lead to development impacts at scale. Change mechanisms are built on lessons from participatory action research, collaborative governance assessment, diffusion of innovations, policy transformation and institutional strengthening/capacity building. Change mechanisms are tailored to regional and national windows of opportunity and evidence of progress along impact pathways (Annex 2).

Change mechanism a *Local adoption and dissemination of technologies and management practices*	Applies participatory approaches to test and refine gender-responsive management, technology and livelihood innovations. The spread of innovations will be promoted through joint analysis for integration into national and subnational government sector strategies and action plans. Models are published and disseminated through novel communication channels for regional scaling. Collaborative cross-case analyses will identify lessons/innovations for adaptation and application in other geographies. Innovations are refined with regional and national agencies responsible for implementation and technical support toward policy commitments.
Change mechanism b *Private sector investment.*	Develops, with value chain actors, innovations that provide livelihood opportunities for women and youth, and that increase the availability of nutritious fish to poor consumers. Research outputs will critically evaluate the contexts in which private investments may accelerate progress toward environmental sustainability, food and nutrition security, poverty alleviation and equity outcomes and, alternatively, when they may undermine or reverse such gains. Participatory action research and convened multistakeholder dialogue, inclusive of value chain actors, industry associations and public agencies, ensures research guides policy on private investment in SSF within our target geographies. Research on the regional dynamics of fish trade will also be used to inform policy debates on opportunities for impact investment in the context of the aquaculture investment and the Blue Economy/Blue Growth agenda.
Change mechanism c *Public sector policy improvement and institutional strengthening*	Increases the viability, scalability and equity of technologies, management practices and organizational innovations—with a focus on equitable approaches to fishing rights allocation, policies that promote cross-scale management for resilience and greater recognition of SSF in fisheries, food system and development policy. Research is designed in direct response to public sector priorities and commitments, policy officials are engaged in research design, planning and implementation, and structured dialogue will be facilitated to deliberate results of analyses. Research outputs will directly support policy design and subsequent monitoring and evaluation of policy implementation. Recognizing that the design of appropriate policies does not in itself ensure effective implementation, concurrent investments are made in partnerships and institutional capacity to enable public sector agencies to fulfill and be accountable to their technical roles and policy commitments.
Change mechanism d *Influence on policies and priorities of civil society and development agencies*	Invests in networks and partnerships with proven power to influence, as well as in formal and informal advisory roles in strategic planning processes of multilateral and bilateral donor agencies. These investments lead to greater investment in gender-responsive and equitable fisheries management, technology and livelihood innovations. Strategies include collaborative sector analyses and investment priority setting, recommendation formulation, strategic outputs and communication to ensure consideration in sector strategies and design of large programs. This will lead to, for example, increased recognition of SSF in priority-setting of bilateral and multilateral development agencies and other funders of environmental governance, agricultural innovation, rural livelihoods, food and nutrition. It will also lead to greater investment in solutions developed and validated by FP2.

Table 2.4. FP2 Change mechanisms employed to ensure research outputs translate to research outcomes and lead to development outcomes and impacts at scale.

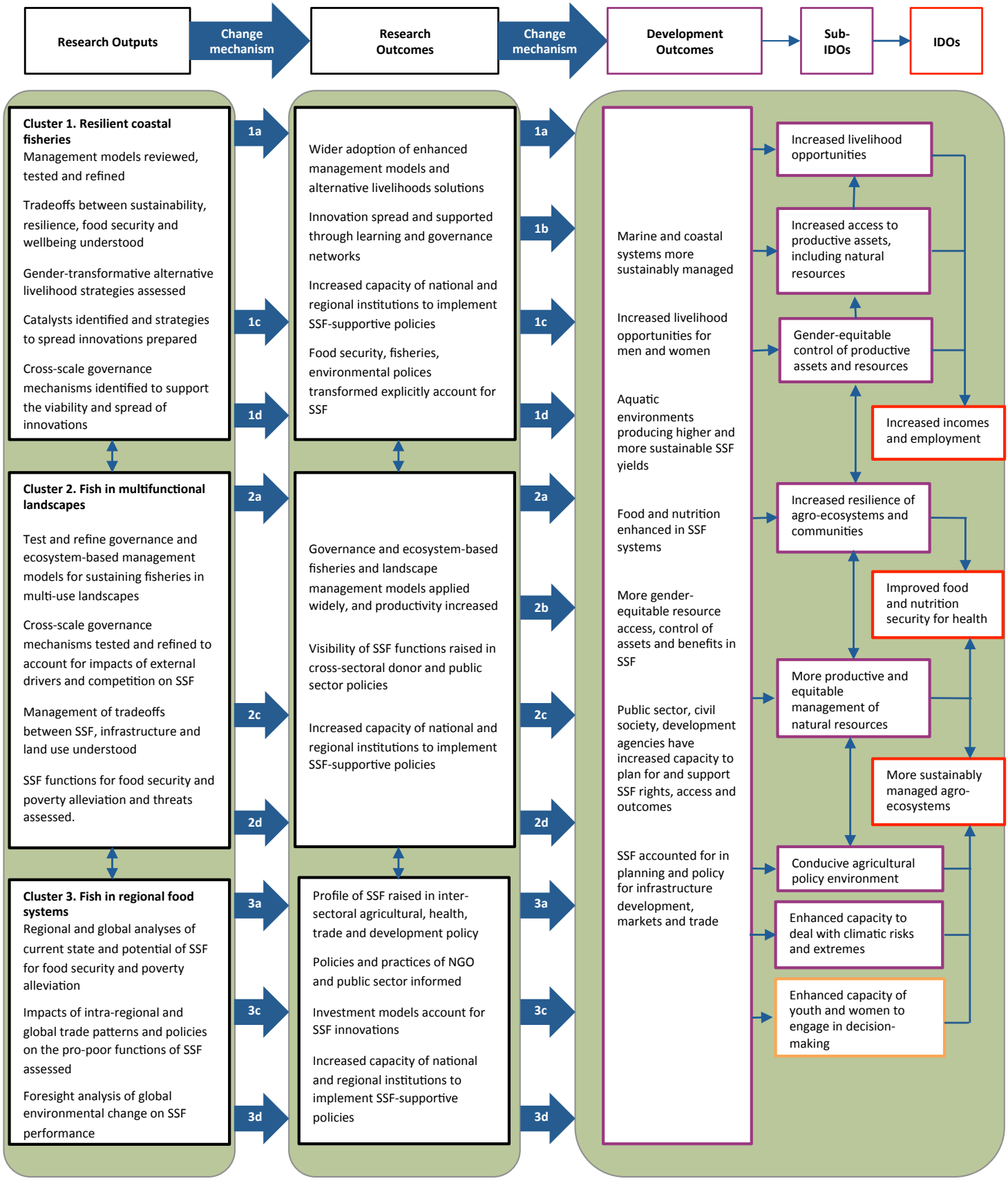

Figure 2.1. (previously figure 5) FP2 impact pathways

Result level (Ref. ToC)	Key assumptions	Corresponding strategies and risk management actions
Research Activities to Research Outputs	Communities, NGOs and government are willing to engage in refinement of management models, assessment of alternative livelihoods and ecosystem-based aquatic resource management (Risk: poor engagement) Related to change mechanism a	Identify communities on need and expressions of interest; tailor activities to local demand; employ participatory processes to establish a shared vision for all relevant stakeholders, with 'resilience' an explicit objective. Co-develop management and livelihood innovations with partners (NGOs and public sector)
Research Output to Research Outcomes	NGOs, public sector and development agencies receptive to recognizing improved forms of management, new innovations and policy amendments (Risk: limited sharing) Related to change mechanisms a, c, d NGOs, public sector and development agencies able to play a promotion and dissemination role effectively with adequate budget and technical capacity (Risk: inadequate capacity). Related to change mechanisms a, c, d Health, development and environment-focused agencies recognize SSF livelihoods alongside other conservation and development objectives in coastal systems and multifunctional landscapes. (Risk: inadequate investment) Related to change mechanisms c, d Government actors across sectors receptive to longer-term concerns of food security and wellbeing, including tradeoffs with short-term economic growth. (Risk: policy obstacles) Related to change mechanism c Government able to implement policy and practice changes with adequate budget and technical capacity. (Risk: inadequate capacity) Related to change mechanism c Fisheries management, technology and livelihood innovations realize equitable outcomes, avoiding elite capture. (Risk: increased inequities) Related to change mechanism a	Co-develop management and livelihood innovations with NGO and public sector; incorporate lessons on challenges and tradeoffs in capacity building and communication resources. Select countries where early policy change indicates progress and support towards testing and improving SSF management, yielding evidence on benefits of ecosystem-based management approaches nested within adaptive co-management process. Focus strategic research and engagements explicitly on dissemination via networks on a regular basis. Synthesis and feeding back of policy lessons in networks and forums High quality engagement processes with cross-sectoral civil society and development agencies in assessments and foresight analysis of the food security and poverty reduction functions of SSF, and work with them to communicate results. Employ a multi-pronged communication strategy to communicate foresight analyses to raise the profile of current and future roles of SSF in food systems. Align monitoring and evaluation processes and findings against formal policy commitments (environment, equity, fisheries, development) made by governments, development agencies and civil society Co-develop innovations and cross-scale governance research with public sector; use profile-raising activities To support increased public and development investment and governance networks to moderate capacity gaps. Implement participatory action research with explicit attention to gender and social differentiation in management and alternative livelihoods.

Result level (Ref. ToC)	Key assumptions	Corresponding strategies and risk management actions
Research Outcomes to Development Outcomes	Outcomes from new innovations persist amid external drivers of change. (Risk: low sustainability) Related to change mechanism a Replicated forms of management, technology, livelihood and integrated farming innovations still deliver equitable and sustained improvements to food security, production and incomes. (Risk: low sustainability) Related to change mechanism a Government policy supports longer-term planning and policy on food security, nutrition and ecological sustainability objectives versus short-term economic growth. (Risk: policy obstacles) Related to change mechanism c Government policy promotes poverty alleviation and food security objectives, alongside ecological conservation and economic growth. (Risk: policy obstacles) Related to change mechanism c Civil society and development agency decision-making responsive to foresight analysis. (Risk: poor integration) Related to change mechanism d Civil society activities promote human wellbeing and food security in SSF, not only environmental conservation. (Risk: poor integration) Related to change mechanism d Private sector engagements promote equity and distributive models of economic development. (Risk: elite capture) Related to change mechanism b	Analyze regulatory and institutional barriers that incentivize unsustainable fisheries exploitation and reduce equitable access. Explicitly engage with cross-sectoral and cross-scale drivers and partners in research; build management and livelihood innovations into broader resilience-building approaches. Raise the profile among government and regional agencies of the potential and barriers to outcomes from co-management. SSF governance and alignment to SDGs and other policy commitments; engage with civil society to ensure government accountability to SDGs, human rights and SSF commitments, as well as conservation commitments. Integrate foresight analysis into existing forums and processes for strategic planning and policy formation. Partner to recognize SSF explicitly in cross-sectoral and cross-scale governance arenas in which civil society and development agencies are active; build accountability to SDGs, human rights and SSF commitments into civil society capacity development work. Close tracking of private sector investments and models to understand and positively influence equity and distribution issues.

Table 2.5. (previously table 13) FP2 Key assumptions with corresponding strategies and risk management actions.

2.2.1.4 Science quality

To ensure relevance we strategically align our research priorities to those articulated by community and national stakeholders (e.g. SSF Guidelines, FAO 2015). These are summarized as flagship-specific hypotheses (Table 1) representing interrelated dimensions of the SSF challenge; to ensure credibility these are set within different literatures and theoretical framings. The partners in the flagship have made significant contributions to that literature (see Table 5 for examples).

Across all clusters, we consider SSF through an overarching lens of social-ecological resilience because they encapsulate sustainability, poverty and food and nutrition security, and also account for relationships between social and ecological systems, cross-scale interactions and feedback and shocks. Although this focus is closely aligned with the objectives and commitments laid out in the SSF Guidelines (for example), efforts to apply resilience thinking in practice have struggled to account for the human dimensions and objectives of social-ecological systems (Cote and Nightingale 2012; Brown 2014). We will address this gap through our comparative advantage in social and interdisciplinary science in the SSF domain; analysis of peer reviewed research shows WorldFish ranks second, globally, for SSF research and in the past five years 42% of WorldFish research falls into the social (30%) and economic (12%) sciences (Scopus, accessed July 2017). Through our established and developing relationships, we engage in policy networks in Asia, Africa and the Pacific. For example, within our efforts to improve livelihoods and strengthen co-management, we will examine and test how resilience is defined locally, how it is built and the inevitable tradeoffs that determine where improved resilience does, and does not, translate to improved wellbeing (Hicks et al. 2009; Mills et al. 2011; Coulthard 2012; Cohen et al. 2013). We employ quantitative fisheries and demography research to examine changes in productivity, ecological status and the income and nutritional status of men, women and children reliant on SSF.

FP2 research recognizes the multidimensional nature of development and the inadequacy of framing poverty solely in economic terms (Stiglitz et al. 2009). We will build on conceptual framing and measurement of human wellbeing to reconcile resilience insights with poverty alleviation and ecological sustainability (Smith and Subandoro 2007; Ballard et al. 2011; OECD 2013; McGregor et al. 2015). This will require methodological advances at the interface of research and development and policy practice at local and national scales. At this interface, CGIAR and FP2 research partners enjoy a comparative advantage and a proven track record.

Research within Clusters 1 and 2 will examine governance and social and ecological outcomes among diverse fishery systems. While we examine localized cases in depth, we will also use analytical frameworks to facilitate comparative, cross-case analyses (e.g. Ratner et al. 2013). Employing such frameworks strengthens our analytical power to draw generalizable lessons for different agro-ecological characteristics and governance arrangements in different contexts. Although there is a great deal of advocacy around co-management approaches, there is also a paucity of systematic analysis of fisheries co-management practices applied, and comparison of outcomes, particularly for the social and equity dimensions (Selig et al. 2016). By addressing this gap, we can provide improved co-management models alongside robust guidance for the other governance and management strategies necessary to achieve development outcomes at local, national and regional scales. This research extends beyond the application of existing frameworks and uses applied insights to further refine and operationalize them. Both the use and refinement of frameworks will be subject to peer review.

In Clusters 1 and 2, we ensure legitimacy through a commitment to engage with fishing communities and policy forums aligns. Credibility is ensured through our use of established and peer-reviewed frameworks that guide implementation. Effectiveness is enabled and monitored through *subsequent* analyses of implementation and governance processes (e.g. Andrew et al. 2007; Ratner et al. 2013; Stockholm Resilience Center 2015), wetland ecology and restoration (e.g. Zedler 2000; Junk and Wantzen 2004) and empirical research on promising management practices in SSF and integrated food production systems in both coastal and freshwater realms, conducted through research for development projects led by WorldFish and the International Water Management Institute (IWMI) (e.g. Brooks and Sieu 2016; Dey et al. 2013; Lorenzen et al. 2007; McCartney et al. 2016). To ensure relevance and effectiveness, our research will be co-generated with fishing communities and government, nongovernment and research agencies, using participatory action research principles that have been shown to promote both sustained local innovation and multistakeholder dialogue that can influence policy and institutional change

(Reason and Bradbury 2008; Ratner et al. 2014). Our emphasis on knowledge generation through co-production and on-the-ground engagements sets WorldFish and FP2 apart from traditional research organizations. It ensures research has greater relevance, credibility, legitimacy and effectiveness - well aligned to ISPC science quality approaches (ISPC 2017). This approach is fundamental and apparent in each of our change mechanisms — ensuring responsiveness to stakeholder needs and increased ability to influence practice and policy.

A critical aspect of effectiveness will be to understand how locally generated insights and lessons are considered within a systems perspective, and the potential and limitations of scaling. For example, investments in management, technology and livelihood innovations can bring about improvements to environmental sustainability and food and nutrition for human wellbeing, but structural dynamics (e.g. international trade and global environmental change) can affect sustainability and human wellbeing to even greater degrees. Much existing research focuses on one scale or the other; the FP2 research team has a strong comparative advantage for linking actors in meaningful, evidence-based dialogue about options to address SSF challenges through networks bridging local, national and regional scales.

Science credibility and legitimacy will be facilitated through effective science partnerships and robust review mechanisms. At a global level, WorldFish and the IWMI will partner with James Cook University to ensure an evidence-based approach that enables fisheries systems to be ecologically sustainable and governed for objectives of food and nutrition security and resilience of fishery-dependent households. This global science partnership will engage with each of the appropriate national science agencies within targeted countries to ensure the quality of our science remains high, as well as responsive to country needs, and that it is aligned and contributing to concurrent efforts to build capacity for future innovation. Science quality will also be maintained through cross-CRP cooperation and collaboration that facilitates exchange of methods and approaches across agri-food systems and social science, such as the CGIAR Systemwide Program on Collective Action and Property Rights (CAPRi), sustained through PIM FP5 and the CGIAR Gender Platform (PIM FP6).

Flagship hypothesis	Conceptual frameworks and theories	Selected evidence of track record on which we build
Management and technology	Fisheries and ecological sustainability examined from the perspective of sustainable fisheries resources (Dugan et al. 2010) and ecosystem approaches to fisheries management (Garcia et al. 2003; Patrick and Link 2015). Linkages between sustainability resilience and adaptive capacity (Gallopin et al. 2006). Governance understood locally (e.g. Ostrom 1990; Ratner et al. 2013) and from multiscale governance perspective (Bavinck et al. 2013).	Albert et al. 2014, 2015; Cohen and Alexander 2013; Cohen and Foale 2013; Cohen et al. 2014; Dewan et al. 2014; Evans et al. 2011; Mapedza et al. 2012; McClanahan et al. 2011; Schwarz et al. 2011; McCartney et al 2016; Kura et al. in review; Kim and Brooks 2015
Livelihoods and markets	Research structured around the resilience of social-ecological systems (Folke 2006), linkages between resilience and adaptive capacity (Gallopin et al. 2006), improved food and nutrition security and the role of aquaculture for the poor (Troell et al. 2014; Powell et al. 2015) and ecosystem services in water and energy planning (Bekchanov, et al, 2015). Research guided by seminal approaches to livelihoods by Allison and Ellis (2001).	Albert et al. 2014; Cinner and Bodin 2010; Cinner et al. 2013; Schwarz et al. 2011; Sulu et al. 2015; McCartney et al. 2015, 2016; Joffre et al. 2012, 2017; Brooks et al. 2015; Mattson et al. 2001; Meynell 2014; Kura et al. 2014, 2017; Eriksson et al. 2017
Scaling through partnerships and networks	Social network theory (Bodin and Crona 2009; Borgatti 2009), diffusion of innovation theory (Rogers 2003) and institutional analysis.	Abernethy et al. 2014; Cohen et al. 2012; Orirana et al. 2016
Governance landscapes	Interactive Governance Framework (Bavinck et al. 2013) and Ratner et al. (2013) framework for analyzing governance. Analyzing policy and practice against SDG policy and human rights approaches (e.g.	Abernethy et al. 2014; Andrew et al. 2007; Foale et al. 2013; Ratner and Allison 2012; Agpar et al. 2017; Miratori and Brooks 2015; Song et al.

Flagship hypothesis	Conceptual frameworks and theories	Selected evidence of track record on which we build
	Allison et al. 2012).	2017; Cohen et al. 2017.
External drivers of change	Research builds on ideas of globalization of social-ecological systems (Young et al. 2006). Explicit focus on global trade, climate change and other external drivers of change such as hydropower development.	Albert et al. 2014; Allison et al. 2009; Baran et al. 2015; Eriksson and Clarke 2015; Eriksson et al. 2015; Hecht and Lacombe 2014; Hoanh et al. 2010; Kam et al. 2016; Kura et al. 2014; Lacombe et al. 2014; Phong et al. 2016; Winemiller et al. 2016; Matthews and McCartney 2017; Fabinyi et al. 2017
Imagining alternative futures	Participatory scenario development and related techniques (Vervoot et al. 2014); foresight modeling using IMPACT fish supply modeling (World Bank 2013; Kobayashi et al. 2015) and WorldFish Fish Supply Model (previously AsiaFish model, Dey et al. 2005).	Dey et al. 2005; Evans et al. 2013; Secretariat of the Pacific Community 2015; Tran et al. 2017; Henriksson et al. 2017; Chan et al. 2017
Capacity development	Systems approaches to capacity development at individual, institutional and organizational levels (Morgan 2006; Ortiz and Taylor 2008) and understanding of capacity development as a process (OECD 2008).	Apgar et al. 2015; Leuwis et al. 2014; Sarapura et al. 2014
Gender, equity and youth	Ratner et al. (2013) framework to examine gendered and socially differentiated representation and power in SSF governance. Application of wellbeing (Weeratunge et al. 2014) and rights-based (Allison et al. 2012) framings.	Allison et al. 2012; Cohen and Steenbergen 2015; Cole et al. 2015; Kantor et al. 2015; Morgan et al. 2016; Ratner et al. 2013; Weeratunge et al. 2014; Weeratunge et al. 2016; Cohen et al. 2017; Locke et al. 2017

Table 2.6. (previously table 13) Scientific foundations of FP2 hypotheses, their relationship to science literatures and theories, and our track record in contributing to those fields of enquiry. Our research is grounded in conceptual frameworks and theories, which are critical to keep pace with research advances, and acts as evidence of our capacity to produce international public goods.

In addition, we will develop two communities of practice for FP2 that leverage existing investments in science quality, including research design. For coastal fisheries (Clusters 1 and 3) we will use the Centre of Excellence for Coral Reef Studies Scientific Management Committee as a review panel for the design of research. To review our research on the interactions of inland fisheries with broader trends in landscape-level change (Clusters 2 and 3), we will draw on relevant expertise through our engagement with the Ramsar Convention's Scientific and Technical Review Panel (STRP) where the IWMI is an International Organization Partner, and the Ecosystem Services Partnership, coordinated by the Environmental Systems Analysis Group at Wageningen University and Research Centre.

Research will also be published in regionally appropriate, peer-reviewed publications/journals and venues to ensure it is not only academically robust, but withstands review from practitioners and policymakers. In addition, all the partner research organizations have internal peer-review processes that require sign-off from experts with domain knowledge.

2.2.1.5 Lessons learnt and unintended consequences

FP2 design has drawn upon lessons from CRP on Aquatic Agricultural Systems (AAS) as well as linkages with WLE (particularly in the Mekong and Ganges regions). Learning from AAS on local political economies linked to resource capture has presented critical understanding for designing approaches to build institutions that support decision-making processes that result in both sustainable and equitable resource use (Agpar et al. 2016). Learning from Khulna, Bangladesh, through AAS and the WLE, Ganges focal region work on improved community water and land management

practices at the micro-scale within the polders has contributed to the creation of innovative water resource governance mechanisms to reduce conflicts associated with water management among community members (Dewan et al. 2014; Kenia and Buisson 2015). These mechanisms contributed to sustainable improvements in agricultural productivity, and these findings have informed what is proposed in Bangladesh under Cluster 2.

Through our linkages with WLE, particularly WLE FP4 on managing resource variability, risk and competing uses for increased resilience (VCR) and optimization of water management in integrated fish and crop production systems. Partnership with WLE seeks to make certain that deliberations over basin and watershed-scale resource competition and development scenarios are legitimate and equitable.

We have learned that co-management and governance reforms (particularly in multi-use contexts) carry risks, particularly when issues surrounding accountability and representation are not managed or addressed. This creates opportunities for elite capture (Béné et al. 2009; Evans et al. 2011; Cinner et al. 2012; Cohen and Steenbergen 2015). Our research will pay particular attention to power imbalances and other social differentiation that interventions may cause or exacerbate.

We also recognize risks inherent in action research that aims to influence change in governance, particularly in areas under collective or contested tenure. We have learned that the process of clarifying and securing tenure, deemed necessary for resource management and development efforts, can precipitate contestation or dispute (McDougall 2005). Mechanisms to manage competing perspectives and integrate an awareness of gender and social equity are critical to avoid aggravating conflicts or unintentionally exacerbating existing inequalities. FP2 incorporates lessons from WorldFish's long history in community engagement and community-based fisheries management, including from phase 1 CRPs (Douthwaite et al. 2015; Apgar et al. 2017). The Collaborating for Resilience approach (Ratner et al. 2014), co-developed under AAS and PIM in phase 1, will also be used, along with locally contextualized tools to provide tested approaches to address this challenge through multistakeholder dialogue (e.g. Schwarz et al. 2014) and mediation and conflict resolution between resource users in multifunctional landscapes (e.g. scenario development and decision support tools developed with WLE).

Fisheries reforms at local, national and regional scales commonly fail because of problems of implementation and external drivers such as natural, political or economic shocks; internal social relations and leadership issues; and competition for resources with other sectors (Andrew et al. 2007). More successful reforms anticipate a wide range of economic, social, political, institutional or environmental risks and opportunities, and build in mechanisms to adapt (Armitage et al. 2009; Gelcich et al. 2010). Recognizing that social and ecological shocks are inevitable, we focus on building resilience and adaptive capacity through the design of our engagements. Furthermore, our use of foresight analysis and multistakeholder dialogue on future scenarios, as well as related capacity development efforts, aim to embed such resilience principles in policy and institutional reform decisions.

Without adequate attention to linkages across sectors and scales, institution-strengthening investments in the sector also frequently fail to yield the intended results. An African Development Bank review (2008) of fisheries projects found that "the lack of adequate analysis of the institutional framework is undermining the establishment of mechanisms to support public, private or civil society organizations." Similarly, a key lesson of AAS is that strengthening community-level institutions needs to be complemented by a greater focus on governance across scales and on the external drivers of change.

2.2.1.6 Clusters of activity

FP2 will pursue a combination of place-based field research in strategic geographies, comparative analysis and cross-cutting learning, and analyses of fish in regional food systems. Research in Cluster 1 focuses on the challenge of sustaining production from and equitable access to small-scale coastal fisheries. Cluster 2 focuses on sustaining fisheries production in multifunctional landscapes in which land-use changes, hydropower development and climate change present major challenges. Cluster 3 focuses on the role of SSF in regional food systems, analyzing the drivers of change

and routes to improve contributions to food and nutrition security, equitable asset building and wealth creation. This integrated program of research addresses the eight propositions outlined in the FP2 ToC (Table 11).

Cluster 1: Resilient coastal fisheries

Coastal SSF produce approximately half the fish consumed in the developing world and employ 47 million people, about a third of whom are women (Mills et al. 2011). With appropriate governance, coastal SSF contribute to the wellbeing and food security of millions of people who have few economic and nutritional alternatives (Béné et al. 2010). Research in this cluster focuses on sustaining the food and nutrition security and poverty alleviation functions of coastal SSF through five streams of action research: (1) strengthening co-management; (2) building alternative and improved livelihood strategies; (3) refining fishing technologies to improve food security (3) spreading co-management and livelihood innovations via novel, strategic networking (change mechanisms a and d); (4) investing in regional and national regional policy forums.

We will focus on Solomon Islands and later on Tanzania, scaling to the Philippines and Vietnam because of their high reliance on coastal fisheries (Cinner et al. 2012a; Foale et al. 2013) and opportunities for regional influence. WorldFish has established networks, partnerships and a track record in these countries and surrounding regions. In the first year of FISH, we have strengthened our partnerships in Tanzania and will build on these emerging networks to leverage bilateral funding and expand our engagement. In Vietnam, we will develop responses to national demand as funding is secured.

Country-specific and comparative analyses will address the following three questions: (1) How can multiscale governance be improved to both increase ecological sustainability and promote gender-equitable flows of benefits from fisheries, particularly to the poorest and most marginalized? (2) What are the tradeoffs between longer-term system sustainability, resilience, food and nutrition security, and more immediate improvements to wellbeing? (3) In what ways can resilience be built into SSF at national, subnational and local levels to account for external and local drivers of change?

While meta-analyses suggest co-management can contribute to each SLO, impacts are highly variable and socially differentiated (Evans et al. 2011; Cinner et al. 2012a). A risk of widespread policy and donor support for co-management for SSF is that without critical evaluation of the benefits *and limitations* of these approaches, there will be insufficient attention paid to multiple management and governance innovations necessary to realize food and nutrition security, and environmental sustainability at scale. While improving models of co-management will form a component of Cluster 1 (to determine the local contexts, tradeoffs and enabling structures that increase SSF sustainability, equity and food and nutrition security), this cluster firmly situates research within broader fisheries governance systems.

We will employ data from gender-disaggregated catch surveys, interviews, focus groups and household surveys to test gender-inclusive and women-targeted livelihood options and market opportunities in Solomon Islands (e.g. fish-aggregating devices, communication technology for market connectivity). We will use gender-inclusive participatory approaches to identify livelihood options prioritized by women, men and youth; how they can be introduced in an equitable manner; and how costs and benefits differ by gender and social group. We will examine outcomes in terms of poverty alleviation and interactions with SSF sustainability and resilience.

To realize impact at scale, we will strategically invest in partnership modalities to understand different impact capacities. For example, we will partner with existing governance and learning networks in the Asia-Pacific region (e.g. the Locally Managed Marine Area network [LMMA]) and Solomon Islands (e.g. National Coordinating Committee for the Coral Triangle Initiative), which are established, publicly funded scale-out mechanisms. We will measure impact on capacity development and policy response through network members in terms of co-management practice, livelihood strategies and gender equity. Using social network analysis, we will measure the institutional and social accelerants and barriers to innovation spread and network functioning to amplify learning and governance outcomes. We will synthesize policy lessons and support partners to engage effectively in regional networks, leveraging the commitments made by

countries toward global norms in SSF (e.g. FAO 2015) that reinforce human rights and gender and social equity in governance. Cross-scale governance interactions are a particular focus. By engaging with policy instruments and forums, we will influence environmental and development policies and support their implementation to better protect SSF functions.

Cluster 2: Fish in multifunctional landscapes

Research in this cluster will address how fisheries in estuaries, rivers, wetlands, man-made water bodies, seasonal water bodies and rice fields can be sustained or enhanced in landscapes where natural seasonal and inter-annual variability, land-use changes, hydropower development and climate change are major challenges to enhancing the natural productivity of SSF. Additional localized challenges include access rights, power dynamics and decision-making, and distribution of benefits equitably across different social constructs (such as gender, religion, age and wealth), which constrains local innovations and livelihood adaptation in response to environmental changes driven by external factors. We will take an interdisciplinary approach to interventions, combining ecological, hydrological and governance research to provide a suite of options on how poor women, men and youth can manage risks and realize opportunities with regard to SSF in these landscapes. Research will support the development and refinement of tools to negotiate tradeoffs and synergies between fish production and alternative landscape uses. Research will cut across scales, linking with and informing national as well as regional development and policy processes. Cluster 2 focuses on change mechanisms a (local adoption of technologies and management practices), c (strengthening institutional capacity) and d (influencing donor priorities).

Critical to the broader landscape analyses that frame both localized as well as national and transboundary responses will be the link between Cluster 2 and WLE FP4 on managing resource variability and competing uses for resilience, linking our fisheries-focused analysis with broader research on multiple uses of water and land at landscape and river basin scales.

Country-specific and comparative analyses will address the following four questions: (1) What strategies and tools can minimize the impacts of the key drivers of change on the hydrology, ecological character and fisheries livelihood opportunities in multifunctional landscapes at different scales? (2) How can governance mechanisms be improved in these landscapes to have transformative impacts on the livelihoods of the poorest and most marginalized and support gender-equitable distribution of benefits from fisheries? (3) What technologies and management practices can help sustain or revitalize fisheries productivity in reservoirs and rice fields in different agro-ecological zones? (4) What tradeoffs between fish production and other uses within these landscapes need to be considered to optimize contributions to livelihoods, food and nutrition security and wellbeing while maintaining long-term ecological sustainability, and how can these be achieved?

We will work in the Bangweulu wetland system in Zambia as a learning site on enhancing the contributions of inland SSF to diversified livelihoods in southern and eastern Africa. Using remote sensing and GIS tools to do land-use classification and change detection analyses, we will assess how temporal and spatial variability in the hydrological regime affect and influence patterns of wetland utilization and fisheries livelihoods. We will link this with tradeoff analysis, including the feasibility of integrating fish-rice production systems, in line with the Zambian government's strong support for fish production.

Research in Myanmar's Ayeyarwady Delta addresses opportunities for improved governance and productivity of seasonal wetlands, integrated fish-rice production systems (including water management) and in irrigation reservoirs. Research employs nutrition-sensitive and gender-accommodating approaches to ensure benefits such as improved income, nutrition and health are acquired in a gender-equitable manner by fishers and producers who depend on these systems. One of the Cambodian government's policy strategies for addressing food security and poverty alleviation is to enhance natural productivity of rice field environments, including the establishment of 1200 dry season community managed fish refuges by 2019. In alignment with this policy ambition and leveraging a substantial USAID investment in rice field fisheries enhancement in the Tonle Sap Lake floodplain region, Cluster 2 will test (a) approaches to habitat improvements for increasing rice field fisheries productivity and diversity, (b) strategies to manage migratory fisheries in

the Mekong River and tributaries, and (c) models of water management that adopt a multiple-use orientation in community fish refuges.

In Bangladesh, we will contribute to improving the governance of the Padma-Meghna river-estuarine system to ensure socially equitable benefits for women, young people and the landless. In this multifunctional landscape, fisheries, agriculture, aquaculture and ecosystem conservation can be complementary but also compete. We will analyze the tradeoffs between SSF, increased productivity and equitable resource management with communities. This research leverages a substantial USAID investment, which aims to improve community fisheries management and livelihood resilience, in support of government policy goals for the sector. While these fisheries are multispecies, focus is on the freshwater migratory fish hilsa which is the national fish of Bangladesh and a much valued fish in diets throughout South Asia.

Lastly, we will conduct ecological and social research around increasing fish production and adapting livelihoods in man-made water bodies, focusing on sites in the Mekong and Ayeyarwady basins, where the number of reservoirs is rapidly increasing as a result of irrigation and hydropower development. The fisheries yields from such reservoirs are often promoted as an important secondary benefit to landscape alterations. There is significant scope to improve the design and management practices of reservoirs to maintain productivity and diversity of native species which is less costly in the long run and can make it more resilient to seasonal and inter-annual variability (McCartney et al. 2016). Our research will focus on testing techniques and management frameworks aimed at maximizing the natural fish production in these reservoirs without compromising other ecological values and uses of water (Meynell 2014; McCartney et al. 2016). Further, we will test and promote access strategies that promote equitable benefits from these fisheries, particularly nutrition, for women and children.

Cluster 3: Fish in regional food systems

The resilience of both coastal and inland fisheries production and the distribution of benefits derived from these systems depend critically on larger-scale dynamics and external drivers such as trade, the rise of aquaculture, regional governance and global environmental change (e.g. Allison et al. 2009; Winemiller et al. 2016). These drivers have profound impacts on fish supply and demand, resource status, and livelihood and nutritional outcomes. This cluster augments research in Clusters 1 and 2 to build the evidence base for policy that enables productive and equitable SSF (principally through change mechanisms c and d), and to enhance the value chains most important for poor consumers (including private entrepreneurship through change mechanisms b and c).

Country-specific and comparative analyses will address the following three questions: (1) How will supply and demand for fish from SSF evolve in the face of market dynamics, competing claims on landscapes and coastal zones, and demographic and environmental change? (2) How can policy and practices governing SSF be influenced to maximize their contribution to poverty reduction and food and nutrition security? (3) What policies, institutions and investments are needed to increase the contribution of national and regional fish trade to gender-equitable impact on food and nutrition security and livelihoods of the poor?

Recent reviews have contrasted projections of supply and demand and the role of fish in regional food systems (e.g. Bell et al. 2015; Amos et al. 2016). Understanding the future of fish production, trade and consumption will be critical in the evolution of regulations governing fish production, land use, coastal development, hydropower and food policy. We will use foresight modeling and participatory scenario development to understand the dynamics of fish food systems as they evolve under a range of ecological and social drivers of change, including climate change. This research will focus first on the Pacific and the lower Mekong, and by year four we will launch scenario analysis in East Africa.

New insights on the global benefits derived from SSF through a global-scale data synthesis that updates and strengthens the Hidden Harvests report (FAO/World Bank/WorldFish 2012). In addition to informing foresight models, outputs will provide evidence to include considerations of SSF in high-level policy design and implementation on food systems.

In collaboration with PIM FP1, we will use the International Model for Policy Analysis of Agriculture Commodities and Trade (IMPACT) model (Rosegrant et al. 2001) to explore global and large-scale regional trends in fish supply and demand. We will focus on Africa and Asia as two regions where the emergence of aquaculture offers contrasting projections for future supply. In addition, FP2 will collaborate with Australian National University scholars to further develop the WorldFish Fish Sector Model (previously the AsiaFish model; Dey et al. 2005) to downscale IMPACT projections to smaller regional and national scales. In these analyses, we will focus on the Mekong Delta, East Africa and the Pacific region to augment scenario development and research in FP1 and FP3.

In collaboration with CCAFS FP1, we will continue scenario development (Vervoot et al. 2014; Amos et al. 2016) in the Pacific region, where food and nutrition security is challenged by rapid population growth and urbanization, shortages of arable land, and cheap, low-nutrient, high-energy food imports from global trade. Many Pacific island countries are affected by the double burden of malnutrition (undernutrition and obesity). We will extend these analyses to the Mekong Delta, where infrastructure development such as reservoirs for hydropower and irrigation, dikes and sluices for flood protection, and irrigation is considered key to sustaining economic growth. National agencies in Cambodia and Vietnam seek more in-depth studies to identify impacts of changing patterns of fish production and diversity as they evolve under broader landscape development and climate change.

Our analyses of trade will focus on domestic and intraregional fish trade that, in contrast to North-South trade, remains poorly understood and in which the contributions to poverty reduction remain contested (Béné et al. 2010, 2015, 2016; HLPE 2014). Two case studies of fish trade systems will highlight contrasting challenges to fish delivering benefits to poor women, men and youth in their roles as producers, processors, traders and consumers. The first addresses intraregional trade in the African Great Lakes fish trade corridor with a focus on dried small fish, which are especially important because of their high nutritional value, affordability and accessibility to poor consumers in remote regions far from the source of production. The second will focus on fish trade in the Mekong Delta, particularly from Cambodia to Vietnam, to support the latter's burgeoning aquaculture industry and understand its emerging importance as a regional hub for seafood trade, including as an entry point to Chinese markets.

Value chain analysis will draw upon and co-develop tools in partnership with PIM FP3flagship 3. Household survey data, reviews of regulation and institutional performance, and participatory, qualitative case studies will be used to gather evidence on the implications for different social groups, distinguishing by occupation, gender and age. These analyses will inform scenario research and be used in structured multistakeholder dialogue, complemented by institutional capacity development, to underpin investments in governance solutions at national and regional levels, and to inform cross-regional exchange of best practice in partnership with FAO and others. Value chain innovations, in addition to reducing inefficiencies that lead to waste and loss, will target nutritional benefits through increased fish consumption, particularly by women and children. Linkages with A4NH will focus on opportunities to reduce waste and loss in fish value chains (Flagship 3) and on integrating fish-based solutions in broader nutrition policy (Flagship 4) on nutrition-sensitive food systems).

2.2.1.7 Partnerships

The focused partnerships of FP2 are designed to integrate three critical aspects of research delivery: science quality (delivered through advanced research institutions), place relevance (delivered primarily through NARES) and development outcomes and impacts at scale (delivered through public and private investment influencers).

WorldFish, which is CGIAR's focus on fish, ranks second globally, in terms of peer-reviewed SSF research, and first in developing country orientated research, and provides the established in-country partnerships and track record of catalyzing, testing and refining fisheries innovations through place-based action research. The IWMI, which is CGIAR's focus on water, is the foremost organization in agricultural water management and the winner of the 2012 Stockholm Water Prize, the world's most prestigious water award. The IWMI brings established in-country partnerships to continue multidisciplinary research for development, and to keep testing and evaluating technical, policy and institutional interventions to develop scalable water and land management solutions that lead to poverty reduction, food security

and ecosystem health. The Centre of Excellence at JCU is an international collaboration of research agencies and is the world leader in research on social and ecological goods and services from marine reefs. Too Big To Ignore (TBTI) is a network of 50 research and development agencies and an information management platform designed collate knowledge to promote policy accountability and responsiveness to SSF, particularly through relationships with SSF advocacy networks.

WorldFish and the IWMI in partnership with the JCU will lead the delivery of science quality throughout the FP2. These three institutions bring together a high level of global research capability to contribute to resilient coastal fisheries and fish in multifunctional landscapes through research outputs and research outcomes to improve coastal and inland SSF. These three research institutions bring a depth and breadth of thematic expertise, geographic engagement and in-country presence particularly well-positioned to both catalyze in-country innovations and derive cross-country and cross-regional lessons. WorldFish has previously worked effectively with both IMWI and JCU and will draw on these established relationships to jointly lead the delivery of high science quality within FP2.

This global science partnership of WorldFish, the IWMI and JCU will engage with key local institutions to ensure high quality science and place relevance in proof of concept. In doing so, FP2 builds significant research capacity and is produced and disseminated through partnerships to ensure relevance and influence the development of domestic policies and institutional capacities that demonstrate proof of concept and facilitate future innovation. These focus on well-established partnerships with the relevant Departments of Fisheries and Departments of Water Resources (or equivalents), universities and agencies (e.g. regional economic communities, fisheries bodies, fisheries organizations and authorities) that provide policy and technical support throughout the regions where innovations will be taken to scale. The place-relevant partners will be selected on capacity to make a contribution to the quality of science and influence policy development and institutional strengthening within the focal geography and on the potential that improved research capacity will have a long-term impact.

The global science partnership in conjunction with the place-relevant partners will work with partners focused on national, regional and cross-regional influence to accelerate impact at scale. These partnerships are foundations of FP2 change mechanisms. In addition to the national and regional partners noted in Table 2.7, these include cross-regional partners, FAO and TBTI. Each brings complementary roles influencing multi-stakeholder public policy, program development and implementation for resilient coastal fisheries and fish in multifunctional landscapes. Both FAO and TBTI are globally recognized as leaders and influencers in their respective fields and have agreed to use their substantial convening power, linking governments, civil society and, increasingly, private sector actors as well to enable FP2 innovations to be taken to scale. In linking research findings to emerging initiatives channeling private investment to support sustainability in the sector, we will coordinate as well with initiatives such as the Coalition for Private Investment in Conservation.

Discovery	Proof of Concept	Scaling
FP2 Cluster 1: Resilient coastal fisheries		
James Cook University (design of research agenda for coral reef fisheries)	**Solomon Islands**: Provincial governments, Ministry of Fisheries and Marine Resources; Ministry of Environment, Climate and Disaster Management (co-design of research agenda and enabling environment for interventions; policy development)	**Solomon Islands**: Malaita Provincial Partnership for Development; Western Province Coalition of Development Partners (scaling of learning through provincial development initiatives), Locally-managed marine area network

Promundo (guidance on gender and livelihoods)	**Philippines:** National Fisheries Research and Development Institute; Bureau of Fisheries and Aquatic Resources (BFAR) (co-design of research agenda and enabling environment for interventions; policy development); Palawan State University and UP Marine Science Institute (lead research on fisheries	**Philippines**: Iligan Bay Alliance of Misamis Occidental; Protected Area Management Bureau (scaling of learning through provincial and national policy initiatives)
FP2 Cluster 2: Fish in multifunctional landscapes		
Cornell University; USAID Innovation Lab (design of research on fisheries ecology and tool development) University of Rhode Island (guidance on research methods for adaptive co-management)	**Cambodia:** IFReDI (lead rice-field fisheries research); Tonle Sap Authority (lead development and implementation of policy for Tonle Sap); Cambodia Agriculture Value Chain program (key investor in small-scale flood water storage infrastructure in Mekong floodplain)	**Cambodia:** Fisheries Administration and Department of Agriculture Extension (policy and capacity development initiatives in support of SSF); Technical Working Group on Fisheries (inter-sectoral coordination and scaling through networks); Cambodia Agriculture Value Chain program (key investor in small-scale flood water storage infrastructure in Mekong floodplain)
	Bangladesh: Dhaka University (lead research on governance); Sylhet Agricultural University (lead research on socioeconomics of fishing households); International Institute for Environment and Development (lead policy and incentives research)	**Bangladesh**: Ministry of Fisheries and Livestock (policy and capacity development initiatives in support of SSF)
	Myanmar: Department of Fisheries Research Division; Universities of Yangon, Mandalay; Yezin (field research on fisheries)	**Myanmar:** Department of Fisheries (policy and capacity development initiatives in support of SSF); National Water Resources Committee (inter-sectoral coordination and scaling through networks)
	Zambia: University of Zambia (field research on fisheries ecology and community fisheries)	**Zambia**: Ministry of Fisheries and Livestock; Ministry of Agriculture (policy and capacity development initiatives in support of SSF)
FP2 Cluster 3: Fish in regional and global food systems		
James Cook University (design of research agenda for coral reef fisheries) Australian National University (adaptation of foresight	**Mekong Delta**: Vietnam RIA2, SIWRP (foresight and trade analyses); Sustainable Mekong Research Network; Can Tho University; IFReDI (field research on fish trade)	**Mekong delta**: Ministry of Agriculture and Rural Development (Vietnam) and Ministry of Agriculture Forestry and Fisheries (Cambodia) (policy and capacity development investments)
	African Great lakes: Regional Economic Communities (SADC, EAC, COMESA) and Regional Fisheries Bodies (LVFO, LTA) – integration of policy into regional agendas	**African Great lakes**: AU-IBAR; Lake Victoria Fisheries Organization; Lake Tanganyika Authority (scaling through policy forums and norms building on AU-IBAR policy framework and reform strategy for fisheries)
	Pacific Food System: Secretariat of the Pacific Community member countries (provision of household data and analysis)	**Pacific Food System**: SPC (scaling through New Song policy initiative and intergovernmental forums)

Table 2.7. (previously table 14) Illustrative examples of non-CGIAR FP2 partners at discovery, proof of concept and scaling stages of the impact pathway.

2.2.1.8 Climate change

FP2 addresses the grand challenge of climate change and the need to build resilience to risks associated with climate variability. While fishers in floodplains and coastal areas are well adapted to seasonal variability in resource flow, climate change will affect river flow regimes and associated flow velocity, river and sea water levels, sediment transport, water temperature and associated dissolved oxygen content. This will impact fish population dynamics and breeding areas and habitats.

Cluster 1 research will support capacities to adapt and resilience of SSF through improved management and more diverse livelihood opportunities. Opportunities to better address the vulnerability of SSF communities will be pursued in collaboration with CCAFS—particularly related to climate change concerns around small island developing states. Cluster 2 will develop approaches for sustainable fisheries production that are resilient to natural variability and external threats, including climate change. Cluster 3 will continue its collaboration with CCAFS to analyze alternative future trajectories of fisheries and food security in the Asia-Pacific region. All work will include examination of possible climate change impacts on fish-related livelihoods influencing seasonal and inter-annual dynamics of water availability, quality and productivity over the long term. This will focus on water availability for capture fisheries and aquaculture, and the impact on fish habitat, fish populations and access to fish by small-scale fishers.

Understanding trajectories of resource variability will inform decision-making from household to regional scales and build capacities to cope and adapt. Foresight analyses will enable development of models and scenarios of plausible futures to inform intervention decisions and policy pathways that will ensure equitable development outcomes for the most vulnerable, including women and youth. FP2 will build on tools generated by the IWMI and others for assessing the implications of hydrological change (e.g. Lacombe et al. 2014) and multiple-use approaches for building resilience (Hills et al. 2015).

2.2.1.9 Gender

Women are consistently underrepresented in SSF statistics and policy, and they are insufficiently engaged in decision-making in SSF governance and management (e.g. Mills et al. 2011; Kleiber 2015). This reduces the effectiveness of management actions, perpetuates inequities in the distribution of benefits from SSF and hinders the achievements of food and nutrition security outcomes. FP2 will address these challenges through gender-integrated and gender-strategic research. In understanding pathways to improved gender equity and opportunities for women, we also draw on other research framings applied to SSF, such as the wellbeing lens (Weeratunge et al. 2014), human rights perspectives (Allison et al. 2012) and analyses of power, representation and accountability (Ratner et al. 2013).

Through place-based research, capacity building investments in focal countries, and in global analyses, FP2 will apply, and build capacity in the application of, the sex-disaggregated data collection guidelines. In FP2, this includes their application in social and ecological aspects of research in SSF systems.

In collaboration with Promundo, FP2 tests strategies to enhance socially and gender-equitable participation in SSF governance and associated livelihoods, particularly through the application and further refinement of gender-accommodating and gender-transformative strategies (McDougall et al. 2016; Promundo 2016). Strategies will be adapted to contexts. In the first instance, they are informed by earlier WorldFish and JCU research that built understandings of power and gender equity in decision-making in local contexts (e.g. Cohen and Steenbergen 2015). Their initial design is informed by FP2 early research milestones set to understand norms and relations as barriers and opportunities in rural governance and livelihoods (e.g. Locke et al. 2017; Cohen et al. 2016). Strategies are tested and refined through participatory action research in the development of management and technology innovations for fisheries improvement and in the identification and promotion of women-targeted livelihood and market improvements.

We set early milestones to understand capacity and capacity needs of both public agencies and civil society to improve consideration of gender. These assessments will guide capacity building efforts, of which gender, will be a focus, particularly in support of the implementation of the SSF Guidelines that strongly promote a range of commitments to gender. Subsequent

capacity building similarly has both gender-strategic (through targeted trainings, investment in communities of practice) and integrated strategies such as collaborative action research, co-development of monitoring and evaluation.

FP2 will collaborate with PIM FP5 and the CGIAR Gender Network to refine tools for assessing women's empowerment in fisheries contexts. Specifically, we will further adapt the Women's Empowerment in Agriculture Index to develop a fisheries-specific index suitable for cross-regional comparisons.

We will scale gender impact through four main channels. The first will be through a strategic focus on gender as part of capacity building (first examined and refined through a needs analysis) via learning and governance networks comprised of NGO and informal and formal government partners. In the second, deliberate efforts will be made to draw together cases from across FP2, and indeed the whole CRP, to ensure that generalizable lessons and guidance are crystalized. In the third, context specific models and overarching strategies will be shared through national and regional partnerships and with the extended networks of FAO and TBTI networks, linking through change mechanism to associated policy reform and implementation. The fourth will ensure impact among the national, regional and international research community by sharing research to natural resources, fisheries and environmental governance fields (where gender and other forms of social differentiation are commonly overlooked).

2.2.1.10 Capacity development

Capacity development enables all change mechanisms in the CRP-level ToC. FP2 contributes to two cross-cutting outcomes: enhanced capacity to deal with climatic risks and extremes, and improved capacity of women and young people to participate in decision-making.

Capacity development will be implemented through an iterative process starting with *needs assessments and intervention strategies* (element 1 of the CGIAR Capacity Development Framework) to specify needs of natural resource management NGOs and government agencies, multistakeholder networks, regional and intergovernmental agencies, and individual researchers within national research institutes in focal countries. We will assess the following four capacity areas: (1) gender-sensitive and transformative approaches, (2) learning and governance networking, (3) community livelihood and co-management interventions, and (4) responsive and accountable institutions. We will build on experience of quality *learning materials and approaches* (element 2) such as community-based resource management manuals and systems approaches to capacity development. All materials and approaches will be *gender and youth sensitive* (element 5) in line with our gender and youth strategies (see Annexes 3.4 and 3.5). *Monitoring and evaluation of capacity development* (element 7) will be integrated into program-level monitoring, evaluation and learning (see Annex 3.3).

Our work on *institutional strengthening* (element 6) has two modes: (1) developing the capacity of learning and governance networks and platforms to realize collective impact, and (2) increasing the capacity of institutions, including through policy reform, to help secure the ecological sustainability, food security and poverty alleviation functions of SSF. Aligning with the program's partnerships strategy, our needs assessment and outcome evaluation work will also identify gaps and interventions to increase the *capacity of scientists to partner* to achieve target outcomes (element 3).

One of the main modes of capacity development is via learning and governance networks. In many of the places we work, networks of organizations form around particular themes. For example, the Malaita Provincial Partnership for Development is a multistakeholder and sectoral network focused on sharing knowledge and collectively building capacity to govern the region of Malaita. A further example is the Solomon Islands Locally Managed Marine Areas Network, which was specifically established to build capacity of government, NGOs and community partners to govern via community-based co-management approaches. These networks are natural, existing channels through which to provide further resources and technical expertise to realize improvement in capacity.

2.2.1.11 Intellectual asset and open access management

FP2 will manage intellectual assets consistent with CGIAR and partner policies and procedures, as well as those of our bilateral donors. FP2 will contribute to and take advantage of program-level mechanisms to ensure widespread use and analysis.

All outputs from the project will be published in the public domain with the exception of the individual resource management plans of communities. Consistent with WorldFish's policy of engagement with communities, management plans are owned by them and will only be made publically available with their permission. Research in Clusters 1 and 2 on livelihoods, household dynamics and gender will pay particular attention to compliance with research ethics standards and the protection of participants' privacy and dignity.

FP2 will contribute to FishBase, the world's leading open access database on fish biology. This database was developed by the *International Center for Living Aquatic Resources Management* in the 1980s. WorldFish maintains ReefBase and the Coral Triangle Atlas and will continue contributing to them, drawing on FP2 research in Tanzania, the Philippines and Solomon Islands.

2.2.1.12 FP management

FP2 will be led by WorldFish. The flagship leader, Dr. Philippa Cohen, will (a) provide overall strategic leadership for flagship research; (b) work with cluster leaders, scientists and other flagship leaders to develop and oversee execution of the research agenda for the flagship; (c) lead identification and negotiation of significant strategic science partnerships that will strengthen links between the flagship science team and leaders in the appropriate body of science; and (d) provide a focal point for collaborations with other CRPs.

Cluster 1: Resilient coastal fisheries will be led by the JCU from the Australian Research Council Centre of Excellence for Coral Reef Studies, drawing on its networks and those of WorldFish in focal countries, in collaboration with national fisheries agencies and appropriate regional bodies such as the Southern African Development Community (SADC) and the SPC.

Cluster 2: Fish in multifunctional landscapes will be led by the IWMI, bringing expertise and networks in water management, governance, rural livelihoods and resilience, in collaboration with national fisheries, water and land management agencies in focal countries and national research centers such as Dhaka University, Bangladesh.

Cluster 3: Fish in regional food systems will be led by WorldFish, in collaboration with FAO, and will draw support from the IWMI and the JCU.

Cluster leaders will (a) provide overall strategic leadership for cluster research; (b) work with contributing scientists to develop and oversee execution of the research agenda for the cluster; and (c) lead identification and negotiation of significant strategic science partnerships for the cluster.

CVs of flagship leads, cluster leads and other key scientists leading implementation of the flagship research are provided in Annex 3.8.

2.2.2 Flagship budget narrative

2.2.2.1 General information

CRP Name	FISH
CRP Lead Center	WORLDFISH
Flagship Name	FLAGSHIP 2 – SUSTAINING SMALL-SCALE FISHERIES
Center location of Flagship Leader	MALAYSIA

2.2.2.2 Summary

Total Flagship budget summary by sources of funding (USD)

Funding Projected	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Total
W1+W2	2,624,418	2,759,061	2,878,586	3,028,789	3,170,111	3,329,595	17,790,560
W3	-	-	-	-	-	-	-
Bilateral	6,200,000	6,572,001	6,834,879	7,176,623	7,463,689	7,836,873	42,084,065
Other Sources	-	-	-	-	-	-	-
	8,824,418	9,331,062	9,713,465	10,205,412	10,633,800	11,166,468	59,874,625

Funding Secured	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Total
W1+W2	-	2,759,061	2,878,586	3,028,789	3,170,111	3,329,595	15,166,142
W3	-	-	-	-	-	-	-
Bilateral	6,879,582	5,644,013	3,599,920	1,306,109	285,144		17,714,768
Other Sources	-	-	-	-	-	-	-
	6,879,582	8,403,074	6,478,506	4,334,898	3,455,255	3,329,595	32,880,910

Funding GAP	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Total
W1+W2	(2,624,418)	-	-	-	-	-	(2,624,418)
W3	-	-	-	-	-	-	-
Bilateral	679,582	(927,988)	(3,234,959)	(5,870,514)	(7,178,545)	(7,836,873)	(24,369,297)
Other Sources	-	-	-	-	-	-	-
	(1,944,836)	(927,988)	(3,234,959)	(5,870,514)	(7,178,545)	(7,836,873)	(26,993,715)

Total Flagship budget by Natural Classifications (USD)
(estimates for 2017; projections for 2018 - 2022)

	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Total
Personnel	2,358,487	2,864,604	2,986,473	3,174,510	3,542,742	3,881,074	18,807,889
Travel	463,358	611,589	705,362	874,203	998,217	1,010,738	4,663,468
Capital Equipment	63,485	-	-	-	-	-	63,485
Other Supplies and Services	1,999,294	3,371,865	3,531,350	3,829,039	3,449,227	3,567,318	19,748,093
CGIAR collaborations	-	-	-	-	-	-	-
Non CGIAR Collaborations	1,284,559	1,456,105	1,421,315	1,204,571	1,473,424	1,478,533	8,318,506
Indirect Cost	710,399	1,026,899	1,068,964	1,123,089	1,170,190	1,228,805	6,328,347
	6,879,582	9,331,062	9,713,465	10,205,412	10,633,800	11,166,468	57,929,789

Total Flagship budget by participating partners (USD)
(estimates for 2017; projections for 2018 - 2022)

	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Total
WorldFish	6,879,582	8,334,662	8,677,208	9,117,342	9,502,208	9,978,296	52,489,298
IWMI	-	657,199	683,488	717,662	746,368	783,687	3,588,404
James Cook University	-	339,199	352,767	370,406	385,223	404,482	1,852,077
	6,879,582	9,331,060	9,713,463	10,205,410	10,633,799	11,166,465	57,929,779

Explanations of these costs in relation to the planned 2022 outcomes

Major cost drivers and how these relate to planned activities and target outcomes
Major cost drivers are scientific personnel, travel and operating expenses. Scientific personnel costs include those of principal investigators and cluster research teams, the vast majority of whom are located in the countries in which fieldwork will be implemented. Many of these countries are high-inflation economies, and this is expected to be a major driver over the life of the CRP. Investments are also made in personnel for leading/coordinating key cross-cutting dimensions of flagship activities, including gender, youth and capacity development. Travel includes investments in field visits and assessments, planning and review meetings/workshops, partner consultations and scientific supervision. Given the nature of the research, no capital equipment (>USD 25,000 per item) is expected to be purchased.

Risks and plans to mitigate risks
Annual funding certainty of W1 and W2 funds will be critical to ensure the FP2 achieves its objectives on time and on target. As a means of risk mitigation, WorldFish has dedicated organizational resources during 2017 to securing the bilateral funding targets identified in the proposal.

FP2 is heavily dependent on bilateral funding—the continuity of that funding is the major risk to achieving our ambitious targets. The lack of W1 and W2 funds has to some extent reduced the capabilities to leverage bilateral investment in FP2, though bilateral funding does remain healthy. Bilateral funding has been secured for 2018 and there is a significant pipeline of bilateral projects for at least the subsequent 18 months of the CRP.

Funding risks increase beyond 2018 when the funding pipeline becomes more uncertain. To mitigate the risks, WorldFish has developed a resource mobilization strategy aligned to FISH that responds to an increasingly challenging funding environment where traditional donor funding is reducing. The strategy mitigates the risks of this shifting donor environment by creating opportunities to engage with emerging and developing economies, philanthropic organizations and the private sector in the form of multi-stakeholder partnerships for impact. On an operational level, implementation and fiduciary risks will be managed through CGIAR partner policies and processes.

2.2.2.3 Additional explanations for certain accounting categories

Benefits. Personnel costs are based upon best estimates of the level of effort required by specific staff positions to deliver upon the objectives of the FP2.

This level of effort has been expressed as a number of days per period. The personnel costs have been determined via the application of daily standard rates per position/staff member. In addition to the daily standard rates, the costs of benefits have been calculated on an individual basis and expressed as a function of salary. The benefits included are those that are applicable per the employing partners' established policies and procedures.

The estimated cost of the allowances and benefits vary depending on the classification of the individual staff members as well as the location in which they are working. WorldFish has three staff designations: Global (GRS), Home Country International (HCI) and National (NRS). The following benefits are have been included in the budgeted salary costs:

Retirement contributions: WorldFish contributes the equivalent of 15% of base salary to a retirement fund for staff. This is applicable to all designations of staff (GRS, HCI and NRS).

Insurance premiums: This includes medical (GRS, HCI and NRS), accidental death and dismemberment (AD&D) (GRS and HCI), long-term disability (LTD) (GRS and HCI), and life insurance (GRS, HCI and NRS).

Annual medical examination costs: Applicable to all staff designations (GRS, HCI and NRS), WorldFish encourages annual medical examination for all staff and agrees to subsidize the costs thereof for all staff over the age of 40, up to USD 250 per annum.

Housing allowance: Generally applicable to GRS staff only, WorldFish provides an allowance of up to 75% of the cost of housing, subject to monthly maximums established by location.

Dependent education allowance: Applicable to GRS staff only, WorldFish provides the cost of education (up to end of secondary education) for dependent co-located children.

Home leave: Applicable to GRS staff only, WorldFish funds the cost of an annual trip to the staff members' home country for the staff member and dependents.

Relocation and repatriation costs: Applicable to GRS staff only, WorldFish covers the cost of relocating GRS staff from their home location to their duty post. Once the staff member has completed at least three years of continuous service, WorldFish will also cover the cost of repatriating the staff member to their home location upon termination of employment.

Location specific benefits (i.e. hardship allowances), where applicable, have also been included in the cost as have the cost of statutory employment related taxes applicable in certain operating locations.

As there is great range in the cost of benefits by location and by staff designation, we assigned a specific percentage (of salaries) to each location/staff designation combination. The following provides the range of percentages that were used by staff designation:

Range of Benefit %		
	High	**Low**
HCI	Zambia (63.56%)	Philippines (21.6%)
GRS	Zambia (129.03%)	Egypt (36.59%)
NRS	Solomon (62.15%)	Zambia (21.64%)

Other supplies and services: Other supplies and services include (i) specialist contracts for international development partners (e.g. Promundo), national and regional NGOs and network (e.g. LMMA) and field enumerators, and other field costs, (ii) costs associated with participation in planning and design meetings, at global/national levels; and (iii) workshops for annual flagship and cluster planning, stakeholder consultations and training, scaling activities and national research platforms, (iv) National workshops/multistakeholder platforms: costs associated with the organization of national / local level workshops and multi-stakeholder platforms; (v) Training events/student fellowships: this includes costs for capacity development of local stakeholders, own staff, and fellowships for PhD and MSc students integrated into the FP2 program. Given the participatory nature of FP2 and the need to engage with governance networks and national processes as a central element of the impact pathway, this budget is estimated to be a significant proportion of the flagship budget.

2.2.2.4 Other Sources of Funding for this Project

In 2017, FP2 has W3/bilateral funding of USD6.880 million (a slight increase from the figure provided in the FISH CRP 2017 POWB), but the lack of W1-2 funding for FP2 has constrained progress within the flagship toward all planned cross-cluster and cross-CRP syntheses. New W3/bilateral opportunities will continue to be pursued for FP2 throughout the period of the CRP. The resource mobilization roadmap provides a proactive strategy to pursue W3 and longer-term, programmatic investment strategies with traditional donors and to forge new relationships with emerging and developing economies, philanthropic organizations and the private sector in the form of multi-stakeholder partnerships for impact. A number of philanthropic organizations are showing interest in SSF, and FP2 will continue to be pursued for future collaboration.

2.2.2.5 Budgeted costs for certain key activities

The budgeted costs for certain activities are provided below.

	Estimate annual average cost (USD)	Please describe main key activities for the applicable categories below, as described in the guidance for full proposal
Gender	1,272,360	Gender: investment of US$7.6M over the six years or 13.2% of the budget will support integration of gender into all flagship activities as well as focused research on gender to increase the impact of the research on development outcomes for women. This includes global and national scientists, specialist consultancy, partners, workshops and training of research teams and development partners and operating expenses for field research in focal countries and cross-country synthesis. Research will focus on gender-equitable control of assets and participation in decision making as a contribution to building more resilient fishing communities and households (clusters 1 and 2) and on increasing the value women derive from value chains through improved governance and policy. WorldFish and IWMI will continue to recruit and train people in our own organizations so we are fit-for-purpose in engaging with the ambitious FISH gender research agenda.
Youth (only for those who have relevant set of activities in this area)	297,843	Youth: investment of $1.8M over the six years or 3.1% of the budget will lay the foundation for a growing research agenda to increase participation and benefit sharing among young people. Existing tools and approaches to better engage young people will be further developed. Cluster 3 research on alternative future for fish in food systems and on trade will ensure young people have a 'voice' in imagining that future and policy concerning young people as labor in value chains will be better informed. In the latter years of the CRP, and as the evidence base grows, the research agenda will increasingly shift to more direct engagement in youth as agents of change in fisheries governance.
Capacity development	880,013	Capacity development: investment of US$5.3M over the 6 years represents 9.2% of the budget allocated to FP2 and supports integration of gender into all activities as well as focused research on gender to increase the impact of the research on development outcomes for women. Investment in national partners through collaboration in research activities, training (spanning short courses to post-graduate scholarships) is a significant enabling activity in the ToC. Thematically our investments in building capacity range from community leadership to national policy. We will continue to invest in our own staff to build the capacity needed to remain at the leading edge of fisheries R4D.
Impact assessment	348,841	Impact assessment investment of US$2.1M over the 6 years represents 3.6% of the flagship budget and supports household surveys, consolidation and analysis of data, annual after-action meetings to consolidate outcomes, GIS mapping of land use, and development of tablet-based systems for data collection and consolidation and development and updates of an outcome tracking database.
Intellectual asset management	28,414	Intellectual asset management: investment of US$170K over the 6 years is focused on maintenance of OA databases, including hosting infrastructure costs and staff time. The budget is largely comprised of external expert resources (legal, training, contracting) and allocation of personnel time towards ensuring capacity development of intellectual asset management

	Estimate annual average cost (USD)	Please describe main key activities for the applicable categories below, as described in the guidance for full proposal
		best practices throughout the Flagship operations.
Open access and data management	159,449	Investment of US$957K over the 6 years supports publication of research data and papers (including OA publication costs) and management. This includes investments in ensuring materials are disseminated through the CRP website, investments in data management and appropriate documentation to make datasets publicly available through open access depositories, and purchasing of open access privileges for publication in non-open access journals where needed. The budget also consists of external expert resources (legal, training, contracting) and allocation of personnel time towards ensuring capacity development of open access data management best practices throughout the Flagship operations.
Communication	504,858	Communication: Investment of US$3.0M over the 6 years supports publication of research papers, and communication activities (policy briefs, manuals, technical reports, outcome stories) that will support the communication of research to end users with and through partners, including fishing communities in focal countries (costs of pamphlets, manuals), policy makers (policy briefs) and NGO or government partners (extension manuals). We will build on existing investments in innovative channels to better engage youth through theatre, social media and cartoons. Communications will also be resourced through our partners and their institutional investments in communications, particularly, for example, JCU which has developed a highly effective communications and media program. Similarly, we will seek synergies with collaborating CRPs.

2.2.2.6 Other

The level of ambition of FP2 (Sustaining Small-Scale Fisheries) requires mobilization of approximately USD42 million in bilateral and Window 3 funds over the life of the program. This calls for flexibility to address the priorities of funders in terms of country focus and thematic interest. Window 1 and 2 funds are used primarily to support core elements of the program that can be widely applied when matched with bilateral funds. Given the breadth of the flagship and the funding model, with dependence on all sources of funding, funds from different sources are often integrated in support of tasks that have been determined to fit within the scope and priorities of the program.

The costs in 2017, and future risks, of not securing W1 and W2 are reduced capacities to (a) deliver core elements of the program, including methodological support and programmatic design of M&E, gender and youth, capacity building, (b) conduct cross-country and global synthesis, and delays in resourcing such syntheses, and (c) leverage bilateral opportunities.

The lack of W1 and W2 funding in 2017 has had a follow-on effect on implementation and execution of the flagship as WorldFish has not been in a position to pre-finance program activities designated to be funded from W1 and W2 sources. Hiring key new appointments, including economists and fisheries scientists, have been postponed until sufficient funds are available. We will continue to seek bilateral donor funds to implement the research priorities identified in the proposal.

Due to the limitations of the online submission form, the funding figures presented herein have combined all bilateral and Window 3 funds into the bilateral fields. It is our full expectation that there will be a mix of both bilateral and Window 3 funds contributing to the flagship.

Indirect costs included in the budget have been set at 12%, which is consistent with existing audited indirect costs for WorldFish, adjusting for information technology and facility costs, which have been specifically included as direct costs in the flagship budget.

2.2.3 Flagship Uplift Budget

No Uplift Budget has been included in this revised FP2 submission.


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Table summarizing revisions made to Flagship 2 "Sustaining Small-Scale Fisheries" in response to the ISPC assessment and donor perspectives review (September 2016)

The ISPC and CGIAR donors provided feedback (dated 14 and 17 September 2016, respectively) on the FISH CRP revised proposal that included specific commentary on Flagship 2 "Sustaining Small-Scale Fisheries" (FP2). The ISPC assessment rated the flagship as "strong", but nevertheless provided comments on a number of weaknesses/risks and suggestions for further improvement. This table, organized by key ISPC assessment criteria and/or questions provided, documents a revised approach for FP2 to address the reviewers' commentary. Further, we describe improvements that respond to learning during implementation of the FISH CRP in 2017, as well as new opportunities in the small-scale fisheries space.

ISPC characterization of flagships. Overall, a "**strong**" rating for FP2, but with the following weaknesses/risks identified: (i) weak articulation of the understanding of complexity of achieving systemic change; (ii) evidence base in this area of research is evolving rapidly; and (iii) strategy to scale results up and out not tested.

The FP2 revisions take account of these three key issues.

(i) Articulation of the understanding of complexity of achieving systemic change. The revised FP2 recognizes that an insufficient understanding of the complexity inherent in achieving systemic change in small-scale fisheries (SSF) systems would increase the risk of not delivering on the outcome targets, and not realizing the contribution of FP2 research to the SLOs. We have addressed such risks as follows:

The FP2 revision focuses more on the emerging windows of opportunity to achieve systemic change in SSF. Revisions to the background analysis (section 2.2.1.1) clarify what these windows of opportunity are, and how the overarching design and ambition of FP2 responds; i.e., we clarify that shifts in discourse, policy and investment are evident through, for example, commitment to Sustainable Development Goal (SDG) 14; a goal dedicated to sustainable use of ocean resources. Further, there is explicit focus on fisheries, marine and freshwater systems within SDG 1, SDG 2, SDG 6 and SDG 15. Additionally, there has been a commitment by 126 countries to the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (henceforth the SSF Guidelines; FAO 2015). Further, partly due to successful advocacy by SSF civil society organizations (CSOs), there has been a shift in private sector investor priorities (previously focused narrowly on biodiversity conservation) toward social objectives, food and nutrition security, and SSF. FP2 responds to the challenge of translating these policy intentions and opportunities for change into improved sustainability, food and nutrition security and reduced poverty by applying interdisciplinary research necessary to develop the management, technology and governance innovations required to translate these commitments into outcomes.

Substantial revisions to section 2.2.1.3 (Impact pathways and theory of change) articulate more clearly how capacity to facilitate systemic change is built into FP2 with investment in four distinct change mechanisms (these are presented in a new table, table 4). In sum, *change mechanism a* ensures local adoption and dissemination of technologies and management approaches, *change mechanism b* guides value chain innovations and influences emerging growth in impact investment in SSF toward poverty alleviation and food and nutrition outcomes; *change mechanism c* provides strategies to ensure public sector policy improvement and institutional strengthening to ensure fulfillment of and accountability to technical roles and policy commitments, and *change mechanism d* ensures influence to the policies and priorities of civil society and development agencies through investment in networks and partnerships with a track record of influence. The application of change mechanisms is depicted in the revised impact pathway figure 2.1 (page 9; previously figure 5). Change mechanisms rely on our strategic partnership strategy that is focused on national, regional and cross-regional influence; we invest in these in conjunction with global partners with proven convening power and policy influence to accelerate impact at scale. Substantial clarifications have been made in section 2.2.1.7 (partnerships).

Cluster 3 revisions (page 18) in section 2.2.1.6 (clusters of activity) also articulate the links between developing a robust understanding of the place of SSF in regional fish agri-food systems and identifying opportunities to influence systemic change. This draws upon foundational research in clusters 1 and 2 that relate marine and freshwater production systems respectively to the broader policy and economic landscapes in which these are embedded.

(ii) Evolving evidence base in this area of research. FP2 recognizes that the evidence base within this area of research is growing rapidly, in line with the increasing and growing recognition of SSF as a key research agenda that underpins achievement of the SDGs.

Success in achieving early milestones of the FISH CRP in 2017 has led to increased organizational and researcher buy-in from partners, growing integration with other CRPs and improved research linkages across the CRP. In revisions to the 'Staffing of management team and flagship" (annex 1) we present the team of lead researchers that are committed to the delivery of FP2; a strategic growth that enhances our continuing position at the frontier of SSF research, policy and practice. The key changes include the addition of Prof. Edward Allison, one of the most cited, productive and influential SSF scholars, as a Senior Scientific Advisor. Assoc. Prof. Tiffany Morrison from the ARC Centre of Excellence for Coral Reef Studies now acts as a Principal Investigator, bringing substantial capacity for research on policy and institutional reform. Dr. David Mills and Dr. Nhoung Tran are now the Cluster 3 Lead and Principal Investigator, respectively, bringing strong research for development track records, enabling linkages to FISH Flagship 1 and the global integrating programs, CCAFS and PIM, and contributing foundational work in preparation for 2018 milestones on global syntheses and foresight analysis. Dr. Shakuntala Thilsted is added to act as the Principal Investigator on nutrition-sensitive approaches and as the research link with A4NH. Dr. Cynthia McDougall is now included as a Principal Investigator for gender and acts as the FP2 contact point to the CGIAR Gender Platform. Dr. Sloans Chimatiro is added as a Principal Investigator with a focus on regional trade and scaling in Africa.

The research track record of FP2 research leaders demonstrates that the team assembled to deliver FP2 keeps abreast of and makes substantial contribution to this growing evidence base. For example in 2016–2017, FP2 research leaders (as named in annex 1) published in excess of 70 research papers, contributing research from local grounded cases to global analyses and policy perspectives examining SSF with respect to food security, gender, social equity in value chains, infrastructure impacts, ecological sustainability, fisheries management, governance and institutions, biodiversity, nutritional contribution, economic and food security tradeoffs, and monitoring and evaluation. In addition, FP2 will convene regular learning events, as part of its results based management approach, enabling FP2 (and FISH) research, milestones and the theory of change to respond efficiently to newly emerging evidence and opportunities for systemic change.

(iii) Strategy to scale results up and out. The strategy to scale results has been further strengthened in the revised FP2. Extensive revisions have been made to section 2.2.1.3 (impact pathway and theory of change; the narrative provided on page 6–8, and the following figure 1, table 2.5). A new table (annex 3) provides greater clarity and detail on the strategies being employed to scale from research outputs to research outcomes, and ultimately to development outcomes. The evidence on which these scaling strategies have been built broadly, and specifically for FP2 focal countries and scaling regions, are presented in three areas. Innovations presented here have been selected due to the strength of emerging evidence, from 2017 in particular, that demonstrate tracking on impact pathways towards outcome targets. Further, we have added more detail of the approach to the quantified outcome targets (annex 2, previously Annex 3.11 of the FISH proposal).

First, the four FP2 change mechanisms (table 2.4) in section 2.2.1.3 illustrate the areas in which we will directly invest. Change mechanisms ensure research is designed, developed, disseminated and shared to ensure research outcomes and development outcomes. Change mechanisms are particularly reliant on working in conjunction with partners focused on national, regional and cross-regional influence that will accelerate outcomes at scale

Second, we clarify that scaling strategies for FP2 have been tailored in response to context-specific windows of opportunity, established and developing partnerships and evidence of past progress along impact pathways. We have prepared a new annex 3 that, for selected innovations, illustrates the change mechanisms, scaling strategy and emerging evidence for scale of impact targeted. These strategies build on national and regional partnerships that have been built through preceding in-country engagements of implementing partners. An example from Cluster 1; in the Pacific, recent regional policy commitments respond to research recommendations on equitable community-based approaches, alongside the need for management approaches that span scales of governance (Song et al. 2017). An example from Cluster 2; in Cambodia, innovations resulting from action research on rice-fish systems are now promoted as priority actions in key government fisheries, food and nutrition security, and climate action plans for agriculture and are reflected by donor commitments (e.g., CARD 2014; MoAFF 2011, 2016). An example from Cluster 3; in 2017 a partner coalition has been formed to respond and increase understandings of SSF values; such

information has previously been used by global SSF civil society organizations (CSOs) in advocacy for human rights and social considerations in fisheries governance, and CSOs have highlighted the importance of this information for equitable governance, and called for it to be strengthened and updated. This research is an agenda item for the 2018 FAO Committee on Fisheries.

Third, revisions to the partnership strategy (in section 2.1.1.7, page 19), reflect that, in addition to work with partners focused on national and regional scales, we work also with organizations with convening power that span regions. The FAO is the leading intergovernmental body for establishing guidance in the sector. In convening research agencies, civil society, private sector and state actors FAO have built agreement from of 126 countries to the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. With partners, FAO is now focused on leveraging the technical support countries need to ensure implementation of these guidelines. Too Big to Ignore (TBTI) is a network of 50 research and development agencies and an information management platform designed to collate knowledge to promote policy accountability and responsiveness to SSF, in particular through relationships with SSF advocacy networks. Partnership with FAO and TBTI support provide powerful avenues, in terms of reach and influence, for scaling.

Fourth, we have more clearly articulated in a revised section 2.2.1.7 the comparative advantage of the managing partners - a coalition that is uniquely positioned for impact at scale. WorldFish, for example; (1) is an authority on SSF research for development (ranking second, globally, for SSF research on www.scopus.com), (ii) has the research capabilities to test and refine innovations in place-relevant action research, (iii) has established relationships in focal countries to contribute consistently to development outcomes, and (iv) has credibility and relationships to influence donor investments. Based on metrics of journal quality, citations, keynote addresses, grant revenue, and awards (ISI Essential Science Indicators), the Centre of Excellence for Coral Reef Studies, James Cook University, is the highest performing research organization globally working on coral reef systems, with an international research network spanning 477 institutions across 81 countries. IWMI has established an unprecedented knowledge base on the status of global water and land resources (with one of the most influential studies on water and agricultural policy) and is the winner of the 2012 Stockholm Water Prize, the world's most prestigious water award. IWMI's established relationships and research for development partnerships with national governments and regional organizations continue to develop scalable water and land management solutions that have an impact on poverty reduction, food security and ecosystem health.

ISPC comment #1. A description of the process which the CRP intends to use for further priority setting and closer functional integration with the other AFS CRPs and GIPs.

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "satisfactorily addressed" this comment.

FP2 has however been further strengthened with more precise strategies for collaboration with the global integrating programs of A4NH, CCAFS, PIM and WLE, providing opportunities for enhancing both quality of research and delivery of SLO outcome targets. Revisions have been made to clusters 1, 2 and 3 (section 2.2.1.6) to highlight and provide specific examples of cross-CRP collaboration, building on collaboration and dialogue that has developed during 2017. Specifically:

- *CCAFS:* Where FP2 provides CCAFS with analysis of climate resilience in SSF, and links between climate change and nutrition, CCAFS contributes influential connections to raising the profile of SSF in climate change policy. For example, in 2017, FP2 is working together with CCAFS to raise the profile of small-scale fisheries research and action in the UNFCCC Convention of Parties (COP) 23 chaired by the President of Fiji, through our network of Pacific partners. In particular, this will address the statement of the leaders of the Pacific Small Island Developing States on what to prioritize in COP23: "Making the health of the world's oceans and seas a greater part of the UNFCCC work program by building on the achievements of the recently held UN Ocean Conference to support the implementation of Sustainable Development Goal 14, held in New York from 5 – 9 June 2017." (Modest changes have been made to section 2.2.1.8 climate change, to reflect the opportunities for influence presented by these developments).
- *A4NH*: The revised FP2 (particularly in revisions to cluster 3) includes a clearer connection to A4NH, specifically flagship 1 (food systems for healthier diets) for integration of supply side interventions into agri-food systems, as well as flagship 3. We will focus particularly on Bangladesh, a focal country for A4NH and FISH, to partner on the integration of fish into the national nutrition and food systems research agenda.
- *PIM*: Section 2.2.1.9 on gender explains that FP2 collaborates with the CGIAR Gender Platform and PIM flagship

6 to refine tools for assessing women's empowerment in fisheries contexts.

- *WLE*: FP2, through cluster 2 and 3, links with WLE, particularly flagship 4 on managing resource variability, risk and competing uses for increased resilience, to test innovative solutions for managing the natural variability of hydrological systems in ways that safeguard and improve the sustainability, poverty alleviation and food security functions of fisheries. This includes complementary research in integrated sites in Cambodia and Bangladesh. As indicated in annex 3.7, partnership with WLE seeks to ensure that deliberations over basin and watershed-scale resource competition and development scenarios take into consideration fisheries outcomes.

ISPC comment #2. The provision of supplementary information to better support the CRP and FP ToCs including the supporting evidence base, the concomitant capacity development and a deeper analysis of complexities

The ISPC assessment (dated 14 September) considers that the FISH proposal "partially addressed the ISPC concerns". It notes that, "in some cases, however, the underlying scientific basis, the recognition of the complexity of systemic change, and the evidence base supporting FISH's capacity to influence policy, remains thin." Revisions have been made to FP2 to address the ISPC commentary as follows:

Underlying scientific basis. This has been strengthened in the revised FP2 in further additions and updates to table 2.5 (previously table 12; full citations included in annex 5 'additional references') demonstrating strong scientific foundations built from earlier research conducted by FP2 researchers, including early milestones of FP2.

Reviewers raised a specific concern on the scientific basis for the emphasis placed on decentralized fisheries governance. In response we have made revisions to section 2.2.1.1 (rationale, scope) under the scope and approach subheading (page 2) to better reflect the position of research on decentralization and co-management; i.e., as one approach within a broader suite of management improvements and multi-scale governance reform. Further, the description of the theory of change for cluster 1 (page 7) clarifies where decentralized approaches are prioritized by public sector and development agency policy: "the opportunity is to increase the performance of these models to realize their productivity, food security and poverty alleviation potential. Simultaneously, this requires a strong focus on situating decentralized management (and its limitations) within a range of management and governance innovations that are responsive to contemporary challenges such as demographic change, competition for fisheries resources and climate change". These clarifications are also reflected in revisions to the description of cluster 1 within section 2.2.1.6 (clusters of activity), which clarifies improvements in co-management models and how understanding of their limitations and necessary complementary strategies have substantial potential for influence within the Asia Pacific region.

Research outputs – foundational and new – cited in table 2.5 provide the scientific foundations for the design of FP2 and evidence of emerging outcomes. In broad summary, they evaluate impact brought about by management, technology and governance interventions and also assessments of opportunities for impact at scale. For example, research describes the application of gender transformative approaches to fisheries value chains, the resultant reduction in post-harvest losses, the influence of regional agencies for convening and reforming regional policy on fisheries (Song et al. 2017), the application of participatory approaches that led to governance transitions (Apgar et al. 2017), and the outcome of action research applied to convene an alliance of civil society, government, and domestic policy research partners in Cambodia that contributed to the first significant transfer in a decade from commercial to community-based resource fishery management rights (Ratner et al. 2014).

Recognition of complexity of systemic change. Within section 2.2.1.6 (clusters of activity) we have strengthened the description of how cluster 3 research will be used to understand and influence SSF-related contributions toward SLO targets around adoption of improved management, routes to exit poverty, improving food and nutrition security and enhancing ecosystem-outcomes, within shifting macroeconomic and political environments on global and regional scales. We clarify, in the refined descriptions of change mechanisms (the addition of a new table, table 2.4 within section 2.2.1.3: impact pathway and theory of change*)*, the strategies that will be employed to produce and mobilize findings to inform policy discourse around fisheries and food systems involving SSF. These strategies augment research in clusters 1 and 2 that engage more directly with structural challenges, opportunities and trade-offs associated with fisheries at national levels.

Risks of not realizing systemic change are mitigated substantially (but not totally) in the alignment of FP2 research to emerging and recent shifts in political commitment, discourse and investment. Revisions to the background analysis, within section 2.2.1.1 (rationale, scope) describe these at the global scale and revisions to section 2.2.1.3 (impact pathway and theory of change) and section 2.2.1.7 (partnerships) provide greater clarity around the explicit ways in

which FP2 capitalizes on and leverages impact from these windows of opportunity.

Risks and strategies to manage risks along the impact pathways to achieve systemic change have been clarified in substantial revisions to table 4 (original table 12). Strategies to mitigate risks are embedded within change mechanisms and partnerships strategies and focus on (i) the co-design and collaborative analysis of research, (ii) investment in partnerships with proven convening power, (iii) utilizing extensive networks that seek innovative solutions, strategic and simultaneous investments in building capacity, (iv) engagements across scales of governance, and (v) increasing accountability and delivery through improved and more transparent monitoring and evaluation of progress towards existing and emerging political commitments.

Further, the strengthening of the results chain (in the revised impact pathways figure 2.1 on page 9, and reflected in more detailed sequential milestones in a revised PIM Table D presented as annex 4) will enable results to be tracked and assessed, allowing the FP2 team to make strategic adaptations to their approach to maximize impact.

Program capacity to influence policy. A revised narrative and new table (table 2.4) within section 2.2.1.3 (impact pathway and theory of change) clarify FP2 investments and strategies in change mechanisms that ensure research is designed, developed, disseminated and communicated using strategies to influence policy. Strategies have been designed using lessons from prior experience in diffusion of innovations, policy transformation, capacity building and institutional strengthening. Broadly:

- **Change mechanism a** refers to local adoption and dissemination of technologies and management. It includes the application of participatory approaches to test and refine gender-responsive management, technology and livelihood innovations. The spread of innovations will be promoted through joint analysis for integration into national and sub-national government sector strategies and action plans. Models are published and disseminated through novel communication channels for regional scaling. Collaborative cross-case analyses will identify lessons/innovations fit for adaptation and application in other geographies. Innovations are refined with regional and national agencies responsible for implementation and technical support towards policy commitments
- **Change mechanism b** refers to private sector investment, which was not previously addressed in FP2 but presents an important pathway to influence; firstly, with engagement with value chain actors. Cluster 3 strategic research outputs critically evaluate and provide clear guidance on the contexts in which environmental sustainability, food and nutrition security, poverty alleviation and equity outcomes are realized and accelerated or perverted and stalled. Second, is a focus on influencing the emerging landscape of impact investment in SSF (e.g., SSF Investment Blue Prints) and the burgeoning political and economic support for the Blue Economy / Blue Growth agenda.
- **Change mechanism c** refers to public sector policy improvement and institutional strengthening. Research responds to public sector priorities and commitments, with policy officials engaged in the research design and structured dialogue convened to deliberate results of analyses. Strategic and novel approaches to communication and dissemination of research outputs are adopted to directly inform decision-making, policy design, and monitoring and evaluation processes. Recognizing that the design of appropriate policies does not in itself ensure effective implementation, this mechanism includes direct investments in partnerships and institutional capacity to enable public sector agencies to fulfill and be accountable to technical roles and policy commitments.
- **Change mechanism d** refers to the influence on policies and investments of civil society and development agencies through investment in networks and partnerships with proven power to influence. Strategies include collaborative analysis and recommendation formulation, strategic outputs and associated communication strategies to ensure consideration in decision-making, policy design processes and priority setting and planning for development investments.

FP2 has been designed and refined in response to context-specific windows of opportunity and evidence of progress along impact pathways. This progress is summarized for select innovation in annex 2 that illustrates the change mechanisms, scaling strategy, and emerging evidence for scale of impact targeted for particular innovations.

FP2's capacity to influence policy is built on earlier investments in now strong relationships in countries to which the research design and implementation has been built. We have made substantial revisions to the section 2.2.1.7 (partnerships) to clarify how our selection of partners and partnership modalities is based on proven convening

power and policy influence. In addition to strong in-country and regional relationships with government and development agencies, our strategy also involves providing the research insights and knowledge advances to SSF advocacy groups to continue their success in keeping conservation and Blue Growth commitments aligned to SSF, food and nutrition security and equity concerns.

ISPC comment #3. Checking and clarification of the internal consistency of the CRP's outcome targets and validation against poverty reduction achievements based on evidence from the CGIAR.

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "partially addressed the ISPC concerns". It notes in particular that "no real attempt has been made, however, to validate the proposed outcome targets against past impacts from fisheries development / fisheries R4D."

Bilateral projects investment preceding and in the FISH CRP during 2017 provide strong examples of our strategy and progress towards outcome targets aligned to SLO targets for poverty reduction, food and nutrition security for health and improving natural resources and ecosystem services (these are cited in annex 3 'Further explanatory notes regarding SLO outcome targets, assumptions, and supporting evidence'). In section 2.2.1.2 (page 3) we have incorporated examples from our focal countries and regions (three examples provided below). Further information on scaling strategies and progress towards outcome targets for specific innovations is provided annex 2.

In Bangladesh, WorldFish partnerships with the Government of Bangladesh to expand co-management adoption and revise the Government Hilsa Fisheries Management Action Plan, which when implemented will contribute to livelihood improvements for 0.5 million poor hilsa fishers, plus poor value chain actors among the 2.5 million people involved with the hilsa value chain (Mohammed et al, 2016). Government commitments to the establishment of marine protected areas, directly restoring 285,800 ha of estuarine ecosystem, provide an entry point to ensure more productive and equitable management at scale. WorldFish facilitation of the transition from research to development outcomes in Bangladesh is built on solid experiences with several years of co-management research, that has delivered reductions in poverty among significant numbers of small-scale fishers (Khan et al, 2012)

In Cambodia, WorldFish research on rice-field fisheries management improvements during 2012-2016 reached 3,000 ha of rice field agro-ecosystems, that independent assessments indicate contributed to increased income and fish consumption in 86,000 people (PCI, 2016; Nuppun, 2016), as well as wider policy shifts by the Department of Fisheries towards investment in habitat restoration and better management of fish refuges in rice field areas. Bilateral funding will now enable further expansion of WorldFish research across 11,000 ha of rice fields in the Tonle Sap region, directly benefiting more than 75,000 households by 2021.

In the Great Lakes region of Africa, WorldFish research on the Fish Trade project has provided knowledge on the structure, products and values of intra-regional fish trade in four trade corridors across 21 countries, that FP2 will build on for specific interventions in the Great Lakes region (Ward, 2015). Women play a critical role in small-scale fisheries in Africa (Ward, 2015) and gender transformative strategies for engagement of women developed by Cole et al (2016) provide knowledge and capacity that can contribute to solutions and innovations for improvements that benefit the many women and youth associated with Africa's small-scale fisheries production systems and value chains.

ISPC comment #4. Additional clarification is needed on how [the CRP] will balance its research agenda between the need for context specific response while at the same time achieving impact at scale, both in its technology and policy work.

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "satisfactorily addressed" this comment. This topic is not addressed further in the revised FP2.

ISPC comment #5. The provision of greater detail on the CRP's further development of its partnership and gender strategy.

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "partially addressed the ISPC concerns". The FP2 text has therefore been revised with further development of its gender and partnerships strategies in sections 2.2.1.9 (gender) and 2.2.1.7 (partnerships).

Gender. We have made revisions to section 2.2.1.9 (gender; page 22) to reflect the developing FISH gender strategy (for completion Q4 2017). These revisions clarify the focus and pathways to impact of both gender-integrated and gender-strategic research executed by FP2. A planned "small-scale fisheries symposium" to be held in Penang on 5–8 September 2017 will include participation from six gender-focused researchers and will be a key forum to refine

and complete the FP2 gender strategy. The gender strategy will also respond to early FP2 milestones, for example the challenges and opportunities identified in a foundational output from the collaboration between WorldFish, FAO and TBTI, "Promoting gender equity and equality through the SSF Guidelines; experiences from multiple case studies" (Kleiber 2017), and other foundational research conducted to understand gender in context (e.g., Cohen et al. 2017, Locke et al. 2017). Three associated clarifications have been made to the gender text to respond to donor Flagship level reviews (see response to Question #1).

Partnerships. We have made substantial revisions to section 2.2.1.7 (partnerships) that reflect the 2017 developments of a focused and strategic partnership strategy of FP2 (which reflects the FISH partnership strategy in development) to integrate three critical aspects of delivery: (a) science quality for discovery (delivered through advanced research institutions), (b) proof of concept and place relevance (delivered primarily through NARES) and (c) impact at scale (delivered through public and private investment influencers).

Our clarified partnership strategy and some critical developments during 2017 demonstrate our high likelihood of success. Refinements to our strategy have been made in response to (a) outcomes and buy-in from engagement with partners during 2017, (b) further evidence of opportunities for impact, progress on impact pathways, and emerging evidence of impact (annex 3) within focal countries and regions more broadly, (c) recent shifts in research frontiers, policy development and investment priorities, and (d) a stronger evaluation of assumption and risks (reflected in revisions to table 2.4).

The response to ISPC comment #3 provides some examples of substantial progress towards impact targets due to continued and strengthened buy-in from government, non-government and funding partners within the countries and the regions we are invested in. These and other examples are provided in revisions to section 2.2.1.2 (page 4).

In terms of FISH managing partners; In 2017, the Centre for Coral Reef Studies, James Cook University received outstanding mid-term reviews from the Australian Research Council indicating a high likelihood of success in funding renewal from 2021. Centre of Excellence leaders indicate that, additional to the commitments made until 2021, preparation for their funding renewal will increase co-investment in FP2 for delivery of science quality, research outputs and research outcomes. In 2017, FP2 researchers from WorldFish and the Centre of Excellence developed and submitted high-impact research outputs addressing SSF and adaptation to climate change, the political position of SSF within shifts in ocean governance, polycentric governance approaches for complex social-ecological systems, and policy alignment assessments in focal countries to guide implementation of the SSF guidelines. An increased profile of FP2 and success against milestones has leveraged additional ARC funding and in-kind contributions for two postdoctoral research fellows to FP2 commencing late 2017–early 2018, and further intake of PhD students. Further, in 2017 there has been increased alignment of researchers addressing governance and institutions (see annex 1 detailing FP2 lead researchers) and fisheries and ecology towards FP2.

In 2017, FAO and TBTI produced a multiple case study analysis of the progress, challenges and opportunities for the implementation of the SSF guidelines (Jentoft et al. 2017). FP2 researchers contributed, for example, analyses on "Promoting gender equity and equality through the small-scale fisheries guidelines" and "Policy coherence with the small-scale fishing guidelines; analyzing across scales of governance in Pacific small-scale fisheries". This synthesis concluded that there is strong evidence of growing commitment to the SSF guidelines and that this represents an unprecedented window of opportunity to improve food security and accelerate poverty eradication. Simultaneously, there are substantial challenges in supporting implementation. In response, FP2 has more deliberately aligned and focused on partnerships to support the successful implementation through the development of context-appropriate innovations. In making this commitment, FAO and TBTI have agreed to use their respective networks for dissemination and policy influence.

Developments in 2017 that build on the strength of this alliance for science delivery and policy influence include: (1) a collaboration at the UN Ocean Conference (June 2017) to host a session on "joining forces for sustainable small-scale fisheries through a human rights-based approach to ocean conservation", (2) alignment of fundraising and science production towards the 3rd World Small-Scale Fisheries Congress in October 2018, and (3) preliminary design of research efforts to generate new insights into the global benefits derived from SSF through a global-scale data synthesis that updates and strengthens the influential Hidden Harvests report (FAO/World Bank/WorldFish 2012).

ISPC comment #6. The specification of time allocations to FISH by the indicated staff and availability of gender and process-related research skills among staff.

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "satisfactorily addressed" this comment. No further changes have been made during FP2 revision.

ISPC comment #7. Terms of reference for the CRP director to be subject to international recruitment should be included.

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "satisfactorily addressed" this comment. No further changes have been made during FP2 revision.

ISPC comment #8. The clarification of the foundational science at the basis of FP3 on *Enhancing the contribution of fish to nutrition and health of the poor.*

The ISPC assessment (dated 14 September) considers that this comment has "partially addressed the ISPC concerns". The ISPC commentary refers to FP3, and not FP2.

The FP2 revision incorporates nutrition-sensitive approaches for fish agri-food systems into clusters 1 and 2, but particularly into the cluster 3 research (page 18). Nutrition-related outcomes will be achieved through collaboration with WorldFish bilateral projects and partnerships that are scaling nutrition-sensitive approaches. Collaboration with A4NH flagship 1 (food systems for healthier diets) will also be undertaken to inform understanding of the role of fish in providing solutions that address food insecurity, undernutrition, and over-nutrition challenges. The revised FP2 has addressed nutritional outcomes within the revised cluster 3 text, impact pathways narrative (page 7) and figure 2.1.

ISPC comment #9. Proponents should re-write FP1

The ISPC assessment (dated 14 September) considers that the approved FISH CRP has "satisfactorily addressed" this comment. No further changes have been made during revision of the FP2 document.

Donor perspectives review of CRP relative to donor-perspective review criteria at CRP level

The donor perspectives review provides an overall endorsement of the FISH CRP with the statement that: "Fisheries and aquaculture provide livelihoods for 800 million people. Some 3.1 billion people obtain 20% of their animal protein from fish. About 75% of the countries where fish contribute more than one third of the animal protein… are low-income countries. To meet future demand fish production must double by 2030. This is an area of strategic importance to the CGIAR. The FISH CRP is a good fit with SRF goals and priorities."

The donor review subsequently provides more specific commentary on the questions raised at the CRP and flagship levels. Here we provide information on how the revision of FP2 has addressed key issues raised in the donor perspective review, first at the CRP level (where pertinent to FP2), and then at the FP2 flagship level.

CRP level summary: Q1: Coherence across the flagships to develop an integrated research program (*At the CRP level, is there sufficient coherence across the flagships and linkage between the flagships to deliver an integrated research program?).*

The donor perspectives reviews contain varied suggestions on coherence across the CRP, noting "at the CRP level, there is sufficient coherence across the flagships and linkage between the flagships to deliver an integrated research program; and that, theoretically, the program fits together and is well-integrated with many synergies", but also "that there is little synergy and integration among three FISH flagships".

In responding to these donor perspectives, we acknowledge the donors' comments that aquaculture and fisheries are distinct subsectors, require different sorts of expertise, and that certain aspects require fundamentally different approaches to research. Flagship 2 does bring together researchers and partners around its design and implementation, providing a unique grouping to achieve impact.

The FP2 revisions also continue to adopt an integrated approach, within the overall goal of FISH to span the spectrum of aquaculture, SSF and pathways to draw on both subsectors to enhance the role of fish to SLO targets and SDGs. In doing so, there are inevitably some areas with higher levels of integration than others. In revising the FP2, further emphasis has been given to providing more explanation on how the fisheries and aquaculture systems interrelate, and at what levels. More specifically:

- Cluster 3 of the FP2 revised text makes further reference to assessing nutrition-related outcomes and

connections to FP1 (sustainable aquaculture) and section 2.2.1.7 (partnerships) provides further information on synergies with the A4NH flagship 1 (food systems for healthier diets).

Beyond the extreme ends of the SSF and aquaculture production spectrum, many millions of poor people rely on both sources of fish for nutrition and income. Communities that depend on these mixed sources of fish are the focus of a major component of the FISH proposal with very strong cross-flagship, cross-CRP and cross-institutional integration. Examples that have been given more attention in the revision of the FP2 text include:

- Fish-dependent communities in the Asian mega-deltas of the Ganges/Brahmaputra (Bangladesh), Irrawaddy (Myanmar) and Mekong (Cambodia). The revisions to FP2 specifically highlight research on rice-fish systems and detail the close integration of aquaculture, SSF and fish for human nutrition in section 2.2.1.6 (clusters of activity) in the description of cluster 2.
- In section 2.2.1.6 (clusters of activity), the description of cluster 2 now explains more clearly research on increasing productivity of man-made reservoirs and value chains that link wild capture fisheries to aquaculture. Cluster 2 research will be conducted in close collaboration with flagship 1.
- Cluster 3 provides the analytical power to examine case studies from clusters 1 and 2 among broader international social, economic and political environments to challenge and guide the ways in which fish from SSF is positioned in food systems at larger scales. This will be developed from joint analysis with flagship 1 and WorldFish's research program on value chains and nutrition to develop scenarios of fish in food systems along a continuum of fish production systems from capture fisheries to different aquaculture systems, for example, homestead ponds connected to rice fields.

At the CRP level, a revised theory of change has been prepared to reflect that FISH is comprised of two flagships, within which are nested the revisions made to FP2. No changes have been made to CRP-level targets.

CRP level summary: Q2: Likelihood of success in research objectives (*What's the likelihood that proposed research objectives will be achieved within 6 years?*)

The donor perspectives review emphasizes the need to strengthen research objectives, specifically noting "the assertion that over-exploited resources can be made to produce more benefits for the poor without some major reduction in the number of fishers (an issue not mentioned) is not consistent with current thinking in the field". One reviewer also commented that "objectives are vague and not consistent with reality, the likelihood that the FP2 project team will achieve them is essentially zero".

The FP2 revisions reflect analysis of probability of success of achieving the target outcomes, providing examples that indicate the likelihood of success. Some specific points addressed in the new FP2 research narrative which address the donor commentary are as follows:

- The necessity of reducing the number of fishers in many fisheries is more explicitly addressed, alongside an emphasis on alternative livelihood strategies in cluster 1 and cluster 2, with a better rationale for providing options for transitioning to productive activities other than fisheries.
- In relation to consistency with current thinking the field, our response is to acknowledge the well-documented challenges, particularly for marine fisheries, to improving fisheries governance; e.g., diverse fishing interests, power asymmetries, multi country agreements etc. This is to clearly demonstrate that realistic approaches have been proposed.

Overall, the theory of change has been revised (from page 6). Further we have made clarifications to the table indicating 'FP2 outcome targets by 2022' (previously table 9, now table 2.2 on page 5) to illustrate the outcome targets and SLO relationships; for example, under SLO target 3.3 we now recognize 'more productive and equitable management of natural resources'. We have elaborated on the sequential approach to reach these outcomes in revisions to PIM table D and a clearer articulation of the change mechanisms employed to ensure research outputs translate to research outcomes and ultimately development outcomes (in a new table, table 2.4, previously table 11).

CRP level summary: Q3: Good fit within SRF goals and priorities (*Is there a good fit within SRF goals and priorities?)*

The donor perspectives review recognizes that fisheries and aquaculture are "of strategic importance to the CGIAR and that the FISH CRP is a good fit with SRF goals and priorities". This is a compelling argument in support of the integrated CRP, and consistent with the ISPC assessment.

CRP level summary: Q4: Risk identification and management (*Have the major risks been identified and risk management plan strategies proposed?)*

The donor perspectives review commentary noted "risk identification and management for the CRP was adequately to well addressed". However, it was recommended that "risk mitigation strategies in the ToC need to be given higher priority or made a core element of the research and treated as research questions by their respective flagships".

In response, section 2.2.1.3 (impact pathways and theory of change) has been updated to identify the risks (and separate from assumptions) and provide specific risk mitigation strategies for each identified risk (table 4, page 10).

The clarifications of risk mitigation strategies and the articulation of our research hypotheses (table 2.1, page 2) now demonstrate that risk mitigation strategies are a core element of our research. For example, the efficacy of established networks for distributing innovations for uptake is critically examined in research and monitoring and evaluation on the hypothesis "The spread and outcomes of livelihood, governance and fisheries management innovations can accelerate and amplify through strategic investment in networks". Further, the policy influence potential of stakeholders convened to examine findings and policy insights from foresight models is examined through the hypothesis "Innovative scenario and foresight models, combined with effective multi-stakeholder convening, can help transform national and regional decision making and policies towards more sustainable and resilient SSF".

FP2 revisions have also taken account of the "risks with regard to 2022 targets and performance of key uptake partners in some regions". While "there are issues around the strengthening of governance and institutions in capture fisheries FP2 even with the proposed mitigation actions", we have clarified that FP2 responds to evidence of receptivity of public sector and development organizations, built on established national, regional and global partnerships. Annex 2 provides, for selected innovations, the change mechanisms, scaling strategy, and emerging evidence for scale of impact targeted being applied under FP2. Further, the elaborated explanations of the four change mechanisms in section 2.2.1.3 (impact pathways and theory of change) clarifies the ways in which change is brought about through existing political commitments, builds further political momentum and invests directly in strategies to realize impact at scale.

Flagship level reviews: Question #1: Potential for Impact (*Impact potential; beneficiaries; time to impact and organizational buy-in*)

Impact potential. The commentary on impact potential notes that the problem statements for FP2 "are generally well stated. However, they depend heavily on a number of critical assumptions, some of which are heroic".

The revision of FP2 has incorporated, in table 2.5, research outputs from FP2 that show progress in addressing the social, institutional, economic, policy and ecological constraints that affect the resource base of SSF and SSF-based livelihoods. But at the same time, we argue that research is necessary to produce new evidence that can have a significant influence on policy and practice and lead to the specified IDOs.

The objective of FP2 is to support sustainable and socially inclusive SSF for food and nutrition security. This is a sector that has suffered from lack of attention despite the fact that it secures food and livelihoods for most developing countries' coastal populations, and significant inland populations. The major challenges have been framed and addressed in a strengthened manner in the background analysis within section 2.2.1.1 (rationale and scope) and are strongly articulated in the problem statement of the FP2 proposal. The challenges are increasing competition for resources, insecure tenure and access rights, overharvesting and degradation of habitats and stocks, weak national capacities to design and govern solutions and inadequate policy recognition of the importance of SSF. These challenges contribute to poor alignment of efforts among diverse stakeholders to drive solutions at higher scales. FP2 presents a strong focus on management, technology and livelihood innovations alongside enabling governance and institutions. Revisions of section 2.2.1.3 (impact pathways and theory of change) have also been made to include a clearer articulation and more direct reference to the risks and assumptions.

Beneficiaries. The donor commentary on beneficiaries identifies that the "predicted quantified outputs are the main weakness of FP2" and proposes a number of improvements, including "the proposal should include a chapter that explains how, and by whom and under which assumptions the quantified impacts are calculated".

We have substantially expanded the description of the methodology and baseline figures used to determine the

quantified impact targets (annex 2, previously Annex 3.11 of the FISH proposal). Individual focal country targets are now also available through a series of focal country profiles on the WorldFish website. Bilateral projects investment preceding and in the FISH CRP during 2017 provide strong examples of our strategy and further substantiate the basis for, and significant progress towards, outcome targets for environmental sustainability, poverty reduction and food and nutrition security. These are now described in section 2.2.1.2 (page 4) and summarized in response to ISPC comment #2. To further respond to this important donor commentary, we have inserted a new annex 3 to FP2, elaborating detail on the innovations tested in different SSF systems and the strategies being employed to reach FP2 targets.

Impact pathway. The revised FP2 proposal has been improved to strengthen the logic between research outputs, research outcomes and development outcomes through further development and depiction of the theory of change (section 2.2.1.3) and revisions made to the PIM table D (annex 4). The revised impact pathway includes additional flagship-related development outcomes, specifying benefits to primary beneficiaries, marine and aquatic environments, and policy makers. To make the connections in the theory of change more explicit, the key assumptions necessary to progress from stage to stage and the associated change mechanisms were identified along with the corresponding strategies and risk management actions (Table 2.4, a revision of Table 12 from the FISH proposal).

The connection between the background analysis, the problem statement and the scope and approach (within section 2.2.1.1, rationale and scope) has been strengthened to make clearer connections from the three interrelated problem areas to the actual research challenges, and ultimately to what the opportunities for research impact are.

The revision has also strengthened the economic research component and partnerships engaging with economists based at James Cook University (for cluster 1) and with the research team from FP1 through the collaborations on foresight analysis that includes understandings of macroeconomics and trade (cluster 3). This enables the research to address a further comment from the donor review that "FP2 lacks economic research to address the major issues described". The refinements made to cluster 3 (within section 2.2.1.6, clusters of activity) emphasize the generation of evidence on the effects of trade, policies and climate change. Further, in Cluster 3 we further elaborate how research will make a contribution to influencing macroeconomic conditions "to challenge and guide the ways in which fish from SSF is positioned in food systems at larger scales. We are not aiming to "influence macroeconomic conditions"—this has specific meaning in economics. Our target is specifically the contribution of SSF to regional social and economic goals and to ensure that scenarios of fish production (from aquaculture, commercial sectors and SSF) account for broader macro-economic trajectories.

In response to the critique that FP2 "*describes gender issues but there is no obvious relationship between being concerned about gender equality and doing something practical to influence it*". The three major clarifications are;

First, Section 2.2.1.9 (gender) now more clearly explains how, through place-based research, capacity building investments in focal countries, and global analyses, FP2 will apply and build capacity in the application of sex-disaggregated data collection guidelines. This will contribute to improved gender analysis in both social and ecological aspects of research in SSF systems. It also contributes research outputs to address the deficit of gender-sensitive fisheries assessments. The knowledge generated will increase the visibility of women's contributions to SSF and, through change mechanisms, lead to improvements to fisheries polices. Improvements to methodologies and increased capacity of partners to integrate gender-disaggregated methodologies into monitoring and evaluation will promote commitment to national to global policy commitments.

Second, FP2 will develop, test and refine gender-accommodating and gender-transformative strategies (McDougall et al. 2016; Promundo 2016). We have updated FP2 text in section 2.2.1.9 (gender) to demonstrate that early research outputs provide foundational understandings of norms and relations as barriers and opportunities in rural governance and livelihoods (e.g., Locke et al. 2017; Cohen et al. 2016). These findings are examined with partners in focal countries to determine preliminary guidance for models of context-specific gender transformative approaches (e.g., Lawless et al. 2017), which are then tested and refined further in SSF management, technology and livelihood improvements.

Third (and related closely to the aforementioned approaches), early milestones (provided in a revised PIM Table D, annex 4) will include needs assessments with public agencies and civil society networks to build an integrated and

focused approach to build capacity around the implementation of the SSF Guidelines that strongly promotes a range of commitments to gender. Needs assessments can take a range of forms, depending on the knowledge gap; for example, these can address organizational and technical capabilities to policy gaps analysis (e.g., Song et al. 2017). Capacity building efforts similarly take a variety of forms, delivered, for example through targeted trainings, collaborative action research, co-development of monitoring and evaluation, and development of communities of practice.

As indicated in the current and original FP2 text, deliberate efforts will be made to draw together cases from across FP2, and indeed the whole CRP, to ensure that generalizable lessons and guidance on gender are crystalized. We now provide further clarification that context specific models and overarching strategies will be shared through FAO and TBTI extended networks and associated policy reform. Our more precise strategy takes advantage of the growing commitments to the SSF guidelines that contain substantial commitments sensitive to, and focused on, gender. Revisions to section 2.2.1.3 (impact pathways and theory of change), and in particular a clearer description of change mechanisms, clarify the deliberate strategies employed to ensure research outcomes and development outcomes are realized.

Time to impact. The donors' comment that "the assumption that FP2 can transfer key management evidence into national institutions is optimistic for many of the target geographies within the timescales set" has been addressed in several ways. Clusters 1 and 2 text revisions, and a new table provided (annex 3), clarify that research outputs are designed, developed and disseminated in response to windows of opportunity (shifts in policy, discourse and investment) within focal countries, and ongoing partnerships. FP2 particularly builds on the strong WorldFish foundation of collaboration with national institutions in several focal countries, facilitating connection between research and ongoing partnerships and policy processes. In section 2.2.1.2 (page 4) we have elaborated this evidence by incorporating examples from our focal countries and regions (refer also to response to ISPC comment #3).

WorldFish research and engagement in policy discussions (including under the AAS CRP) in Solomon Islands have contributed to new provisions within the Solomon Islands Fisheries Management Act 2016 (Cohen et al. 2017). Further, through dialogue facilitated by our regional partner the Pacific Community (SPC) in collaboration with WorldFish the 22 Pacific Island Countries and Territories made new commitments to address coastal fisheries concerns for food security and human wellbeing outcomes.

An updated revised PIM table D (annex 4) for FP2 provides a more complete set of sequential milestones that demonstrate the realistic timescale for the application of management evidence by national institutions.

In association with revisions to section 2.2.1.3 (impact pathways and theory of change) and the provision of table 2.1 that articulates the change mechanisms for FP2, we more clearly describe the investments that will be made to enable impact by 2022—and clearly illustrate how this is based on strategic investments and validation of opportunities, not wishful assumptions.

Organizational buy-in. The review comments that "the range of scale-up partners' capacities is wide, thus organizational buy-in may vary". Indeed, partnership capacities vary and where institutional strengthening and capacity building are needed, these are accounted for in capacity building efforts but also in our improved articulation of risks and assumptions, and risk mitigation strategies (revisions to table2. 4, previously table 12).

The text on partnerships (section 2.2.1.7) has been revised in response to ISPC comment 5, making more explicit the joint commitments under which these partners have been and will be engaged. Despite a lack of W1/W2 funding during 2017, there have been impressive demonstrable increases in organizational buy-in; including co-commitment of in-kind funding, joint pursuit and success in bilateral fundraising under each cluster, completion of early research outputs with in-county, regional and global partners, and progress with co-implementation of activities funded by the project grants under FP2. The role of national, regional and global partnerships in scaling has also been elaborated in the extensive clarifications made to descriptions of the four change mechanisms in section 2.2.1.3 (impact pathways and theory of change)—this further clarifies the existing political momentum and commitments that these change mechanisms leverage.

Flagship level reviews: Question #2: Strategic Importance (*alignment and partners*).

Alignment. The commentary provides different perspectives on the alignment of research with established diagnoses of challenges/problems. Two reviewers considered there to be strong alignment between the proposed interventions or research products and established diagnoses of challenges/problems. Two other reviewers expressed more reservations. One considered that the researchable hypotheses are not described in detail in the proposal and that the assertion that "decentralized fisheries governance systems have proven potential to address sustainability and equity issues" has little empirical evidence to support it. Another reviewer considered that, while theoretically FP2 has good mapping of research knowledge and development impacts, historically these sorts of institutional changes have been hard to bring about. Thus, FP2 research is underinvested in understanding the context, and without this, impact is unlikely.

Section 2.2.1.1. (rationale, scope) contains a scope and approach section where the researchable hypotheses have been clearly stated (table 1) through revision of what were previously described as propositions. Hypotheses cover three areas: a) testing of novel management, technical and livelihood innovations; b) testing and refinement of strategies employed within change mechanisms to bring about institutional change and widespread adoption of innovations; and c) innovation in design and dissemination, accounting for complexity within broader historical, cultural and political economy contexts.

Hypotheses focus on the testing of novel management, technical and livelihood innovations. Hypothesis #1 is that "fisheries management and technology innovations can increase fisheries production, environmental sustainability and food security"; hypothesis #2 is that "livelihood and market innovations can build resilience in fishing communities"; and hypothesis #3 is that "Accounting for social differentiation in SSF and application of transformative approaches through innovations can accelerate equitable poverty reduction and food and nutrition security".

Hypotheses also focus our research explicitly on change mechanisms and the strategies through which institutional change is brought about and innovations are spread. Hypothesis #4 is that "research insights and capacity building directed towards windows of opportunity can transform governance and institutions to amplify food security and sustainability outcomes from livelihood, governance and fisheries management innovations"; hypothesis #5 is that "investments in research, governance, strategic networking build responsive and accountable institutions can accelerate, enhance and sustain equity, sustainability and food security outcomes" and hypothesis #6 is that "the spread and outcomes of livelihood, governance and fisheries management innovations can accelerate and amplify through strategic investment in networks".

Hypotheses also demonstrate that FP2 has a clear focus on understanding complexity within broader historical, cultural and political economy contexts through hypothesis #7 ("new systems knowledge (food systems, trade, global environmental change) can promote capacity to adapt through local and regional innovations for SSF and build accountability towards SSF in the governance of trade-offs and external drivers"] and hypothesis #8 ("innovative scenario and f foresight models, combined with effective multi-stakeholder convening, can help transform national and regional decision making and policies towards more sustainable and resilient SSF").

Hypotheses are tested within different focal country contexts. We clarify in the scope and approach section that research outputs emerging from focal countries are not supposed to represent universal solutions: "research insights will be drawn from across the contrasting systems within focal countries to develop tools, engagement processes, management models and policy innovations appropriate for cross-regional exchange and adaptation" (page 3).

Decentralized fisheries governance. See comprehensive response to ISPC comment #2. In sum, we have revised text in 'scope and approach' of Section 2.2.1.1 to better reflect the position of decentralized and co-management research as one component within a broader approach. The descriptions of cluster 1 impact pathways in section 2.2.1.3 (impact pathway and theory of change, page 6) and the descriptions in 2.2.1.6 (clusters of activity, page 15-9) have been revised to clarify our rationale for a focus on co-management in the contexts where it is heavily emphasized by public sector policy, civil society and development agency investment.

Underinvestment in institutional change. Reviews highlighted that institutional changes have been hard to bring about, and the resultant concern that "FP2 research is underinvested in understanding the context, and without

this, impact is unlikely", we have clarified and refined a number of points. Our articulation of hypotheses (table 2.1) demonstrates our sharp focus on understanding complexity within broader historical, cultural and political economy contexts, i.e., through hypotheses focus on gender equity and youth, governance landscapes and external drivers of change)

Further explanations of our investment in understanding context, and responding in implementation, are provided within section 2.2.1.6 Clusters of activity. For example, in cluster 2 we now clarify that "Critical to the broader landscape analyses that frame both localized as well as national and transboundary responses will be the link between Cluster 2 and WLE FP4 on managing resource variability and competing uses for resilience, linking our fisheries-focused analysis with broader research on multiple uses of water and land at landscape and river basin scales."

Our improved mapping of milestones against development outcomes (revised PIM table D, annex 4) illustrates a clear and sequential approach. For instance, in the early stages of delivery, FP2 builds on knowledge of historical, cultural and political economy contexts. In 2017, for example, we have conducted analyses of the position of SSF in the political landscape of ocean governance (specifically related to the Blue Economy agenda). Further, we have delivered research outputs that examine the policy landscape in focal countries and regions to determine points of focus for improved alignment and implementation of the SSF Guidelines (e.g., Cohen et al. 2017, Song et al. 2017a, b; Matthews & McCartney 2017).

Revisions to section 2.2.1.9 (gender, page 22) now explain more clearly that early research outputs/milestones are direct investments in understanding the context; i.e., the production of foundational research outputs as early milestones to understand local norms and relations, civil society and public sector capacity, and policy landscapes, as they may translate to barriers and opportunities to gender equity in rural governance and livelihoods (e.g., Song et al. 2017; Locke et al. 2017; Cohen et al. 2016). These findings, examined with partners, provide direct guidance to the subsequent development and refinement of preliminary models of context-specific gender transformative approaches, capacity investments and policy reform.

Our clarified partnership strategy (revisions in 2.2.1.7 partnerships) has been developed based on 2017 and preceding experiences of organizational buy-in. Emerging evidence of buy-in and progress along impact pathways ensures that investments in capacity building and instructional change are not spread too widely. Simultaneously, partners have been selected for their extensive networks and influence—so our more focused partnership approach increases the likelihood of FP2 realizing impact at scale.

Finally, we have clarified at a number of points how the FP2 research outputs are designed, developed and disseminated in response to windows of opportunity (shifts in policy, discourse and investment) within focal countries. Change mechanisms for FP2 have been tailored in response to context-specific windows of opportunity and evidence of progress along impact pathways. We provide a new table to illustrate these strategies and evidence against policy traction milestones (annex 3).

Flagship level reviews: Question #3: Comparative advantage (*comparative advantage; CGIAR role; cost-effectiveness*).

Comparative advantage. The reviewers point out that "WorldFish has used their convening power to bring together a strong consortium"; the FP2 partnerships have been further strengthened by drawing together new partners (section 2.2.1.7). The research teams have also been strengthened through addition of skills in the field of policy and institutional reform, nutrition-sensitive fish production systems, regional foresight analysis (with track records in the CVs provided in the revised annex 1 (previously annex 3.8) in ways that provide an even stronger team of researchers, with viable and productive partnerships across the continuum of research outputs to development outcomes.

CGIAR role. While the donor review notes "fish are important, and will be more so in the future," the reviewers note that "institutions and governance are not areas where the CGIAR has a strong track record. Social science has also been weak. This research depends largely on the strengths of the external partners, which is generally good". *Regarding the social science capacity,* the track record of the team illustrates expertise in this area. We add further evidence of this in the section 2.2.1.4 on science quality i.e., "Analysis of peer reviewed research outputs show that in the last five years 42% of WorldFish research falls into the social (30%) and economic (12%) sciences (Scopus, accessed July 2017)". Research updated in table 5 demonstrates a strong and current social science capacity within

the WorldFish FP2 team, augmented by the social and interdisciplinary research capacity of FP2 partners. We have better elucidated the range of partners bringing policy and institutions and gender expertise by adding senior positions to the staffing list (annex 1) and including their CVs. The link to PIM flagship 5 (inclusive natural resource governance) further leverages capacity for institutional and governance analysis by supporting the exchange of tools and approaches among related sectors such as forest and water. We also expect to strengthen the institutions and governance research capacity through collaboration through IWMI with integrated water and landscape management.

Advocacy rather than research. One reviewer considered that the proposed work was "likely to be more advocacy than research, much of the agenda would be best left to civil society organizations". Revisions have been made within the 'background analysis' and the 'scope and approach' in section 2.2.1.1. to more clearly describe the contribution of research from FP2, and where research-based innovations will lead to practice and policies that scale nutrition and food security and environmentally sustainable outcomes. This is achieved, in part, through better recognition of the functions of SSF and the innovations that support and build these functions. In sum, "the provision of research-backed policy and technical solutions to secure and rebuild SSF for the millions of people who depend on them is a significant and urgent challenge, and is the central rationale for FP2". Revisions to both the theory of change and the partnership sections clarify the ways in which research will be actively and directly developed with, and translated for, partners best positioned to influence policy and investments in oceans governance, public sector fisheries policy and private sector investments in fish production systems.

The difference between advocacy and research is specifically highlighted in a revised quality of science section (2.2.1.4): "While there is a great deal of advocacy around co-management approaches, there is also a paucity of systematic comparison of outcomes, particularly for the social and equity dimensions (Selig et al. in press). By addressing this gap, we can provide robust guidance for policies and practice to achieve impact at scale."

Cost effectiveness. Donors expressed some concern about cost effectiveness, stating that "research seems expensive but the overall costs may be justified by the scale of the impact", but simultaneously raised some doubt about the high target figures.

In section 2.2.1.2 (page 3) we have provided strong examples from historical and current research for development around fisheries (Bilateral projects investment preceding and in the FISH CRP during 2017) to demonstrate the basis and achievability of impact targets. Further, progress towards outcome targets for environmental sustainability, poverty reduction and food and nutrition security are provided for select examples in annex 3).

W1/W2 investment in FP2 leverage from bilateral grant funding to achieve the ultimate target figures. Should funding from W1/W2 not materialize, FP2 will reduce its ambitions and implement by reducing activities planned in focal countries, and substantially reducing activities in scaling countries and the investments in scaling mechanisms within the regions of focus.

Donors also expressed that insecure funding beyond 2018 added to the concern of cost-effectiveness, given that this may result in discontinuity of financial support, impede implementation and hinder impact as planned. Revisions in three areas reflect that we have addressed this concern.

We have clarified in section 2.2.2.2 (summary) under the sub-heading 'risks and plans to mitigate risks' (page 26) that "as a means of risk mitigation, WorldFish has dedicated organizational resources to securing the bilateral funding targets identified in the proposal". This has resulted, in 2017, in a "resource mobilization strategy aligned to FISH that responds to a more challenging funding environment, where traditional donor funding for development research in general is declining". Implementation of this strategy has commenced in 2017. In addition to the strong bilateral pipeline, as indicated in the 2017 FISH POWB, this strategy brings a new and pro-active focus on new sources of investment that focus tightly on research within focal countries and scaling to associated regions. These changes are also reflected in a revision to section 2.2.2.4 'Other Sources of Funding for this Project' (page 27).

Revisions to section 2.2.1.3 (impact pathways and theory of change) now include change mechanism b (private sector engagements) to demonstrate that research outputs from FP2 will also be targeted so as to guide investment models aligned with the emerging interest in impact investment in SSF.

Flagship level reviews: Question #4: M&E and Learning (MEL)

The donor commentary is mixed on the MEL plan, but provides specific suggestions for FP2. One reviewer considers the MEL plan to be satisfactory. The other three reviewers considered MEL to be very weak. "The outcomes and impacts of FP2 research will be difficult to measure within the timescale of the CRP. The type of social and institutional impact is difficult to assess and the MEL plan does not comprehensively address these issues for FP2. Systematic reviews have highlighted the weakness of much of the evidence around small-scale fisheries. FP2 requires a better articulation of the methods used to assess the impacts of governance models for sustainable fisheries".

The CRP FISH proposal notes that an evaluation framework is being prepared during 2017, with due reference to the evolving CGIAR Results Based Management framework, which is also under development. Revisions to the FP2 proposal have been made to improve the MEL approach, specifically:

- The refinements to PIM table D now provide stronger foundations on which to build the evaluation framework. The table includes a more comprehensive and measurable set of milestones that will enable FP2 to assess progress towards the outcome targets, including social and institutional changes. The table articulates clear means of verification and brief explanations of how the CRP M&E system will capture the means of verification.
- The strong bilateral contributions on which FP2 is built each mandate project specific M&E. The FP2 evaluation framework will integrate these rigorous, but varied, systems to construct a common FP2 evaluation framework, building on early progress in this direction (e.g., Blythe et al. 2017).
- FP2 also plans to work with FAO and other partners to improve the evidence base for SSF, through an update of the Hidden Harvests report that will provide a more realistic baseline of SSF participation, benefits, foundations at national and global levels and provide a more solid foundation for M&E.
- M&E efforts will be guided by and will contribute to global efforts led by FAO and TBTI to track implementation of the SSF Guidelines. A 2017 global synthesis, "The small-scale fisheries guidelines; global implementation" (Jentoft et al. 2017) was led by FAO and TBTI, with contributions from WorldFish in 2017. A further planning meeting on M&E design is scheduled for later in 2017 and will include advice from the senior research advisor to FP2.

The M&E framework will build on robust research that has employed a range of methods necessary to evaluate sustainability, food and nutrition security and equity impacts from the different governance models that will be further refined and scaled under FP2. Further additions to table 2.5 demonstrate the application of these methods, including in early milestones of FP2. For example, methods for fisheries-based evaluations of ecological and economic performance (e.g., Cohen et al. 2013; Brooks et al. 2015) contribute to the refinement of community-based management. Governance outcomes from community to national interventions are assessed in terms of power, accountability and representation (Locke et al. 2017; Miratori and Brooks 2015; Cohen and Steenbergen 2015). Qualitative approaches are used to evaluate the social impacts of participatory-action research in the development of multiple innovations (Apgar 2017; Ratner et al. 2015). The introduction of livelihoods and technology interventions are examined through quantitative and qualitative measures to determine indicators of economic performance (Kura et al. 2017; McCartney 2015), contributions to resilience of adaptive capacity (Cohen et al. 2016; Eriksson et al. 2017) and impacts on access and availability of fish (Albert 2014, 2015; Masu and Albert, 2015).

BUDGET NOTES

The flagship budget narrative (section 2.2.2) has been revised slightly to reflect the funding projections made in the original proposal, funding secured, and present funding gaps. Assumptions of a W1/W2 funding start up during 2018 have led some minor revisions in Section 2.2.2.5 (Budgeted costs for certain key activities) and some minor revisions to the original Table 10 in Section 2.2.1.2. (now Table 2.3, page 6).

Section 2.2.2.4 (Other Sources of Funding for this Project) has been revised in line with present secured budgets, increased slightly from the figure provided in the FISH 2017 POWB, and some additional notes on resource mobilization provided. In revisions to section 2.2.2.6 ('Other') we outline in broad terms the impact of the deficit of W1/W2 in 2017 FP2 implementation. In 2017, significant efforts have been made by WorldFish and our partners to raise W3/bilateral funds, with targets for 2017 bilateral funding already exceeded, and a W3/bilateral funding pipeline developed for 2018 and beyond.

Annexes

Annex 1. Staffing of flagship project

Name	Institution	Role in FISH
Flagship 2: Sustaining small-scale fisheries		
Philippa Cohen	WorldFish	Flagship Leader & Principal Investigator: Small-scale fisheries governance
Joshua Cinner	James Cook University	Leader Cluster 1: Resilient coastal fisheries
Sonali Sellamuttu	IWMI	Leader Cluster 2: Fish in multifunctional landscapes
David Mills	WorldFish	Leader Cluster 3: Fish in regional food systems
Blake Ratner	WorldFish	Principal Investigator: Governance
Tiffany Morrison	James Cook University	Principal Investigator: Policy and institutions
Sanjiv de Silva	IWMI	Principal Investigator: Water and land resources management
Matthew McCartney	IWMI	Principal Investigator: Water and land resources management and ecosystem services
Abdul Wahab	WorldFish	Senior Scientist: Inland fisheries ecology and management
Jane Kato-Wallace	Promundo	Specialist: Gender transformative approaches
Steve Cole	WorldFish	Scientist: Gender equity
Yumiko Kura	WorldFish	Scientist: Fisheries policy and management
Shakuntala Thilsted	WorldFish	Principal Investigator: Nutrition-sensitive approaches
Cynthia McDougall	WorldFish	Principal Investigator: Gender
Sloans Chimatiro	WorldFish	Principal Investigator: Regional trade and scaling in Africa
Nhuong Tran	WorldFish	Principal Investigator: Scenario and foresight modelling
Edward Allison	University of Washington	Senior Small-Scale Fisheries Advisor (Honorary)

COHEN, PHILLIPA

PROFILE

- Interdisciplinary (social science and ecology) researcher who specializes in small-scale fisheries governance and management. Research addresses the increasingly urgent need to improve environmental sustainability and food security in developing countries, particularly for securing the contribution of fisheries to incomes and diets of large numbers of people living in rural and remote areas.
- Solution-orientated and applied research that provides guidance to development policies and interventions, particularly via CGIAR.
- 32 peer-reviewed publications.

EMPLOYMENT

2017 to date	Research Leader, Small-Scale Fisheries Research Program, WorldFish, Penang
2016 – 2017	Senior Scientist, WorldFish, Australia
2013 – 2016	Scientist, WorldFish, Australia; Research Fellow, ARC Centre of Excellence for Coral Reef Studies, James Cook University, Australia
2011 – 2013	Consultant, WorldFish, Australia, Solomon Islands, Timor-Leste

EDUCATION

2013	PhD, ARC Centre of Excellence for Excellence, James Cook University, Australia
2000	BSc (Hons) Marine, Freshwater & Antarctic Biology, University of Tasmania, Australia

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Cohen, P**., Lawless, S., Dyer, M., Morgan, M., Saeni, E., Teioli, H., Kantor, P. (2016) Understanding adaptive capacity and capacity to innovate in social-ecological systems: Applying a gender lens. *Ambio* 45 (3): 309–321.
- Apgar, J.M., **Cohen, P**., Ratner, B.D., de Silva, S., Buisson, M.-C., Longley, C., Bastakoti, R., Mapedza, E. (2017) Navigating opportunities for governance transformations using participatory action research in aquatic agricultural systems. *Ecology and Society* 22: 9.
- **Cohen, P.**, Steenbergen, D. (2015) Social dimensions of local fisheries co-management in the Coral Triangle. *Environmental Conservation* 42: 278–288.
- Evans, L., Hicks, C., **Cohen, P**., Case, P., Prideaux, M., Mills, D. (2015) Understanding leadership in the sustainability sciences. *Ecology and Society* 20: 50. doi:10.5751/ES-07268-200150.
- Jupiter, S., **Cohen**, **P.,** Weeks, R., Tawake, A., Govan, H. (2014) Locally-managed marine areas: Multiple objectives and diverse strategies. *Pacific Conservation Biology* 20: 165–179.
- **Cohen**, **P.**, Cinner, J., Foale, S. (2013) Fishing dynamics associated with periodically-harvested marine closures. *Global Environmental Change* 23 (6): 1702–1713.
- **Cohen**, **P.**, Alexander, T. (2013) Catch rates, composition and fish size from reefs managed with periodically-harvested closures. *PLoSONE* 8(9): e73383. doi:10.1371/journal.pone.0073383.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

- 2017 Awarded ACIAR grant on the contribution of small-scale fisheries research to a food secure world'
- 2017 Awarded ACIAR grant on strengthening and scaling community-based approaches to coastal fisheries management
- 2014 Young Tall Poppy Science Award
- 2010 Coral Reef Initiatives of the Pacific, Research Grant

ROLE IN FISH

Leader, FP2 Sustaining small-scale fisheries

CINNER, JOSHUA

PROFILE

Cinner's research explores how social, economic and cultural factors influence the ways in which people use, perceive and govern natural resources. He works closely with ecologists on interdisciplinary research topics, including defining the socioeconomic factors that drive successful marine conservation, understanding resilience and thresholds in social ecological systems, and examining vulnerability to environmental change. 102 peer-reviewed publications.

EMPLOYMENT

2014 to date	Professor, ARC Centre of Excellence for Coral Reef Studies, James Cook University, Australia
2012 – 2014	Principal Research Fellow/Associate Professor, James Cook University, Australia
2008 – 2012	Senior Research Fellow/Senior Lecturer, James Cook University, Australia
2006 – 2007	Postdoctoral Research Fellow, James Cook University, Australia

EDUCATION

2006	PhD, James Cook University, Australia
2000	MA Marine Affairs, University of Rhode Island, USA

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Hughes, T.P., Barnes, M., Bellwood, D., **Cinner, J.E**. et al. (2017) Coral Reefs in the Anthropocene. *Nature* 546: 82–90.
- Graham, N.A.J., McClanahan, T.R., MacNeil, M.A., Wilson, S.K., **Cinner, J.E**., Huchery, C., Holmes, T.H. (2017) Human disruption of coral reef trophic structure. Current Biology, 23: 231–236.
- **Cinner, J. et al.** (2016) Bright spots among the world's coral reefs. *Nature* 535: 416–419.
- **Cinner, J.E**. et al. (2016) A framework for understanding climate change impacts on coral reef social-ecological systems. *Regional Environmental Change* 16: 1133–1146.
- Bergseth, B., **Cinner, J.E**., Russ, G. (2015) Measuring and monitoring compliance in no-take marine reserves. *Fish & Fisheries* 16: 240–258.
- **Cinner, J.**, McClanahan, T.R. (2015) A sea change on the African coast? Preliminary social and ecological outcomes of a governance transformation in Kenyan fisheries. *Global Environmental Change* 30: 133–139.
- MacNeil, A., Graham, N.A.J., **Cinner, J.** et al. (2015) Recovery potential of the world's coral reef fishes. *Nature* 520: 341–344.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

2016–2020	Future Fellowership from the Australian Research Council (USD 680,000)
2015–2018	Pew Fellowship in Marine Conservation (USD 150,000)
2014–2020	Centre Investigator for a USD 25 million grant from the Australian Research Council to the ARC Centre of Excellence for Integrated Coral Reef Studies

ROLE IN FISH

Leader, Cluster 1 – Resilient coastal fisheries, FP2 Sustaining Small-scale fisheries

SONALI SENARATNA SELLAMUTTU

PROFILE

- 20 years of experience in natural resource management, sustainable livelihoods and poverty reduction in the context of agricultural and aquatic systems (including coastal and inland systems), with over 50 articles, book chapters, technical reports and policy briefs published (including 24 peer-reviewed publications).
- Leadership role in a number of research for development multidisciplinary projects in Southeast Asia, South Asia and Africa focused on: (1) water management to improve food security and livelihoods in Myanmar's Dry Zone; (2) optimizing reservoir management to improve livelihoods of affected communities in Cambodia, Vietnam and Laos PDR; (3) commune agro-ecosystem analysis supporting decision-making for water allocation for fisheries and agriculture in Tonle Sap, Cambodia; and (4) integrating conservation and poverty interventions in wetlands.

EMPLOYMENT

2011 to date	Senior Researcher, Acting Theme Leader and Head of IWMI Southeast Asia Regional Office, Vientiane, Lao PDR
2006 – 2010	Researcher – Livelihood Systems, IWMI HQ, Sri Lanka & IWMI Southeast Asia
2000 – 2001	Head, National Marine & Coastal Program, IUCN, Sri Lanka
1999 – 200:	Policy Fellow, Sustainable Use Initiative/Ford Foundation, IUCN, Washington DC, USA

EDUCATION

2006	PhD, Imperial College London, UK
1995	MSc in Ecosystems Analysis and Governance, University of Warwick, Coventry, UK

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Joffre O.M., Castine, S.A., Phillips, M.J., **Senaratna Sellamuttu, S.,** Chandrabalan, D., Cohen, P. (2017) Increasing productivity and improving livelihoods in aquatic agricultural systems: A review of interventions. *Journal Food Security* 9 (1): 39–60. doi:10.1007/s12571-016-0633-3.
- Weeratunge, N., Joffre, O., **Senaratna Sellamuttu, S.,** Bouahom, B., Keophoxay, A. (2016) Livelihoods, gender and household decision-making in a Lao village: Implications for hydropower development. *Gender, Place and Culture* 23 (11): 1599–1614.
- McCartney, M., Rebelo, L.M., **Senaratna Sellamuttu, S.** (2015) Wetlands, livelihoods and human health. In Wetlands and Human Health. Edited by Finlayson, C.M., Horwitz, P., Weinstein, P. *Wetlands: Ecology, Conservation and Management.* Vol. 5. Netherlands: Springer. pp 123–148.
- **Senaratna Sellamuttu, S.,** Aida, T., Kasahara, R., Sawada, Y. and Wijerathna, D. (2014) How access to irrigation influences poverty and livelihoods: A case study from Sri Lanka. *Journal of Dev. Studies* [ISI] 50 (5): 748–768.
- **Senaratna Sellamuttu, S.,** de Silva, S., Nagabhatla, N., Finlayson, M., Pattanaik, C., Prasad, S.N. (2012) The Ramsar Convention's wise use concept in theory and practice: An inter-disciplinary investigation of practice in Kolleru Lake, India. *Journal of International Wildlife Law and Policy* [ISI] 03-04: 228–250.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Co-Chair for the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) Asia-Pacific Regional Assessment (2015–2017), which involves a team of 130 scientists covering five sub-regions and 68 countries. IWMI Representative on the Ramsar Convention's Scientific and Technical Review Panel (STRP) for 2013–2015. Lead for the STRP Working Group on Wetlands and Poverty Eradication (2013–2015), member of the working group (2009–2012) and provided significant inputs to Ramsar Resolutions on wetlands and poverty. Member of AAS CRP Strategic Leadership Group. Major grants awarded: CPWF Mekong1 (USD 1.6 million); CPWF PN71 (USD 570K); and LIFT (USD 400K).

ROLE IN FISH

Leader, Cluster 2 – Fish in multifunctional landscapes, FP2 Sustaining small-scale fisheries

MILLS, DAVID

PROFILE

Inter-disciplinary fisheries scientist with:

- 24 years of research experience in temperate and tropical marine systems
- a research interest in coastal livelihoods, well-being and system resilience in the developing world
- experience leading projects in Africa, Asia and the Pacific focusing on quantifying the contribution of small-scale fisheries in developing countries, coastal livelihoods, governance systems, climate change adaptation and co-management
- 32 peer-reviewed publications.

EMPLOYMENT

2013 to date	Senior Scientist, Natural Resource Management, WorldFish, Australia
2011 to date	Adjunct Senior Research Fellow, ARC Centre of Excellence on Coral Reef Studies, Australia
2008 – 2013	Scientist, Natural Resource Management, WorldFish, Malaysia
2006 – 2007	Postdoctoral Research Fellow, Natural Resource Management, WorldFish, Malaysia

EDUCATION

2005	PhD, University of Tasmania, Australia
2000	BSc (Hons), Marine, Freshwater and Antarctic Biology, University of Tasmania, Australia

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Mills, D.J.,** Tilley, A., Pereira, M., Hellebrandt, D., Fernandes, A., Cohen, P.J. (2017) Livelihood diversity and dynamism in Timor-Leste; insights for coastal resource governance and livelihood development. *Marine Policy* 82: 206–216.
- Blythe, J., Sulu, R., Harohau, D., Weeks, R., Schwarz, A., **Mills, D.J.,** Phillips, M.J. (2017) Social dynamics shaping the diffusion of aquaculture innovations. *Sustainability* 9(1): 126. doi:10.3390/su9010126.
- Mutimukuru-Maravanyika, T., **Mills, D.J.**, Asare, C., Asideu, G. (2016) Enhancing women's participation in decision-making in artisanal fisheries in the Anlo Beach fishing community, Ghana. *Water Resources and Rural Development.* doi:10.1016/j.wrr.2016.04.001.
- Bene, C., Al-Hassan, R.M., Amarasinghe, O., Fong, P., Ocran, J., Onumah, E., Ratuniata, R., Truong, T., McGregor, A.J., **Mills, D.J.** (2016) Is resilience socially constructed? Empirical evidence from Fiji, Ghana, Sri Lanka, and Vietnam. *Global Environmental Change* 38: 153–170.
- Evans, L.S., Hicks, C.C., Cohen, P.J., Case, P., Prideaux, M., **Mills, D.J.** (2015) Understanding leadership in the sustainability sciences. *Ecology and Society* 20:50. doi:10.5751/ES-07268-200150.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

2016	Principal Investigator for a USD 200,000 grant (two years) from PLAN United Kingdom to research the potential for fish to improve nutritional status, food security and economic well-being in Timor-Leste
2016	Principal Investigator for a USD 90,000 grant (one year) from the Asian Development Bank to research coastal livelihoods and resource management in Atauro Island, Timor-Leste
2015	Principal Investigator for a USD 1.5 million grant (two years) from the Norwegian Government to develop a fishery sector support program in Timor-Leste

ROLE IN FISH

Leader, Cluster 3 – Fish in regional food systems, FP2 Sustaining small-scale fisheries

RATNER, BLAKE D.

PROFILE

- Responsible for the overall leadership, operation, and management of WorldFish. After a handover of Director General responsibilities at the end of 2017, Dr. Ratner will take up the role of Director of the Collaborating for Resilience initiative.
- An environmental sociologist, his research focuses on natural resource governance, conflict, and cooperation from local to regional scales. Specialist in participatory multi-stakeholder dialogue to build institutional and policy innovation addressing competition over common-pool resources, including both inland and coastal fisheries.
- Skilled in executive leadership, organizational change, participatory facilitation, experiential education and conflict mediation. Fluent in English, Spanish, French and Khmer (Cambodian).
- Over 70 journal articles, policy reports, book chapters and edited volumes on rights, equity, and accountability in environmental decision-making.

EMPLOYMENT

2017 to date	Director General, WorldFish, Malaysia
2014 to 2016	Research Director, WorldFish, Malaysia
2003 – 2014	Program Leader, Governance; Regional Director, Mekong, WorldFish, Cambodia
2000 – 2003	Consultant and Faculty Appointments: World Bank, University of Minnesota, USA

EDUCATION

1997	PhD, Development Sociology (Rural and Environmental Sociology), Cornell University, USA
1995	MS, Development Sociology and MPS, Rural Development Administration, Cornell University, USA

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Ratner, B.D.,** So, S., Mam, K., Oeur, I., Kim, S. (2017) Conflict and collective action in Tonle Sap fisheries: Adapting governance to support community livelihoods. *Natural Resources Forum* 41 (2): 71–82.
- Apgar, J., Cohen, P., **Ratner, B.D**., de Silva, S., Buisson, M.-C., Longley, C., Bastakoti, R., Mapedza, E. (2017). Identifying opportunities to improve governance of aquatic agricultural systems through participatory action research. *Ecology and Society* 22 (1): 9.
- Ensor, J., Park, S., Hoddy, E., **Ratner, B.D**. (2015) A rights-based perspective on adaptive capacity. *Global Environmental Change* 31: 38–49.
- **Ratner, B.D**., Mam, K., Halpern, G. (2014) Collaborating for resilience: Conflict, collective action, and transformation on Cambodia's Tonle Sap Lake. *Ecology and Society* 19: 31.
- **Ratner, B.D**., Åsgard, B., Allison, E.H. (2014) Fishing for justice: Human rights, development, and fisheries sector reform. *Global Environmental Change* 27: 120–130.
- **Ratner, B.D**., Cohen, P., Barman, B., Mam, K., Nagoli, J., Allison, E.H. (2013) Governance of aquatic agricultural systems: Analyzing representation, power, and accountability. *Ecology and Society* 18: 59.
- **Ratner, B.D**., Meinzen-Dick, R., May, C., Haglund, E. (2013) Resource conflict, collective action, and resilience: An analytical framework. *International Journal of the Commons* 7: 183–208.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

- Led cross-regional, action research resulting in governance innovations that improved resource access, reinforced livelihood security, and reduced social conflict in Cambodia, Uganda and Zambia, with lessons from the Collaborating for Resilience approach now applied in Bangladesh, Solomon Islands, Philippines and India.
- Led cross-regional exchange and synthesis of lessons aimed at strengthening collective action for management of water, forests and fisheries in conflict-sensitive environments of Asia, Africa and Latin America.
- Led participatory research to build collective action and strengthen civil society-state linkages in Cambodia's Tonle Sap Lake, contributing to more effective community advocacy for reform.

ROLE IN FISH

Principal Investigator: Governance, FP2 Sustaining small-scale fisheries

MORRISON, TIFFANY H.

PROFILE

Political geographer with:

- experience in interdisciplinary environmental science, with qualifications in environmental planning, and a broad interest in human and geographic approaches to natural resource and environmental governance
- a research interest in a basic theory of environmental governance and applied studies in environmental governance, planning and management.

EMPLOYMENT

2015 to date	Associate Professor and Social Science Research Leader, Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, Australia
2008 – 2015	Senior Lecturer and Director of the Environmental and Social Planning Research Group, University of Queensland, Australia
2004 – 2008	Lecturer, Flinders Institute of Public Policy and Management, Flinders University, Australia
2000 – 2002	Tutorial Fellow, School of Geography, Planning & Architecture, University of Queensland, Australia

EDUCATION

2004	PhD, University of Queensland, Australia
1999	BSc (Hons), University of Queensland, Australia

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Cohen, P., Song, A., **Morrison, T.H.** (2017) Policy coherence across scales of governance in Pacific small-scale fisheries. In Jentoft, S., Chuenpagdee, R., Franz, N., Barragan Paladines, M.J. (eds.). The Small Scale Fisheries Guidelines. MARE Publication Series, vol. 14. Springer. 57–77.
- **Morrison, T.H**., Hettiarachchi, M., Seabrook, L., McAlpine, C. (2017) Environmental change and social learning. In Goodchild, M., Marston, D., Kobayashi, A., Castree, N., Liu, W. (eds.). International Encyclopaedia of Geography: People, the Earth, Environment, and Technology. Wiley-AAG.
- Hettiarachchi, M., **Morrison, T.H.** (2016) A tale of two cities: Similar ecologies and diverging governance of urban fisheries in Kolkata and Colombo. In Song, A.M., Bower, S.D., Onyango, P., Cooke, S.J., Chuenpagdee, R. (eds.). Inter-Sectoral Governance of Inland Fisheries. St John's, NL, Canada: Too Big To Ignore.
- Cuevas, S.C., Peterson, A., **Morrison, T.H.** (2015) An Analytical Framework for Investigating Complex Institutions in Climate Change Adaptation: The Institutional Environment Matrix. In Leal Filho, W. (ed.). Handbook of Climate Change Adaptation. Springer Berlin Heidelberg. doi 10.1007/978-3-642-40455-9_18-1.
- McAlpine, C.A., Seabrook, L.M., **Morrison T.H.,** Rhodes, J.R. (2013) Strengthening Landscape Ecology's Contribution to a Sustainable Environment. In Fu, B., Jones, B. (eds.). Landscape Ecology for a Sustainable Environment and Culture. Dordrecht, Netherlands: Springer. 21–37.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Co-researcher on AUD 100,000 (two years) ACIAR research grant looking at the regional governance of fisheries in the Pacific. Keynote speaker at the Stockholm Environment Institute and Stockholm University Scientific Workshop in May 2017. Steering committee member on the Network of Environmental Social Scientists at the University of Queensland; people and ecosystems research program leader and a member of the scientific management committee for the ARC Centre of Excellence for Coral Reef Studies at James Cook University. Chief investigator for completed three-year AUD 837,000 grant from the Australian Research Council looking at adaptation to the impacts of sea level rise.

ROLE IN FISH

Principal Investigator: Policy and Institutions, FP2 Sustaining small-scale fisheries

DE SILVA, SANJIV

PROFILE

- 18 years of experience in natural resources governance practice research, mainly in Asia.
- Contributed to and managed multi-disciplinary teams dealing with: i) promoting local-level resource governance in Tonle Sap, Cambodia, under the Aquatic Agricultural Systems research program; ii) assessing national institutional performance in promoting water resources governance as a key climate adaptation strategy across South Asia; iii) groundwater governance liked to climate adaptation in Bangladesh; and iv) building networks and capacity supporting flood-based food production systems in the Ayeyarwadi Delta, Myanmar.
- Published over 40 peer-reviewed and other publications on natural resources governance including water governance, wetlands management and poverty reduction, and climate adaptation, with equity, gender and sustainability in food production systems as cross-cutting analytical lenses.

EMPLOYMENT

2014 to date	Researcher (Regional), Natural Resources Governance, IWMI, Sri Lanka
2012 – 2013	Researcher (National), Intuitional Analysis, IWMI, Sri Lanka
2004 – 2012	Programme Officer/Research, IWMI, Sri Lanka
2002 – 2004	Senior Programme Officer, Environmental Law Programme, IUCN, Sri Lanka

EDUCATION

1997	Master of Laws (LLM) in International Environmental Law, Nottingham University, UK
1994	Bachelor of Laws (LLB; Hons), Warwick University, UK

SELECTED RECENT PEER-REVIEWED AND OTHER PUBLICATIONS

- **de Silva, S**., Miratori, K., Bastakoti, R.C., Ratner, B.D. (In press) Collective action and governance challenges in the Tonle Sap Great Lake, Cambodia. In: Suhardiman, D., Nicol, A., Mapedza, E. 2017. *Water Governance and Collective Action: Multi-Scale Challenges*. Earthscan: London.
- Apgar, J.M., Cohen P.J., Ratner, B.D., **de Silva, S.** Buisson, M.C., Longley, C., Bastakoti, R.C., Mapedza, E. (2017) Identifying opportunities to improve governance of aquatic agricultural systems through participatory action research. *Ecology and Society 22* (1): 9. doi: 10.5751/ES-08929-220109.
- Joffre, O., **de Silva, S**. (2015) Community water access, availability and management in the Tonle Sap region, Cambodia. Penang, Malaysia: CGIAR Research Program on Aquatic Agricultural Systems. Program Report: AAS-2015-04.
- **de Silva, S**., Johnston, R., Senaratna Sellamuttu, S. (2014) Agriculture, irrigation and poverty reduction in Cambodia: Policy narratives and ground realities compared. CGIAR Research Program on Aquatic Agricultural Systems. Penang, Malaysia. Working Paper: AAS-2014-13.
- Senaratna Sellamuttu, S., **de Silva, S.,** Nagabhatla, N., Finlayson, C.M., Pattanaik, C., Prasad, N. (2012) The Ramsar Convention's wise use concept in theory and practice: An inter-disciplinary investigation of practice in Kolleru Lake, India. *Journal of International Wildlife Law & Policy* 15 (3-4): 228–250.
- Jonathan, L., **de Silva, S**., Giordano, M., Sanford, L. (2011) Putting the cart before the horse: Water governance and IWRM. *Natural Resources Forum* 35 (1): 1–8.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Contributed to a range of governance reviews for national and international organizations including the Asian Development Bank, World Bank and the Australian Centre for International Agricultural Research. IWMI representative at the Ramsar Convention's Scientific and Technical Review Panel (STRP), Member, National Wetlands Steering Committee, Sri Lanka.

ROLE IN FISH

Principal Investigator: Water and land resources management, FP2 Sustaining Small-scale fisheries

McCARTNEY, MATTHEW P.

PROFILE

- Over 20 years of experience in water, natural resources and ecosystems related research, with geographical experience in Africa, Asia and Europe.
- Contributed to and managed multi-disciplinary teams dealing with: i) decision support systems for large dams; ii) water storage and climate change; iii) agricultural and competing water use; iv) the role of wetlands in supporting livelihoods; v) hydropower; vi) malaria in the vicinity of reservoirs; vii) environmental flows; and vii) integrating natural and built infrastructure.
- More than 100 peer-reviewed publications covering hydrology, water resources, large dam planning and management, environmental impact, ecosystem services, climate change, food security and human health.

EMPLOYMENT

2017 to date	Research Group leader: Water Futures, Growth and Natural Capital, IWMI, Lao PDR
2014 to 2016	Theme Leader, Ecosystem Services, IWMI
2012 to 2014	Office Head, IWMI Southeast Asia
2002 – 2012	Researcher, Senior Researcher & Principal Researcher, IWMI (South Africa, Ethiopia and Lao PDR)

EDUCATION

1998	PhD, Wetland Hydrology, University of Reading, UK
1988	MSc, Engineering Hydrology, Imperial College, London, UK

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Matthews, N., **McCartney, M.P.** (2017) Opportunities for building resilience and lessons for navigating risks: dams and the water energy food nexus. *Environmental Progress and Sustainable Energy*. doi: 10.1002/ep.12568/abstract
- **McCartney, M.P.**, Rebelo, L-M., Senaratna Sellamuttu, S. (2015) Wetlands, livelihoods and human health. In: Finlayson, C.M., Horwitz, P. & Weinstein, P. (eds). Wetlands and human health. Netherlands: Springer, 123–145.
- **McCartney, M.P.**, Khaing, O. (2014) A country in rapid transition: Can Myanmar achieve food security? In: Sekhar, N.U. (ed). Food Security and development. Oxford, UK: Rutledge-Earthscan. 79-103.
- Lacombe, G. and **McCartney, M.P**. (2014) Uncovering consistencies in rainfall trends across India (1951–2007). *Climatic Change.* 12 (2): 287–299. doi:10.1007/s10584-013-1036-5.
- Zemaddin, B., **McCartney, M.P.**, Langan, S., Sharma, B. (2014) A participatory approach for hydrometeorological monitoring in the Blue Nile River Basin of Ethiopia. Colombo, Sri Lanka: International Water Management Institute. IWMI Research Report 155. doi:10.5337/2014.200.
- **McCartney, M.P.** (2013) Wetlands and livelihoods: The value of wetlands for livelihood support in Tanzania and Zambia (Chapter 2). In: Wood, A., Dixon, A., McCartney, M.P. (eds). Wetlands Management and Sustainable Livelihoods in Africa. Oxon, UK: Routledge-Earthscan. 43–62.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Contributed to broad-ranging reviews for national and international organizations such as the UK Department For International Development (DFID), the World Conservation Union (IUCN), the United Nations Environment Programme (UNEP), FAO and the World Bank. Steering committee member on the UNEP Dams Development Project (2002–2004). A member of the Ramsar Science and Technical Review Panel (STRP) contributing to the working groups on wetlands and agriculture, and wetlands and water resources (2007–2015). Major grants awarded: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, International Climate Initiative (€936,000); GIZ: Rethinking water storage for climate change in sub-Saharan Africa (€1.12 million); and CPWF: Improved livelihoods through dam management ($637K). Adjunct Research Fellow, Charles Sturt University, Australia.

ROLE IN FISH

Principal Investigator: Water and land resources management and ecosystem services, FP2 Sustaining Small-scale fisheries

WAHAB, MD. ABDUL

PROFILE

Aquaculture and limnology specialist:

- 35 years of experience at Bangladesh Agricultural University, Mymensingh, Bangladesh; held positions as professor, founding head of department of fisheries management, and dean of faculty of fisheries.
- Extensive research and consultancy experience in freshwater and coastal aquaculture, water quality and pond dynamics, and open water capture fisheries.
- 96 research publications in peer-reviewed journals covering aquaculture technologies, water quality and environmental impacts. 12 book chapters.

EMPLOYMENT

2014 to date	Team Leader, Enhanced Coastal Fisheries in Bangladesh (ECOFISH^{BD}), WorldFish, Bangladesh
2010 – 2012	Dean, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh
2007 – 2014	Host Country Principal Investigator, USAID CRSP & AquaFish Fish Innovation Lab, Bangladesh
1996 – 1998	Head, Department of Fisheries Management, Bangladesh Agricultural University, Bangladesh

EDUCATION

1986	PhD Aquaculture, University of Stirling, Scotland, United Kingdom
1979	MSc Fisheries Biology & Limnology, Bangladesh Agricultural University, Bangladesh

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Sahoo, A.K., **Wahab, M.A**., Phillips, M., Rahman, A., Padiyar, A., Puvanendran, V., Bangera, R., Belton, B., De, D.K., Meena, D.K., Behera, B.K., Sharma, A.P., Bhaumik, U., Mohanty, B.P., Choudhury, S.R.,Mohan, C.V. (2016) Breeding and culture status of Hilsa (*Tenualosa ilisha*, Ham. 1822) in South Asia: a review. *Reviews in Aquaculture*. doi:10.1111/raq.12149.
- **Wahab, M.A**., Nahid, Sk. A. A. M., Ahmed, M.N., Haque, M.M., Karim, M.M. (2012) Current status and prospect of farming of Giant River prawn *Macrobrachium rosenbergii* (De Man) in Bangladesh: A review. *Aquaculture Research* 43: 970–983.
- **Wahab, M.A**., Kadir, A., Milstein, A., Kunda, M. (2011) Manipulation of species combination for enhancing fish production in polyculture systems involving major carps and small indigenous fish species. *Aquaculture* 321: 289–297.
- Asaduzzaman, M**.**, **Wahab, M.A.**, Verdegem, M.C.J., Mondal, M.N., Azim, M.E. (2009) Effects of stocking density of freshwater prawn *Macrobrachium rosenbergii* and addition of different levels of tilapia *Oreochromis niloticus* on production in C/N controlled periphyton based system. *Aquaculture* 286: 72–79.
- **Wahab, M.A**., Kunda, M., Azim, M.E., Dewan, S., Thilsted, S.H. (2008) Evaluation of concurrent rice- freshwater prawn small fish culture in rain-fed rice fields in central Bangladesh. *Aquaculture Research* 39: 1524–1532.
- **Wahab, M.A**., Alim, M.A., Milstein, A. (2003) Effects of adding the small fish punti, (*Puntius sophore*), and/or mola, (*Amblypharyngodon mola*), to a polyculture of large carp. *Aquaculture Research* 34 (2): 149–164.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Development of 10 sustainable technologies in freshwater and coastal aquaculture widely practiced in Bangladesh, Nepal and Cambodia. Pioneer researcher on nutrient-rich mola fish research in the South Asia region. Led World Bank-funded Flood Action Plan-17: Fisheries project in North Central region of Bangladesh in 1992–93. Presently leading the USAID-funded Enhanced Coastal Fisheries in Bangladesh (ECOFISH^{BD}) project in Bangladesh. Major grants awarded: Environment and socioeconomic assessment of shrimp farming in Bangladesh (USD 240,000, NORAD); Sustainable Ethical Aquaculture Trade (SEAT) (USD 313,000, EU); Economic Incentives to Conserve Hilsa Fish in Bangladesh (USD 61,000, DFID's Darwin Initiative); and Enhancing Aquaculture Technologies and Adaptive Measures to Climate Impacts in Bangladesh (USD 310,000, USAID AquaFish Innovation Lab).

ROLE IN FISH

Senior Scientist – Inland fisheries ecology and management, FP2 Sustaining small-scale fisheries

KATO-WALLACE, JANE

PROFILE

Gender specialist with:

- Experience in coordinating and implementing formative research and program evaluations with partners on gender equality, masculinity and fatherhood in Latin America, sub-Saharan Africa, Eastern Europe, and Asia.
- Leadership of gender equality projects, including authoring and adapting gender-transformative methods to engage, men, boys, women and girls in gender equality.
- Skills in developing monitoring and evaluation tools to track the success of gender projects.

EMPLOYMENT

2011 to date	Senior Program Officer, Promundo-US, USA
2011 – 2012	Monitoring and Evaluation Officer, Futures Group International, USA
2011 – 2012	Gender Research Consultant, Columbia University, USA
2011	Field Research Coordinator, Columbia University, USA

EDUCATION

2011	MPH Public and Family Health, Columbia University, New York, USA
2007	BA International Relations, The American University, Washington, USA

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Kato-Wallace, J.,** Barker, G., Eads, M., and Levtov, R. (2014). Global pathways to men's caregiving: Mixed methods findings from the International Men and Gender Equality Survey and the Men Who Care study. *Global Public Health* DOI: 10.1080/17441692.2014.921829.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Experience managing large and small gender equality-related projects worth USD 8 million from both private and government donors. Previous experience developing, implementing and evaluating training workshops that promote gender-transformative methodologies and approaches. Lead teams to support the coordination of qualitative and quantitative research. Published research on the role of adolescent boys and young men in gender equality and health, and the involvement of men in caregiving.

ROLE IN FISH

Specialist – Gender-transformative approaches, FP2 Sustaining small-scale fisheries

COLE, STEVEN

PROFILE

- Expertise in social/gender inequality, food and livelihood security, nutrition, rural land tenure and labor arrangements, and masculinity and women's empowerment in small-scale fisheries.
- Experience and publication record of research in Zambia.
- 15 research publications (10 peer-reviewed) on social/gender inequality, vulnerability, food and livelihood security, nutrition and health, rural labor arrangements, small-scale fisheries, gender-transformative approaches (Google Scholar h = 6, i10 = 2, total citations = 121 at 21 June 2017).

EMPLOYMENT

2015 to date	Scientist, WorldFish, Zambia
2013 – 2014	Postdoctoral Fellow, WorldFish, Zambia
2004 – 2012	Independent consultant/research assistant (e.g. for USAID, Michigan State University, Baylor University) while pursuing PhD, USA

EDUCATION

2012	PhD Biological Anthropology, University of Arizona, USA
2004	MSc Agricultural and Resource Economics, University of Arizona, USA

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Cole, S.M.**, McDougall, C., Kaminski, A.M., Kefi, A.S., Chilala, A., Chisule, G. (In review) Piloting technical and social innovations with fish processors to shift in pathway out of the social-ecological trap in the Barotse Floodplain fishery, Zambia. *Ecology and Society*.
- Kleiber, D., Frangoudes, K., Snyder, H.T., Choudhury, A., **Cole, S.M.**, Soejima, K., Pita, C., Santos, A., McDougall, C., Petrics, H., Porter, M. (2017) Promoting gender equity and quality through the small-scale fisheries guidelines: Experiences from multiple case studies. In Jentoft, S., Chuenpagdee, R., Barragán-Paladines, M.J., Franz, N. (eds). The small-scale fisheries guidelines: Global implementation. Switzerland: Springer. 737–759.
- Rajaratnam, S., **Cole**, **S.M.,** Kruijssen, F., Sarapura, S., Longley, C. (2016) Gender inequalities in access to and benefits derived from the natural fishery in the Barotse Floodplain, Zambia, Southern Africa. *Asian Fisheries Science Journal Special Issue* 29S: 47–69.
- **Cole, S.M.**, Puskur, R., Rajaratnam, S., Zulu, F. (2015) Exploring the intricate relationship between poverty, gender inequality, and rural masculinity: A case study from an aquatic agricultural system in Zambia. *Culture, Society and Masculinities* 7 (2): 154–170.
- Longley, C., Thilsted, S.H., Beveridge, M., **Cole**, **S.M.,** Nyirenda, D.B., Heck, S., Nielsen, A-L.H. (2014) The role of fish in the first 1,000 days. *International Development Studies Bulletin* Special Collection (September): 27–35.
- **Cole, S.M.**, Hoon, P.N. (2013) Piecework (*ganyu*) as an indicator of household vulnerability in rural Zambia. *Ecology of Food and Nutrition* 52(5): 407–426.
- **Cole, S.M**. (2012) The relationship between relative deprivation and adult nutritional status in rural Zambia. *American Journal of Human Biology* 24: 800–805.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

- Leader of two research projects on aquaculture and nutrition (Irish Aid-funded project in Zambia, USD 2.5 million, and USAID-funded project in Sierra Leone, USD 3.5 million). Principal investigator for WorldFish on a multi-partner research project on postharvest fish losses and gender (IDRC/ACIAR-funded project in Zambia, CAD 1.6 million).
- Integrating (and testing) gender-transformative approaches in small-scale fisheries-focused research projects.
- Peer-review journal referee since 2011.

ROLE IN FISH

Scientist – Gender equity, FP2 Sustaining small-scale fisheries

KURA, YUMIKO

PROFILE

Natural resources management specialist with:

- 20 years of research and program management experience in fisheries policy, aquatic ecosystem services assessment and management, and biodiversity conservation, as well as engagement with government, universities, development agencies and NGOs.
- Leadership role in multi-disciplinary research and development projects in several countries in Southeast Asia and Africa, and contribution to global and regional syntheses by UNEP, FAO, World Bank and the Ramsar Convention on Wetlands.
- More than 30 research publications on water resources, ecosystems and biodiversity, and fisheries, including 17 peer-reviewed papers (Google Scholar: h = 12, i10 = 14, total citations = 5,960 at 17 July 2017).

EMPLOYMENT

2016 to date	Country Director, WorldFish, Cambodia
2005 – 2016	Regional Program Manager, WorldFish, Cambodia
1998 – 2004	Research Analyst (Senior Associate from 2001), People and Ecosystems Program, World Resources Institute (WRI), Washington DC
1997 – 1998	Independent consultant (clients – WWF, Conservation International, World Bank), Washington DC

EDUCATION

1997	MA in Environmental Science and Policy, Clark University, Massachusetts, USA
1992	BA in English Literature and Language, Aichi Prefectural University, Nagoya, Japan

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Kura, Y.,** Mam, K., Chea, S., Eam, D., Almack, K. (Under review) Conservation for sustaining livelihoods: Ecosystem-based adaptive co-management of freshwater fisheries in Cambodia. Submitted to *Ecology and Society*.
- **Kura, Y.**, Joffre, O., Laplante, B., Sengvilaykham, B. (2017) Coping with resettlement: A livelihood adaptation analysis in the Mekong River Basin. *Land Use Policy* 60: 139–149.
- Tezzo, X., **Kura, Y.**, Baran, E., Zizawah. (2016) Individual tenure and commercial management of Myanmar's inland fish resources. In Song, A.M., Bower, S.D., Onyango, P., Cooke, S.J., Chuenpagdee, R. (eds). *Inter-Sectoral Governance of Inland Fisheries*. St. John's, Canada: Memorial University of Newfoundland.
- McCartney, M.P., **Kura, Y.**, Meynell, P-J., Senaratna Sellamuttu, S., Matthews, N. (2016) Hydropower reservoirs as novel ecosystems: Adopting an ecosystems based approach for management. Proceedings of ASIA 2016, Vientiane, Laos. *International Journal on Hydropower and Dams*.
- **Kura, Y.**, Joffre, O., Laplante, B., Sengvilaykham, B. (2014) Redistribution of water use and benefits among hydropower affected communities in Lao PDR. *Water Resources and Rural Development* 4: 67–84.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Established WorldFish's in-country representation and operations in Cambodia and Myanmar, overseeing a program portfolio of USD 2–3 million/year and 20 staff. Lead role in 16 projects of various sizes (USD 300K to 7 million). Major grants awarded: Mekong fisheries and aquaculture R&D (Japan, cumulative USD 1.5 million since 2007); reservoir water management (CPWF, USD 1 million, 2010–2014); rice field fisheries enhancement (USAID, USD 7 million, 2016–2021); contributed to securing over USD 12 million in grants to WorldFish. Science focal point for CRP Water, Land, and Ecosystems. Focal point for CCAFS Climate Smart Village in Cambodia.

ROLE IN FISH

Scientist: Fisheries policy and management, FP2 Sustaining Small-scale fisheries

THILSTED, SHAKUNTALA HARAKSINGH

PROFILE

- Expertise, experience, research, academic teaching and mentorship in food-based strategies, with a focus on fish for improved food and nutrition security in low-income countries.
- Lead science direction, execution of research program, partnerships and funding strategy for the value chains and nutrition research program at WorldFish.
- Areas of work include nutrition-sensitive capture fisheries and aquaculture, nutrient-rich small fish in combating and preventing micronutrient deficiencies, and fish-based products in the first 1000 days of life.

EMPLOYMENT

2015 to date	Research Program Leader, Value Chains and Nutrition, WorldFish, Cambodia
2010 – 2015	Senior Nutrition Scientist, WorldFish, Bangladesh and Cambodia
1992 – 2009	Associate Professor (Nutrition in Low-Income Countries), Department of Human Nutrition, Faculty of Life Sciences, University of Copenhagen, Denmark
1991 – 1992	Associate Professor, Department of Production Physiology and Human Nutrition, The Royal Veterinary and Agricultural University, Denmark

EDUCATION

1980	PhD in Physiology of Nutrition, Department of Animal Science, The Royal Veterinary and Agricultural University (Faculty of Life Sciences, University of Copenhagen), Denmark
1976	Postgraduate Course in Physiology of Animal Nutrition, Veterinary Faculty for FAO Fellows, The Royal Veterinary and Agricultural University, Denmark

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Bogard, J.R., Farook, S., Marks, G.C., Waid, J., Belton, B., Ali, M., Toufique, K., Mamum, A., **Thilsted, S.H.** (2017) Higher fish but lower micronutrient intakes: Temporal changes in fish consumption from capture fisheries and aquaculture in Bangladesh. PLoS ONE 12(4): e0175098. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0175098
- **Thilsted, S.H.**, Thorne-Lyman, A.L., Subasinghe, R., Webb, P., Bogard, J.R., Phillips, M.J., Allison, E.H. (2016) Sustaining healthy diets: The role of capture fisheries and aquaculture for improving nutrition in the post-2015 era. doi: 10.1016/j.foodpol.2016.02.005.
- Béné, C., Arthur, R., Norbury, H., Allison, E.H., Beveridge, M., Bush, S., Campling, L., Leschen, W., Little, D., Squires, S., **Thilsted, S.H.**, Troell, M. (2016) Contribution of fisheries and aquaculture to food security and poverty reduction: Assessing the current evidence. *World Development* 79: 177–196.
- Fiedler, J., Lividini, K., Drummond, E., **Thilsted S.H.** (2016) Strengthening the contribution of aquaculture to food and nutrition security: The potential of a vitamin A-rich small fish in Bangladesh. *Aquaculture* 452: 291–303.
- Bogard, J.R., **Thilsted, S.H.**, Marks, G.C., Wahab, M.A., Hossain, M.A.R., Jakobsen, J., Stangoulis, J. (2015) Nutrient composition of important fish species in Bangladesh and potential contribution to recommended nutrient intakes. *Journal of Food Composition and Analysis* 42: 120–133.

OTHER EVIDENCE OF LEADERSHIP, MANAGEMENT AND DELIVERY

Leader and technical advisor of global (UN, HarvestPlus) and national (Denmark, Bangladesh, Kenya) advisory bodies on food and nutrition security, e.g. member, technical advisory committee, USAID Nutrition Innovation Lab. Project leader for several WorldFish-led projects within fisheries and nutrition in Africa and Asia, with funding from multiple sources, e.g. DFID, IFAD, World Bank. Guest speaker in various international forums, e.g. World Food Prize, United Nations Informal Consultative Process on Oceans and the Law of the Sea, World Aquaculture Conference 2015. Co-supervisor of postdoctoral and PhD fellows.

ROLE IN FISH

Principal Investigator: Nutrition-sensitive approaches, FP2 Sustaining Small-scale fisheries

MCDOUGALL, CYNTHIA

PROFILE

- Interdisciplinary, gender and social equity-oriented researcher and team leader with a background in systems thinking.
- Leads and supports the development and implementation of gender-integrated, strategic and transformative research across WorldFish research initiatives, including in AAS and L&FFISH, in relation to aquaculture, fisheries management, value chains and livelihood strategies, including micro-credit.
- Main research areas: gGender, community development and livelihoods, natural resource governance, social learning and adaptive collaborative management.
- Over Total number of peer-reviewed publications: 22 peer-reviewed publications including journal articles, book chapters and edited books.

EMPLOYMENT

2015 to date	Gender Research Leader, Senior Scientist, Gender & Equity Theme Leader, WorldFish, Malaysia
2013 – 2014	Independent cConsultant
2013	Researcher/Research Award Recipient, Ecosystems Approaches to Health Programme, The International Development Research Centre (IDRC), Canada
1998 – 2008	Research Fellow, Scientist and Science Associate, Adaptive Co-Management Project—Nepal Team Leader, Participatory Research and Gender Analysis Focal Point, Center for International Forestry Research (CIFOR), Indonesia & Canada

EDUCATION

2015	PhD, Knowledge, Technology and Innovation Group, Wageningen University, The Netherlands
1994	MPhil in Environment and Development, Department of Geography, Cambridge University, United Kingdom

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Kleiber, D., Frangoudes, K., Snyder, H.T., Choudhury, A., Cole, S.M., Soejima, K., Pita, C., Santos, A., **McDougall, C.,** Petrics, H., Porter, M. (2017) Promoting Gender Equity and Equality Through the Small-Scale Fisheries Guidelines: Experiences from Multiple Case Studies. In Jentoft, S., Chuenpagdee, R., Barragán-Paladines, M.J., Franz, N. (Eds.) *The small-scale fisheries guidelines; global implementation*. MARE Publication Series 13. Springer.
- Locke, C., Muljono, P., **McDougall, C**., Morgan, M. (2017) Innovation and gendered negotiations: Insights from six small-scale fishing communities. *Fish and Fisheries*. doi:10.1111/faf.12216.
- Kawarazuka, N., Locke, C., **McDougall, C.,** Kantor, P., Morgan, M. (2016) Bringing analysis of gender and social-ecological resilience together in small-scale fisheries research: Challenges and opportunities. *Ambio* 46 (2): 201–213.
- McDougall, C., Ojha, H. Forthcoming. The persistence of power in community-based natural resource management: A theoretical perspective. *Ecology and Society.*
- McDougall, C., Banjade, M.R. (2015) Social capital, conflict, and adaptive collaborative governance: Exploring the dialectic. *Ecology and Society* 20 (1).
- **McDougall, C.**, Jiggins, J., Pandit, B.H., Thapa Magar Rana, S.K., Leeuwis, C. (2013) Does adaptive collaborative forest governance affect poverty? Participatory action research in Nepal's community forests. *Society & Natural Resources* 26 (11): 1235–1251.
- **McDougall, C.L.**, Leeuwis, C., Bhattarai, T., Maharjan, M.R., Jiggins, J. (2013) Engaging women and the poor: Adaptive collaborative governance of community forests in Nepal. *Agriculture and Human Values* 30 (4): 569–585.
- Ojha, H., Paudel, N.S., Banjade, M.R., **McDougall, C.**, Cameron, J. (2010) *The Deliberative Scientist: Towards an Approach to Integrating Science and Politics in Forest Resource Governance in Nepal*.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

Successfully fundraised and led collaborative multi-year, multi-scale systems-based governance research (2000–2008). Contributed to establishment of Research Chairs in Health and Global Environmental Change in Sub-Saharan Africa (2013). Keynote presenter: *Gender and Systems Research*. International Conference on Integrated Systems and Sustainable Intensification. IITA, Ibadan, Nigeria (March 2015). Recipient of Research Award, International Development Research Centre (IDRC); Queens' College Bursary, Cambridge University; Dean's Honour Role, Trent University; Economics Letter of Recognition, Trent University; Trent University Entrance Scholarship, Trent University.

ROLE IN FISH

Gender Research Lead (Cross-cutting role)Principal Investigator: Gender, FP2 Sustaining small-scale fisheries

CHIMATIRO, SLOANS KALUMBA

PROFILE

- Senior specialist with more than 20 years' experience in research in fisheries and aquaculture administration, policy reform and project management at a senior government level.
- Conversant with fish processing, quality assurance and trade issues within the framework of regional integration and improving market access for African fish products.
- Policy advisor on fisheries and aquaculture to the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA) and the New Partnership for Africa's Development (NEPAD).

EMPLOYMENT

2017 to date	Acting Country Director (Zambia and Tanzania), WorldFish, Zambia
2014 to date	Program Manager, FishTrade Program, WorldFish, Zambia
2009 – 2014	Head of Fisheries, NEPAD Agency, South Africa
2006 – 2009	Fisheries Scientist, WorldFish, seconded to NEPAD, South Africa

EDUCATION

2004	PhD, Fisheries Science, Rhodes University, South Africa
1993	MSc, Aquaculture, University of Malawi, Malawi

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Onyango, P.O., **Chimatiro, S.**, Sumaila, R. (eds). (In press) *Accelerating Economic Growth and Food Security in Africa: The Contribution of Capture and Aquaculture Fisheries.* Springer, Mare Book Publication Series.
- Meke, P., Chimatiro, S. (In press) *The Value Chain Analysis of Domestic and Cross-Border Fish Trade in the Central African Corridor: A Case of Cameroon*. Fisheries Research.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

As Director of Fisheries in Malawi, initiated the "Save the Chambo Campaign" as Malawi's response to the World Summit on Sustainable Development (WSSD), and the Presidential Initiative on Aquaculture as Malawi's response to the African Union/NEPAD Pan-African Fisheries. Presented the action plan to the Heads of State and Governments during the Abuja Summit and was instrumental in formulating the 2005 NEPAD Fisheries and Aquaculture Action Plan. As Head of Fisheries at NEPAD, initiated and led the development of the Pan-African Fisheries & Aquaculture Policy Framework & Reform Strategy that was approved by African Union Heads of States in 2014 and supported the integration of fisheries and aquaculture in the CAADP. Significant grant awards: International Partnership for African Fisheries Governance and Trade (£9 million) and NEPAD-FAO Fish Partnership (NFFP) (USD 1.2 million).

ROLE IN FISH

Principal Investigator: Regional trade and scaling in Africa, FP2 Sustaining Small-scale fisheries

TRAN, NHUONG

PROFILE

Scientist and economics foresight modelling leader, WorldFish, Malaysia:

- Interdisciplinary (social, economic and environmental management) researcher specializing in aquaculture and fisheries development.
- Areas of work include fish supply and demand analysis & foresight modelling, fish value chain, climate change in fisheries and aquaculture.

EMPLOYMENT

2013 to date	Scientist, Sustainable Aquaculture Program, WorldFish, Malaysia
2011 – 2013	Postdoctoral Fellow, Policies, Economics and Social Science, WorldFish, Malaysia
2006 – 2011	Research Assistant, Agricultural Economics & Rural Sociology Department, Auburn University, USA
2004 – 2005	Vietnamese Coordinator, PORESSFA project funded by EC, Vietnam

EDUCATION

2011	PhD Applied Economics, Agricultural Economics & Rural Sociology, Auburn University, USA
2010	MS Rural Sociology, Agricultural Economics & Rural Sociology, Auburn University, USA
2000	MS Natural Resources and Environmental Management, Norwegian University of Life Sciences, Norway

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- **Tran, N**., Rodriguez, U.P., Chan, C.Y., Phillips, M.J., Mohan, C.V., Henriksson, P.J.G., Koeshendrajana, S., Suri, S., Hall, S. (2017) Indonesian Aquaculture Futures: An analysis of fish supply and demand in Indonesia to 2030 and role of aquaculture using the AsiaFish Model. *Mar Policy* 19: 25–32.
- Henriksson, P.J.G., Chadag, V.M., **Tran, N**., Chan, C.Y., Rodriguez, U.P., Mateos, L.D., Utomo, N.B.P., Hall, S., Phillips, M.J. (2017) Indonesia aquaculture futures: Evaluating environmental and socioeconomic potentials and limitations. *J Cleaner Prod* 162: 1482–90.
- Chan, C.Y., **Tran, N**., Dao, C.D., Sulser, T.B., Phillips, M.J., Batka, M., Wiebe, K., Preston, N. (2017) *Fish to 2050* in the ASEAN region. Penang, Malaysia: WorldFish and Washington DC, USA: International Food Policy Research Institue (IFPRI) Working Paper: 2017-01.
- Phillips, M.J., Subasinghe, R., **Tran, N**., Kassam, L., Chan, C.Y. (2016. Aquaculture big numbers. FAO Fisheries and Aquaculture Technical Paper No 601, Rome.
- **Tran, N.**, Nguyen, A.V.T., Wilson, N. (2014) The differential effects of food safety regulations on animal products trade: The case of crustacean product trade. *Agribusiness* 30 (1): 30–45.
- **Tran, N.**, Bailey, C., Wilson, N., Phillips, M. (2013) Governance of global value chains in response to food safety and certification standards: The case of shrimp from Vietnam. *World Development* 45: 325–336.
- **Tran, N.**, Wilson, N., Hite, D. (2013) Choosing the Best Model in the Presence of Zero Trade: A Fish Product Analysis. *In* J.C. Beghin (ed.) *Non-Tariff Measures with Market Imperfections*: *Trade and Welfare Implications (Frontiers of Economics and Globalization volume* 12). Emerald Group Publishing Limited. 127–148.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

- Leading foresight modelling activity in WorldFish, global futures and strategic foresight project/CRP PIM, L&F.
- Leading climate-smart aquaculture project in Vietnam, CRP CCAFS SEA office. Coordinate PORESSFA project funded by EC in Vietnam.
- Managing VIE 97/030 Project implemented in Vietnam, funded by UNDP and UNOPS.
- 2009–2010 Norman Borlaug Leadership Enhancement in Agriculture Program (LEAP) Award.
- 2006–2009 Ford Foundation International Fellowship Award.
- 2005 Australian Collaboration for Agriculture and Rural Development (CARD) program and Vietnamese government grant (500,000 AUD) for Better Management Practices Application in Aquaculture in Vietnam.

ROLE IN FISH

Principal Investigator: Scenario and foresight modelling, FP2 Sustaining Small-scale fisheries

ALLISON, EDWARD H.

PROFILE

- An interdisciplinary researcher with interests in coastal and marine social-ecological systems, particularly small-scale fisheries.
- His work is often closely linked to policy or management and development practice and spans scales from global meta-analysis, through national policy analysis to local-site case-studies.
- His recent work has focused on people's vulnerability and adaptation to climate change, the human dimensions of seafood trade, and on the links between fisheries governance, marine conservation, poverty reduction, food security and human health.
- He has extensive experience working in the tropical areas of Africa, South and Southeast Asia, and has project experience in the UK, Latin America, Oceania and the Pacific North West (US and Canada).

EMPLOYMENT

2013 to date	Professor, School of Marine and Environmental Affairs, University of Washington, USA
2011 – 2013	Senior Lecturer in Natural Resources, University of East Anglia, UK / Senior Fellow, WorldFish, Malaysia
2010 – 2011	Principal Scientist: Policy, Economics and Social Sciences, WorldFish, Malaysia
2007 – 2010	Director: Policy, Economics and Social Sciences, WorldFish, Malaysia

EDUCATION

1997	Postgraduate Certificate in University Teaching and Learning, UK Higher Education Academy, UK
1993	PhD in Fisheries Science, University of Liverpool, UK

SELECTED RECENT PEER-REVIEWED PUBLICATIONS

- Guillotreau, P., Allison, E.H., Bundy, A., Cooley, S., Defeo, O., Le Bihan, V., Pardo, S., Perry, R.I., Santopietro, G., Seki, T. (2017) A comparative appraisal of the resilience of marine social-ecological systems to mass mortalities of bivalves. Ecology and Society 22 (1): 46. doi:10.5751/ES-09084-220146.
- Kittinger, J.N., Teh, L.C., Allison, E.H., Bennett, N.J., Crowder, L.B., Finkbeiner, E.M., Hicks, C., Scarton, C.G., Nakamura, K, Ota, Y. et al. (2017) Committing to socially responsible seafood. Science 356 (6341): 912–913.
- Singleton, R.L., Allison, E.H., Le Billon, P., Sumaila, U.R. (2017) Conservation and the right to fish: International conservation NGOs and the implementation of the Voluntary Guidelines for securing Sustainable Small-Scale Fisheries. Marine Policy 84: 22–32.
- Golden, C.D., Allison, E.H., Cheung, W.W.L., Dey, M.M., Halpern, B.S., McCauley, D.J., Smith, M., Vaitla, B. (2016) Nutrition: Fall in fish catch threatens human health. Nature 534: 317–320.
- Allison, E.H., Bassett, H.R. (2015) Climate change in the oceans: Human impacts and responses. Science 350 (6262): 778–782.
- McClanahan, T.R., Allison, E.H., Cinner, J.E. (2015) Managing fisheries for human and food security. Fish and Fisheries 16 (1): 78–103.

OTHER EVIDENCE OF LEADERSHIP, PROGRAM MANAGEMENT AND DELIVERY

- Recent research grants include: principal investigator for review of access regimes in global fisheries, OPRI, Japan (USD 36,000); co-principal investigator for community resilience to harmful algal blooms, JPB Foundation (USD 500,000); and research partner for the contribution of fish to human nutrition and health in a changing climate, Wellcome Trust (total project USD 1,800,000).
- Editorial board member for *Maritime Studies* (2012 to date) and *Development Studies Research* (2013 to date).
- Expert reviewer on FAO High Level Panel on Food Security and Fisheries, FAO Voluntary Guidelines on Small Scale Fisheries Implementation Strategy (2014).

ROLE IN FISH

Senior Small-Scale Fisheries Advisor (Honorary), FP2 Sustaining Small-scale fisheries

Annex 2. Further explanatory notes regarding SLO outcome targets, assumptions, and supporting evidence

Introduction

This FP2 Addendum Annex builds on the Annex 11 in the FISH proposal, but providing further explanation of the process used in setting the CRP targets for the FP2 contributions to SLOs. Those flagship-specific SLO Targets from the FP2 text are provided in the table below.

Flagship-specific outcome targets by 2022 **PRIMARY (annual milestones included in PIM Table D)**	**Target geographies**
1 million fishery-dependent households have reduced poverty as a result of adopting improved fisheries management Addresses SLO target 1.1 and sub-IDOs: *Increased capacity to cope with shocks* *Increased livelihood opportunities (for men and women)* *Increased value capture by producers* *Enhanced capacity to deal with climatic risks and extremes* *Improved capacity of women and young people to participate in decision-making* *Gender-equitable control of productive assets and resources (and benefits in SSF)*	**Cluster 1** Solomon Islands and Tanzania (scaling investments in Philippines and Vietnam) **Cluster 2** Bangladesh, Cambodia, Myanmar, Zambia **Cluster 3** National and regional foresight and intraregional trade analyses across all countries in the Pacific region and regional trade analyses in the African Great Lakes region, Mekong Delta and Ganges-Brahmaputra Delta.
1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements Addresses SLO target 1.2 and sub-IDOs: *Increased capacity to deal with climatic risks and extremes* *Increased capacity to cope with shocks* *Increased livelihood opportunities* *Increased value capture by producers* *Improved access to financial and other services*	
2.1 million ha of aquatic and coastal marine habitat restored and under more productive and equitable management Addresses SLO target 3.3 and sub-IDOs: *Enhanced conservation of habitats and resources* *More productive and equitable management of natural resources* *Increased resilience of agro-ecosystems and communities, especially those including smallholders* *Conducive agricultural policy environment*	
Flagship-specific outcome targets by 2022 **SECONDARY (progress measured through CRP-level M&E)**	
0.3 million people, of which 50% are women, without micronutrient deficiencies as a result of increased consumption of fish sourced from small-scale fisheries Addresses SLO target 2.3	
0.6 million more women of reproductive age consuming an adequate number of food groups as a result of improvements in small-scale fisheries Addresses SLO target 2.4	

Table 2.2. (Previously Table 9) FP2 outcome targets by 2022.

FP2 SLO targets

FP2 aims to achieve significant contributions to each of the three SLOs. The SLO targets of FP2 are primarily Poverty and livelihoods (SLO 1) and Environment and ecosystems services (SLO 3), with Food and nutrition security (SLO 2) as a secondary target.

FP 2 focuses primarily on achieving the targets related to poverty alleviation and habitat restoration, but by enhancing the productivity and diversity of small scale fisheries, it will contribute to secondary targets related to nutrition—specifically those related to enhancing the micronutrient status of populations and dietary diversity of women.

The strong demand for fish by consumers across the developing world due to economic development and demographic patterns and considerable policy priority on fisheries by national governments in focal and scaling countries provide a favorable context for FP2 to pursue the SLO targets.

FP2 targets are derived from focal and scaling country assessments, building on various sources accessible to WorldFish, modelling, FAO data sets and more globally accessible information. For African countries, the targets are further informed from the priorities of the African Union, NEPAD, the Regional Economic Community and Regional Fisheries Bodies. Targets have also been subject to internal reviews within WorldFish with particular reference to W3/bilateral projects which are being implemented by WorldFish and/or partners and evidence from earlier research. We do recognize the need to improve the quality of data on small-scale fisheries. For this purpose, FP2 is collaborating with FAO and NEPAD to update the global "Hidden Harvest" publication (World Bank, 2012), providing a stronger foundation of evidence for future improvements.

Given the scale and importance of small scale fisheries globally, and within FP2 focal and scaling countries, even modest improvements in the geographic reach or efficacy of management and governance will have very significant development outcomes. Country-specific estimates of FP2 contributions to SLO targets are provided in the table below, with particular attention to focal countries and pathways to scale through scaling countries and wider influence to the regions in which we work. We also note that small-scale fishers and their families are often among the poorest and most vulnerable members of society; hence improvements in fishery management and productivity can provide important opportunities for development outcomes.

SLO target	FP2 Contribution to SLO target by country (in millions)											
	FISH CRP R&D focal countries						FP1 R&D	FP2 R&D	Scaling			
	Bangladesh	Myanmar	Cambodia	Nigeria	Tanzania	Zambia	Egypt	Solomon Is.	Asia-Pacific	Africa	Totals	Units
1.1	1 million fishery-dependent households have reduced poverty as a result of adopting improved fisheries management											Households
	0.30	0.15	0.13	0.00	0.08	0.07	0.00	0.02	0.21	0.04	**1.0**	
1.2	1.2 million people, of which at least 50% are women, assisted to exit poverty through livelihood improvements											People
	0.32	0.24	0.14	0.00	0.07	0.06	0.00	0.05	0.29	0.03	**1.2**	
2.3	0.3 million people, of which 50% are women, without deficiencies of one or more of the following essential micronutrients: iron, zinc, iodine, vitamin A, folate and B12											People
	0.14	0.04	0.01	0.00	0.01	0.01	0.00	0.01	0.05	0.03	**0.3**	
2.4	0.6 million more women of reproductive age consuming adequate number of food groups											People
	0.33	0.04	0.02	0.00	0.02	0.02	0.00	0.00	0.10	0.07	**0.6**	
3.3	2.1 million ha of aquatic and coastal marine habitat restored and under more productive equitable management											Ha. of restored ecosystems
	0.60	0.38	0.35	0.00	0.00	0.26	0.00	0.25	0.25	0.01	**2.1**	

Country-partnerships and evidence related to SLO targets
We provide some more specific supplementary information and evidence by country in support of the SLO targets provided.

In ***Bangladesh***, progress towards FP2 targets will be enabled by WorldFish's long history of extensive contact, training, and interventions throughout the country, reaching and positively influencing large numbers of rural and fisheries-oriented communities. Specifically:

- The USAID-sponsored ECOFISH project directly works with 20,000 households involved in fishing and/or small-scale fisheries value chains, primarily for hilsa and other riverine and brackish water fish species. Within ECOFISH, WorldFish is assisting the Government of Bangladesh to revise the Government *Hilsa Fisheries Management Action Plan*, which when implemented may contribute to livelihood improvements among 0.5 million poor hilsa fishers, plus poor value chain actors among the 2.5 million people involved with the hilsa value chain (Mohammed et al., 2016).

- ECOFISH is also assisting Government of Bangladesh to establish of marine protected areas, directly restoring 285,800 ha of estuarine ecosystem, providing an entry point to ensure more productive and equitable management at scale. WorldFish facilitation of the transition from research to development outcomes elsewhere in Bangladesh is built on solid experiences with several years of co-management research, that has delivered reductions in poverty among small-scale inland fishers (Khan et al., 2012)

- FP2 work in Bangladesh will build on current and recent activities involving small indigenous fish within small-scale fisheries, and nutrition education/communications work occurring alongside fish production activities. WorldFish is a partner in the consortium implementing the project "*SUCHANA: Ending the cycle of malnutrition in north-east Bangladesh*", a four year project that commenced in 2016. The project targets 250,000 poor households; WorldFish will work with 50% of these households to promote homestead pond aquaculture, community-based wetlands management, fish drying and vegetable production: 125,000 households (average household size of 5 people, one woman of reproductive age per household), 625,000 people, including 125,000 women of reproductive age will benefit directly from these interventions. We assume that 30% of people will move to sufficiency in one or more micronutrients and that all women of reproductive age will have a greater fish intake and dietary diversity, with additional effects on these indicators resulting from greater fish availability and from the adoption of technologies and approaches in non-project households. Further scaling is likely given that the partners in this project include the Government of Bangladesh, Save the Children, Helen Keller International (HKI) and local NGOs.

- *Wetland fisheries*: WorldFish is partnering in projects implemented by GoB, LGED (Local Government Engineering Department) and funded by IFAD and JICA in north-east Bangladesh to promote *community-based fisheries management in wetlands*. The number of households to be reached with nutrition-sensitive interventions: enhanced stocking of nutrient-rich small fish, nutrition education for increased fish consumption and fish drying is assumed to be 10,000 households (each household with 5 persons and one woman of reproductive age), with 50% of people reaching sufficiency in one or more micronutrients. We anticipate this activity will result in 25,000 people becoming sufficient in one or more micronutrients and that dietary diversity will improve in 10,000 women of reproductive age.

In ***Myanmar***, there are 23 million people living in rural areas and approximately half are considered landless poor. Building on our research in other geographies and the clear evidence from the literature, FP2 will impact through direct engagement with approximately 1% of the landless and boat-less poor and a further 1% targeted through our partners and scaling networks to reach a target of 0.24 M people exiting poverty through livelihood improvements by 2022. WorldFish has recently initiated new bilateral projects with several donors, including ACIAR, and has a well established the networks of national agencies, development NGOs and research partners to reach this proportion of people and fisheries in the Ayerawady delta.

In ***Cambodia***, WorldFish research on rice field fisheries management improvements during 2012-2016 reached 3,000 ha of rice field agro-ecosystems, and contributed to increased income and fish consumption in 86,000 people (PCI, 2016; Nuppun, 2016), as well as wider policy shifts by the Department of Fisheries towards investment in habitat restoration and better management of community fish refuges in rice field areas. Bilateral funding will now enable further expansion of WorldFish research across 11,000 ha of rice fields in the Tonle Sap region, directly benefiting more than 75,000 households by 2021. Significant new investments by the Government of Cambodia and EU in the fisheries sector in Cambodia provide further opportunities for scaling of FP2 research towards the projected targets.

In the ***Great Lakes region of Africa***, WorldFish research in the Fish Trade project has provided knowledge on the structure, products and values of intra-regional fish trade in four trade corridors across 21 countries, that FP2 will build on for specific interventions in the Great Lakes region (Ward, 2015). In Lake Victoria, WorldFish has partnered with the Lake Victoria Fisheries Organization (LVFO), of the East African Community to develop the strategy for the utilization and trade of the small fish dagaa (*Rastrineobola argentea*), which accounts for 55% of total fish production. Women play a critical role in small-scale fisheries in Africa (Ward, 2015) and gender transformative strategies for engagement of women developed by Cole et al. (2016) show promise and provide experience that can be directed towards development outcomes among women and youth.

In ***Zambia***, WorldFish, in collaboration with the Department of Fisheries and Irish Aid, is working in the Northern Province to design improved fisheries and aquaculture management systems. The population of over 1.2 million people in Northern Province, has a high dependency on fisheries of two large lake systems; Lake Tanganyika and Lake Bangweulu and the associated wetland ecosystems. FP2 will partner with Local Government Councils, World Agroforestry Centre and Solidaridad within the project: Sustainable Landscape Management of the Floodplains, which targets 28,000 poor households engaged in SSF in the Kafue Floodplain.

In ***Tanzania***, about 8 million people; 15% of the total population live in the coastal and riparian areas and are dependent on fisheries for their livelihoods and food and nutrition security. Recently, WorldFish has signed a MoU with the Ministry of Agriculture, Livestock and Fisheries to develop the Tanzania Fisheries Transformation Initiative (TFTI), a comprehensive program that includes river and floodplain fisheries, lake fisheries, sea fisheries, trade and emerging issues such as climate change. FP2 will engage with the Government of Tanzania and the Tanzania Food and Nutrition in SSF, fish value chains and cross-border fish trade.

In the ***Pacific***, regional FP2 partner SPC convened, with WorldFish, a meeting of the 22 Pacific Island Countries and Territories which led to the development of a regional policy for coastal fisheries management, including emphasis on equitable community-based approaches (Song et al. 2017). Together, WorldFish and JCU research provides one of the most substantial bodies of work on community-based approaches providing guidance, for example on gender-sensitive and transformative engagement approaches (e.g., Lawless et al. 2017; Schwarz et al. 2015), fisheries management (e.g., Jupiter et al., 2015, Cohen et al. 2013, Cohen and Alexander, 2013), complementary fishing technology (Albert et al. 2014, 2015) and that situate Pacific findings amidst global analyses (Cinner et al. 2012, Evans et al. 2011).

In ***Solomon Islands***, there are ca. 9991 sq km of shallow (<30 m deep) coastal habitat, and approximately 77,000 rural households. The SLO contribution target is set on the assumption that the CRP will directly engage about 5% of these households and a further 20% through our partners and scaling networks to reach a target of 20,000 households by 2022. Through this community engagement in management of coastal ecosystems, we estimate being able to impact about 25% of the coastal habitat mentioned above, reaching a target of 0.25 million ha by 2020. [1 ha = 0.01 sq km].

WorldFish already has an extensive list of partners that it works with in Solomon Islands and in the region, including the Pacific Community (SPC), which has a range of investments in fisheries and climate change adaptation. The partnership between WorldFish and SPC (guided by a long-standing MoU) will ensure this project is well-integrated into regional initiatives. Of particular note is the new key regional policy called the "New song to coastal fisheries" (SPC 2015), or the Noumea Strategy, which energizes the coastal fisheries emphasis for regional livelihoods and food security. The strategy is spearheaded by SPC, but is a product of a regional consortium of bodies under funding from the Government of Australia and endorsed by regional Ministers.

Evidence related to SLO targets in key research areas

Fisheries management practices: Capture fisheries in inland and coastal areas will, for the foreseeable future, continue to supply most of the fish consumed in the developing world (World Bank/FAO/WorldFish 2012). Globally, capture fisheries that are assessed and actively managed show clear trajectories towards improved sustainability outcomes; a recent estimate suggests "common sense" adjustments (balancing fishing effort in relation to stock productivity) in fisheries management could yield an additional 16 million tonnes of fish annually (Costello et al. 2016). Substantive gains can be made rapidly by building on the productivity of natural systems, however the challenges in translating these wins to the context of developing countries are many (Hall et al. 2013, Hilborn et al. 2015).

Coral reef fisheries: Over 400 million people in the poorest developing countries worldwide live within 100 km of coral reefs; of these, the majority live in rural settings where dependence reef resources for livelihoods and food security is high (Donner 2007). Just over a quarter of the world's small-scale fishers fish on coral reefs (Teh et al. 2013). Reef fisheries are estimated to contribute one-quarter of the total fish catch in developing countries (Jameson et al. 1995) and

reef-associated fish constitute around 10% of the fish consumed by humans (Smith 1978). Half of all coral reef fishers are in Southeast Asia; in Western Pacific island nations 68% of rural coastal population are considered to be coral reef fishers (Teh et al. 2013). Coral reefs are valued more than for any other ecosystem on earth ($350,000/ha/year; De Groot et al. 2012) supporting services of fishing, shoreline protection, tourism and biodiversity (Moberg and Folke 1999); hosting a third of the world's marine fish species (McAllister 1991). Coral reefs and the services they provides are particularly vulnerable to the effects of climate change (reefs at risk revisited), and the governance of coral reef systems exemplify the challenges of governing trade-offs economic growth, environmental stewardship and food security.

Rice field fisheries: WorldFish/ICLARM pioneered research in rice-field fisheries improvements (Halwart and Gupta 2004; Dey et al. 2005). Systems developed through this research are now being implemented on a large scale in Bangladesh and in Cambodia, two countries combining extensive flooding and rice fields, in which substantial capture production gains have been achieved. Lessons learnt are now being used to initiate rice field fisheries activities in Myanmar, in partnership with IRRI. The combination of agriculture and fisheries, in particular in the case of rice field management for increased fish production, has been largely demonstrated in Southeast Asia (Gregory 1997, Halwart and Gupta 2004; Dey et al. 2005)

Fisheries value chains. Globally, more than 220 million people participate in seafood harvesting and value chains (FAO, 2013) – 85 percent of them in the Asia-Pacific region (FAO 2014). In developing countries, small-scale fisheries post-harvest activities employ at least 82 million full-time and part-time workers; about twice as many as are directly engaged in fishing (Mills et al. 2011). While data are sparse, in FP2 focus countries there are some 1M people in Cambodia, and 1.6M people in Bangladesh engaged in SSF post-harvest livelihoods (World Bank 2012). These numbers indicate the scope of impact through value chain upgrading, connected to improved productivity that comes from better resource management. Therein lies also a challenge: contemporary markets that are effective in communication and infrastructure connect distant sources of fish supply with metropolitan areas of demand (e.g. Eriksson et al., 2015). Modern seafood sourcing networks are seen in juxtaposition as both a threat to local ecosystems (e.g. Cinner et al., 2016) and an opportunity for rural development.

Ecosystem restoration through small-scale fisheries governance: Small-scale fisheries operate over large areas such as wetlands, lakes, rivers, coral reef and lagoons. As FISH works to improve governance through management plans co-developed with national agencies, communities and other development actors, the geographic reach of impacts will be large. In setting targets for impact on ecosystems as a result of improved fisheries governance, we have made conservative assumptions based on estimates of the total ecosystems in need of restoration or better management as well as our ability to impact those ecosystems. For example, in Myanmar, we assume FISH research will contribute to restoration of 1% of Myanmar's inland freshwater in the Ayeyarwady River catchment area, or potential 0.38 million ha of aquatic ecosystems.

***Ecosystem restoration through improvement of SSF in floodplain and irrigated systems*.** Aquaculture occurs within a diverse range of aquatic agricultural landscapes in focal and scaling countries, commonly including rice fields, crop land, wetlands and low-lying deltaic land and floodplains. Restoring or maintaining ecosystem functions while optimising productivity is a critical and urgent challenge in these systems. Our assumptions for restoration are informed by AAS research on ecosystem services and sustainable intensification of aquatic systems (Attwood et al., 2016) and seek to introduce and scale improvements in productivity and ecosystem services of aquatic-agricultural systems at landscape level. Research in Bangladesh during AAS has, for example, documented improvements in rice field systems productivity and ecosystem services through introduction of fish culture (Islam et al., 2015), diversification of low lying 'ghers" (Faruque et al., 2016), introduction of fish stocking into enclosed water bodies (beels) (Victor and Pukinsis, 2014), and homestead pond culture (Humphreys et al., 2015), all of which have significant potential for scaling (Dey et al., 2013; Nahiduzzaman et al., 2015). Rice field systems, covering 10 million ha in Bangladesh alone, will be a particular target. Examples of improvements in such systems will involve improving productivity, diversity and ecosystem services through introduction of improved fish seed and management practices, waste recycling and habitat modifications, all of which have potential for ecosystem improvements through reduction in fertilizer and pesticide use, more efficient nutrient use and improved habitats for wild fish and associated fauna (Hu et al., 2016; Saiful Islam et al., 2015; Dey et al., 2013). Improvements in productivity of floodplains and associated ecosystem services will involve further development of models and scaling of recent advances in management of such ecosystems through stocking of indigenous carp species, nutritious small fish such as mola and establishment of fish refuges (Victor and Pukinsis, 2014).

Annex 3. Emerging evidence substantiating scale of outcome targeted

Introduction

This table presents selected innovations with the specific application of change mechanisms and scaling strategy that fit the innovation, the SSF system and the context-specific window of opportunity. Innovations have been selected here based on emerging evidence, from 2017 in particular, that demonstrates tracking on impact pathways towards outcome targets.

	Nature of innovation	Change Mechanisms (referencing Table 2.4)	Scaling strategy	Emerging evidence substantiating scale of outcome targeted
CLUSTER 1	Co-management models that support resilient and equitable coastal SSF Scaling to Pacific's Small Island Developing States; scaled from Solomon Islands Partners: SSF communities, national government fisheries agencies, regional technical support and education agencies, conservation NGOs	Action research with SSF communities to refine co-management (mechanism a) leads to improved food security, environmental sustainability and poverty reduction in certain locales Research designed and implemented with public sector (mechanism c) and civil society (mechanism d) to assess potential and limitations of co-management Research informs shift in fisheries policy to better integrate co-management alongside other governance models (mechanism b) Improved co-management models taken up and mainstreamed by NGOs (mechanism c) and government agencies (mechanism d)	Transparent and critical assessments guide government, donor and regional agency investment and policy around CBRM, SSF and food security Testing of novel scaling out strategies through popular media and 'lite touch' (low investment strategies to enable uptake of community-based management)innovations to accelerate spread (e.g., Orirana et al. 2017) Sharing/dissemination events through established communities of practice (e.g., LMMA networks at national or regional levels) and providers of technical support lead to widespread use of models and associated outcomes	Commitment by 22 Pacific Island Countries and regional support agencies responded to research recommendations on co-management (e.g., Song et al. 2017) to address the challenge that "90% of coastal communities do not have viable coastal fisheries management in place" In 2017 US$6 million W3/bilateral investment in co-management leveraged from progress on best practice model development and policy transitions Shifts in environment conservation investments to people-centered, community based approaches (e.g., Evans et al. 2017a, b).
	Fishing technology innovations (e.g., fish aggregating devices) lead to more productive and resilient coastal SSF Scaling in Asia-Pacific, scaling in Pacific from Solomon Islands Partners: Departments of fisheries, regional providers of technical support (Secretariat of the Pacific Community), coastal communities, NGOs	Engagement of community (change mechanism a) and government partners (mechanism c) from research design, site prioritization, research implementation, monitoring and evaluation and joint analysis Action research with fishers and coastal communities to ensure technology development complement concurrent resource management strategies e.g., (mechanism a) Action researchers with communities and fishers (mechanism a), fish traders (mechanism b) and government (mechanism c) to develop and upgrade value chains in response to shifts in product and availability	Hosting regional exchanges and learning events for collaborative analysis of fish technology models and outcomes, informed by rigorous assessments. Collaborative development of a regional model of best practice published and disseminated through national and regional networks Regional communication strategy and high profile research outputs Evidence and models directly into policy and planning dialogues and development partner meetings, alongside partners and influencing new fisheries investments in Asia-Pacific region	Ministry of Fisheries in focal and scaling countries incorporating technology innovations into policy and management systems (Bangladesh, Solomon Islands, Timor-Leste) Emerging ACIAR, EU and ADB investments to replicate and upscale fish aggregating device technology through Asia-Pacific Fish prominent in food security policy and FP2 researchers requested to partner and advise on food security initiatives (i.e., Zero Hunger Challenge, EU Food Security Coordination Group)

	Nature of innovation	Change Mechanisms (referencing Table 2.4)	Scaling strategy	Emerging evidence substantiating scale of outcome targeted
CLUSTER 2	Gender-transformative value chain innovations build resilient fishing communities in multi-functional freshwater landscapes Scaling to Great Lakes; scaling from Western Province Barotse Floodplain, Zambia Partners: fishers cooperatives, women's savings groups, market vendor's associations, University of Zambia, small-scale private sector (Nono Enterprises), Zambia Center for Communication Programs	Research on gender relations in the value chain, value chain innovations, factors/contexts for success conducted in collaboration with government and research agencies, fishers, fish traders, local NGOs (mechanism a, b, d) Action research with fishers and fish traders leads to higher values for fish products, reduction in post-harvest losses and reduced time burden for women (mechanism a) Additional capacity building with fisheries agency staff around gender, nutrition and gender sensitive livelihood and value chain development (mechanism c)	Models or best practice guidance developed through facilitated learning exchanges and collaborative, comparative analyses promotes uptake of new methods with national and regional NGO and government partners Demonstration and dissemination events attached to national and international events (agricultural shows, conventions) Employ a range of media to disseminate research findings and impact e.g., journal articles, blogs, infographic, poster and paper presentation shared with research and development partners	Dissemination event showcasing models and outcomes (developed from test in 6 fishing camps with 256 fishers, processors and traders trained; collaboration with DoF and Zambia Center for Communication Programs EU and IFAD funding commitment to post-harvest fish processing technologies and scaling to Eastern Province (Lower Zambezi) and Northern Province (Lake Bangweulu). Based on early milestones, strengthened partnership with Department of Fisheries has led to model transference to other provinces (Eastern and Northern Provinces).
	Optimizing rice field fisheries production systems Scaling to Myanmar, Lao PDR, Cambodia, floodplain regions in Sierra Leone, Malawi, Zambia; scaled from Bangladesh, Tonle Sap region in Cambodia Partners: rice farming communities, RICE, WLE, Dept. of Fisheries; Ministry of Agriculture and Irrigation; Dept. of Irrigation, Ministry of Environment Conservation and Forestry; Dept. of Meteorology and Hydrology, Yangon, Mandalay, Yezin Universities, National Water Resources Committee, MRC, FAO	Action research with rice-fish farmers to improve management design and governance models for integrated or alternate rice and fish production systems (change mechanism a) Action research with farmers to develop a range of habitat restoration approaches to enhance rice-field fisheries productivity, including creation of dry season fish refuges / micro habitats (change mechanism a) Simultaneous testing and refinements of gender sensitive/accommodating and nutrition sensitive approaches (change mechanism a, mechanism c, d) Testing multiple use of climate smart infrastructure (e.g. dry season water storage ponds and canals) including fish production, in collaboration with farmer/water user groups (mechanism a, d)	Governance, management and production innovations/best practice (outputs; manuals and policy briefs) developed jointly with local NGOs and government extension agencies Best practice models integrated into strategic planning through convened dialogue with government agencies, donors, and NGO partners Facilitation of farmer-to-farmer sharing of best practice models; study tours , exchange visits and at annual village, commune and district planning processes Cross-country (Myanmar, Vietnam, and Lao) exchange visits and analyses to determine policy and investment recommendations	Rice-field fisheries management innovations 3,000 ha and 18,000 households (Rice Field Fisheries Phase 1 Completion Report) Fish production models taken up by government, NGOs and large scale investments (e.g., the Cambodia Agriculture Value Chain program) Rice field fisheries improvement priority action in government strategies e.g., Strategic Planning Framework for Fisheries 2015-2024, National Strategy for Food Security and Nutrition 2014-2018, MoAFF Climate Change Action Plan in Agricultural Sector 2014-2018. DoF policy plan expansion of rice field fisheries across the 11,000 ha of rice fields, 75,000 HHs by 2021. Development partner/donor (e.g., EU, ACIAR, and USAID) investments in scaling out CFR through Cambodia and other countries

	Nature of innovation	Change Mechanisms (referencing Table 2.4)	Scaling strategy	Emerging evidence substantiating scale of outcome targeted
CLUSTER 3	Global syntheses of SSF nutrition and livelihood values improve fisheries and food systems policy Scaled to regional food system and fisheries policies; scaled from Bangladesh, Cambodia, Solomon Islands, Zambia cases Partners; A4NH in Bangladesh and Vietnam; FAO, Ministry of Fisheries in case study countries	New insights into diversity, scale and distribution of benefits from SSF developed in collaboration with government, regional agencies and science quality partners improve accounting of and accountability to SSF (change mechanism c, d) Findings reported in high profile publications and communications, and through strategic partnerships, contributed directly into dialogue high-level policy discourse on food systems and ocean governance (mechanism c, d) Robust, comprehensive and higher profile information and communication products on SSF leverage and guide investment made by development agencies (change mechanism d) and guide private sector investment (mechanism b)	Through partnership with FAO and associated networks findings will be incorporated into documents (e.g. FAO's SOFIA reports) of high influence to national to regional fisheries policy development and planning. New data and methodologies for capturing the benefits of SSF published and disseminated using high profile venues and outlets – mainstreaming improved fisheries M&E for Voluntary Guidelines on Securing Sustainable SSF	Outputs from *Hidden Harvests* report (FAO/World Bank/WorldFish 2012) used by global SSF CSOs in advocacy for human rights and social considerations in fisheries governance The initial) as the first document to synthesize the global benefits of SSF, cited in high-level documents including SOFIA. CSOs call for SSF information on values to be strengthened and updated 2017 multi-partner coalition established to broaden and update global synthesis and appears as an agenda item on the 2018 FAO Committee on Fisheries.
	Foresight tools and scenario analysis guide climate-smart and SSF sensitive policy reform Scaled to Africa, Asia and Pacific regions; scaled from South-East Asia and Bangladesh, Zambia Partners; CCAFS (FP1), SPC, PIM (FP1), SPC, IFPRI, ANU, national governments and regional agencies in Africa, SE Asia, Pacific region	Collaborate with national governments to collate data to disaggregate and improve SSF fisheries assessments (mechanism c) Collaborate with regional agencies (change mechanism c) to apply, and adapt IMPACT model (Rosegrant et al. 2001) to examine global and regional trends in fish supply and demand at regional scales (Mekong Delta, East Africa and the Pacific region) Interpret IMPACT model outputs for scenario development with government, regional agencies (change mechanism c), NGO and universities (mechanism d) Design, adapt and develop the Fish Sector Model with government partners to test and interpret contrasting projections for future demand and supply (aquaculture, commercial capture fisheries and SSF) (change mechanism b, c, d)	High profile publication and communications of scenarios and model outputs Presentation of model outputs and scenarios in policy session at international conferences and policy forum Presentation of model to local fisheries and aquaculture partnership platforms – in collaboration with local governments and department of Fisheries. Models and outputs shared in high profile meeting e.g., Think Tank on Intra Regional fish trade in Africa, World Aquaculture Society, ASEAN Regional Conference on Food Security – to determine SDG2 implementation, OECD-ASEAN Regional Conference on Policy to enable food security.	Early model outputs developed and taken up in policy dialogue (Tran et al 2017; Henriksson, 2017; WorldFish 2017 "*Fish to 2050* in the ASEAN Region") Moore Foundation investment in application of Fish Sector Model in Indonesia. Zambia Fish Sector Model preliminary results developed with Department of Fisheries with continued intent to use if for policy development –African Union, Think Tank on Intra Regional fish trade in Africa request for model outputs Qualitative scenario development in Pacific region well received (Amos et al. 2016) with demand from regional agencies for quantitative approaches

Annex 4. Revised PIM Table D: Flagship level: Annual milestone table

Year	Milestone description	Means of verifying *How the CRP M&E system will capture the MoVs*	For which Outcomes *(Development Outcomes / IDOs)*
2017	Completion review to design management, technology, and livelihood interventions through small-scale fisheries (SSF) in marine and inland fisheries systems in FISH focal countries (Solomon Islands)	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.1: Marine and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2018	Completion review to design adaptive management, technology and livelihood interventions through small-scale fisheries (SSF) research in marine and inland fisheries systems in FISH scaling countries (Timor-Leste, Myanmar)	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.1: Marine and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2018	Baselines established (including performance assessments to arrive at baseline estimates) in FISH focal countries, refined indicators and identify interventions	Baseline report and partner program proposals *M&E plan and M&E framework detailing the baseline design*	Baseline established for all outcomes
2019	Completion of assessments of trade-offs between sustainability, resilience, food security and wellbeing	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.1: Marine and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2019	Identification of cross-scale governance mechanisms to support the viability of interventions	Documentation of processes and outcomes of dialogue on institutional development and on viability of interventions *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP*	Development outcome 2.1: Marine and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2019	Identification and implementation of strategies to spread innovations	Evidences from diffusion of research innovations and reports based on partners program documentation *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP*	Development outcome 2.1: Marine and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2020	Adoption of co management models in focal countries, at wider-scale and policy recognition and support for complementary governance models	Flagship level field monitoring data and reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.1: Marine and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2021	Adoption of co management	Flagship level field monitoring data and	Development outcome 2.1: Marine

Year	Milestone description	Means of verifying *How the CRP M&E system will capture the MoVs*	For which Outcomes *(Development Outcomes / IDOs)*
	models in scaling countries and policy recognition and support for complementary governance models	reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	and coastal systems more sustainably managed (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2017	Completion of assessment of alternative livelihoods in select focal countries	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.2: Increased livelihood opportunities for men and women (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2018	Development and testing of preliminary models of gender-sensitive and gender transformative approaches to livelihood innovations in focal countries	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.2: Increased livelihood opportunities for men and women (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2019	Completion of dissemination of learning on alternative livelihoods through continuous engagement with learning and governance networks	Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP*	Development outcome 2.2: Increased livelihood opportunities for men and women (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2021	Wider adoption of livelihoods solutions in focal countries	Flagship level field monitoring data and reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.2: Increased livelihood opportunities for men and women (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2022	Adoption of alternative livelihoods solutions in scaling countries	Flagship level field monitoring data and reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.2: Increased livelihood opportunities for men and women (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2017	Completed assessment and	Research reports and related	Development outcome 2.3: Aquatic

Year	Milestone description	Means of verifying *How the CRP M&E system will capture the MoVs*	For which Outcomes *(Development Outcomes / IDOs)*
	refinement of governance and production models for integrated aquaculture and agriculture	publication, partner program documentation *Research output tracking in the CRP level Management Information System*	environments producing higher and more sustainable SSF yields (IDO – 2.1 million hectares of aquatic and coastal marine habitat restored and under more productive and equitable management)
2018	Completed testing and refinement of cross-scale governance mechanisms that account for impacts of external drivers and resource competition	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.3: Aquatic environments producing higher and more sustainable SSF yields (IDO – 2.1 million hectares of aquatic and coastal marine habitat restored and under more productive and equitable management)
2018	Completed understanding of trade-offs between SSF, infrastructure and land use	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.3: Aquatic environments producing higher and more sustainable SSF yields (IDO – 2.1 million hectares of aquatic and coastal marine habitat restored and under more productive and equitable management)
2019	Wider-adoption and application of governance and production models for in freshwater systems	Flagship level field monitoring data and reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.3: Aquatic environments producing higher and more sustainable SSF yields (IDO – 2.1 million hectares of aquatic and coastal marine habitat restored and under more productive and equitable management)
2018	Completion of assessments of trade-offs between sustainability, resilience, food security and wellbeing	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.4: Food and nutrition enhanced in SSF systems (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2018	Completion of assessment of SSF functions for food security, poverty alleviation and threats	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.4: Food and nutrition enhanced in SSF systems (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2019	Completed production of a series of key regional and global and multi-case syntheses and methods on SSF within fish food systems,	Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP*	Development outcome 2.4: Food and nutrition enhanced in SSF systems (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2018	Completed production of new knowledge on gender barriers and implications in fisheries-dependent communities, surfacing hidden micro-level barriers to equality in fisheries management and innovation	Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP*	Development outcome 2.5: More gender-equitable resource access, control of assets and benefits in SSF (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2019	Completed assessments of gender	Research reports and related	Development outcome 2.5: More

Year	Milestone description	Means of verifying *How the CRP M&E system will capture the MoVs*	For which Outcomes *(Development Outcomes / IDOs)*
	rights, and access and gender and equity barriers to participation in co-management assessed	publication, partner program documentation *Research output tracking in the CRP level Management Information System*	gender-equitable resource access, control of assets and benefits in SSF (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2020	Wider application of management models, technologies and livelihood solutions that promote equitable resource access and benefits	Flagship level field monitoring data and reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.5: More gender-equitable resource access, control of assets and benefits in SSF (IDO – 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements)
2018	Establishment of partnerships and networks that span communities, national agencies and government bodies	Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP*	Development outcome 2.6: Public sector, civil society, development agencies have increased capacity to plan for and support SSF rights, access and outcomes (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2019	Completed capacity building measures for national and regional institutions to implement SSF guidelines and SSF gender sensitive policies.	Pre and post capacity assessment data, analysis of policy statements and policy and program content, Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP; Research output tracking in the CRP level Management Information System; Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.6: Public sector, civil society, development agencies have increased capacity to plan for and support SSF rights, access and outcomes (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2020	Raised visibility of SSF functions in cross sectoral NGO and public sector policies	Flagship level field monitoring data and reports, partner program monitoring reports, Secondary data and reports on this aspect, External evaluation reports *Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.6: Public sector, civil society, development agencies have increased capacity to plan for and support SSF rights, access and outcomes (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)

Year	Milestone description	Means of verifying *How the CRP M&E system will capture the MoVs*	For which Outcomes *(Development Outcomes / IDOs)*
2018	Completed assessments of Impacts of intra-regional and global trade patterns and policies on the pro-poor functions of SSF	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.7: SSF accounted for in planning and policy for infrastructure development, markets and trade (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2018	Completed foresight analysis of in focus countries environmental change on SSF performance	Research reports and related publication, partner program documentation *Research output tracking in the CRP level Management Information System*	Development outcome 2.7: SSF accounted for in planning and policy for infrastructure development, markets and trade (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2020	Achieving a status when National and regional water management, infrastructure and land-use policies accounted for SSF rights and access	Pre and post capacity assessment data, analysis of policy statements and policy and program content, Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP; Research output tracking in the CRP level Management Information System; Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.7: SSF accounted for in planning and policy for infrastructure development, markets and trade (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)
2022	Achieving a status when SSF functions accounted for in implementation of water management, infrastructure and land-use policies	Pre and post capacity assessment data, analysis of policy statements and policy and program content, Learning products and related publications, documentation of learning events and dialogues organised *Process monitoring mechanisms in research and research-uptake processes initiated /catalysed by the CRP; Research output tracking in the CRP level Management Information System; Outcome monitoring and shared learning workshops /internal reviews; Centre Commissioned External Reviews or External Evaluation commissioned by Independent Evaluation Arrangement in CGIAR*	Development outcome 2.7: SSF accounted for in planning and policy for infrastructure development, markets and trade (IDO – 1 million fishery-dependent households have reduced poverty as a result of adopting fisheries management)

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