



Resilient Aquatic Food Systems for Healthy People and Planet

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Proposal

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Note to readers: Please use the hyperlinks throughout the proposal for definitions, abbreviations, partners, references, etc.

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Summary table

Initiative name	Resilient Aquatic Food Systems for Healthy People and Planet
Primary Action Area	Resilient Agrifood Systems
Geographic scope	Southeastern Asia and the Pacific (SEA) – <i>Cambodia, Myanmar, Solomon Islands, Timor-Leste</i> Eastern and Southern Africa (ESA) – <i>Zambia, Malawi, Kenya</i> Western and Central Africa (WCA) – <i>Ghana, Nigeria</i> South Asia (SA) – <i>Bangladesh, India</i>
Budget	US\$35 million

1. General information

Initiative name: Resilient Aquatic Food Systems for Healthy People and Planet (RAqFS)

Primary CGIAR Action Area: Resilient Agrifood Systems

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Table 1 – Initiative design team

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Total	34M/31F	54 CGIAR/10 non-CGIAR	

2. Context

2.1. Challenge statement

Aquatic foods are an important and growing component of the global food system and provide benefits to all five CGIAR Impact Areas (Figure 1). These realized and potential benefits are, however, threatened by multiple stressors, including:

- Overharvesting of wild aquatic food stocks and poor governance of aquatic commons, leading to marginalization of traditional and indigenous fishers;
- Inequities in supply-chains, including from competing demands for aquatic foods in globalized markets¹
- Vulnerabilities of coastal and riparian communities and aquatic ecosystems to climate change²
- Degradation and destabilization of aquatic ecosystem productivity, biodiversity and carbon-sequestering functions arising from pollution, land use change, and competition for water, space and resources^{3,4};
- Aquatic animal diseases that destabilize production - and antimicrobial resistance⁵;
- Supply chains inefficiencies⁶ and disruptions from COVID-19⁷, natural hazards and political and economic instabilities^{8,9}; and
- Underinvestment in breeding aquatic animals for improved growth, feed conversion efficiency and climate resilience^{10,11}.

Investing in effective aquatic food system (AqFS) governance, informed by research, can address these threats by eliminating the key systemic challenges facing the sector, offering transition pathways to a more just, nutritious, healthier, lower-carbon, and climate-resilient food system^{12,13}. We have identified, from 30 years of CGIAR work on AqFS and extensive review and consultation (Sections 2.3., 2.4. and 2.6.), **five systemic challenges** that must be tackled to build the resilience of aquatic food systems and realize their full potentials in delivering a triple win for nature, people and climate (Section 5). These are:

- 1) Lack of data (or access to it) has curtailed informed policy and investment decision making, resulting in undervaluation of and underinvestment in the sector by both public and private sectors (WP1);
- 2) Power asymmetries characterize current relationships/partnerships in AqFS. Partnerships with farmers often fail to consider the interests of stewards of the aquatic commons. Partnerships also don't cross over into wider food systems and ocean-economy policy spaces, leaving AqFS actors marginalized in development programs and "blue economy" processes (WP2);
- 3) Aquatic foods have great potential to enhance water productivity, provide nutritious food, income and employment opportunities, contribute to climate change mitigation and restoration of land-water systems – but are often overlooked in water resource management – both a lost development opportunity and an existential threat to wetland livelihoods (WP3);
- 4) Genetic improvement programs in agricultural research have focused on crops and livestock and there has been limited investment in the development/promotion of farmed fish varieties with the potential to minimize environmental impacts, reduce GHG emissions and increase profitability for small-scale farmers (WP4); and
- 5) While there are many potential solutions to AqFS challenges and innovations to seize opportunities, these have not been scaled because national Agricultural Innovation

Systems (AIS) don't extend to aquatic foods and the AIS approach hasn't been much used in the AqFS (WP5).

There is an order-of-magnitude underinvestment in solutions-focused research in aquatic foods, relative to other major components of the global food system^{14,15}. resulting in a range of promising institutional and technological innovations that have not yet been scaled. Here we propose a systems-science informed research program that uses five levers of change – data-driven decision-making, novel cross-sectoral partnerships, integrated land-water-foodscape planning, productivity-enhancing technologies, and innovation laboratories – to drive change in the sector while building the capacity of national innovation systems.

AQUATIC FOODS: PRIORITY INVESTMENT IN AGRICULTURAL RESEARCH

CGIAR
Resilient Aquatic Food Systems for Healthy People and Planet

DEFINITION
Aquatic foods derive from over **3000** species of animals, plants and microorganisms grown in or harvested from water.

BIG FACTS

- Provide micronutrient-rich foods for **3.3 billion people**.
- 800 million people** depend on small scale fisheries and aquaculture for their livelihoods.
- 1 in every 2 workers** in the primary and secondary sector of fisheries and aquaculture are women. They are crucial to aquatic food systems, providing labour, innovative ideas and entrepreneurship.
- Aquaculture** is the fastest-growing food production sector in the world. Its production is set to increase by: **32% to 109 million tons** by 2030.
- Aquatic foods can supply essential micronutrients with **lower carbon footprint and far fewer biodiversity impacts than many land-based crops and livestock**.
- Global demand for aquatic foods has doubled since 2000. **2020**
- Aquatic foods are deeply interconnected with the rest of the food system - in human and livestock diets, supply chains, and water systems.
- Long-neglected in food policies and agri-food R&D investments, Aquatic Foods have gained recent prominence, with the **High-Level Panel of Experts and Scientific Group of the 2021 UN Food Systems Summit** identifying AqFS as one of seven priority investments in agricultural research.

POTENTIAL
Partnership-based science and innovation in aquatic food system offer transition pathways to food system that will be:

- Just
- Nutritious
- Healthier
- Socially inclusive
- Climate-resilient
- Gender-equitable
- Lower-carbon emitter

2.2. Measurable 3-year (end-of-Initiative) outcomes

By the end of the Initiative (Q1 2025), the following Work Package level and overall Initiative level outcomes will be achieved:

- Availability, access and utilization of AqFS data (including databases and indexes) in 11 countries is enhanced resulting in **evidence-based policy formulation and/or reform and investment decisions** in at least five countries.
- Novel and transformed partnerships across sectors and levels of governance will lead in inclusion of demands/interests of small-scale aquatic food producers thereby **securing rights and livelihood benefits** for 100,000 small-scale actors in island food systems (Solomon Islands, Timor-Leste) and the Bay of Bengal (Bangladesh, India) bringing **healthier and more nutritious diets** (that include aquatic foods) to 700,000 individuals (at least 50% of whom are women) relative to the baseline.
- Adoption of rice-fish integrated production system by at least 5,000 households in Myanmar and the integration of fisheries and irrigation benefits directly to 5,000 households in Ghana. It creates **employment opportunities and improves nutrition** for 50,000 households in both countries. In Zambia and Cambodia, **improved governance** of 50,000 hectares of multifunctional water and land systems supports **healthier ecosystems** (fish stock restoration +25%).
- Improved performance of tilapia, carp and catfish strains demonstrate **increased productivity** (+30% increase in profitability) and **environmental performance** (-25% GHG emission reduction). New **public-private partnerships** provide a network (at least one major node per country engaging with 20–60 SMEs and 2,000 farmers) for delivery of improved strains in Nigeria, India and Bangladesh.
- Aquatic food system hubs are operational in Solomon Islands, Bangladesh and Zambia and **increase national innovation systems' ability to identify, evaluate and scale socio-technical innovations**.

2.3. Learning from prior evaluations and impact assessments (IA)

RAqFS builds on learning from previous CGIAR research programs (e.g., [FISH](#), [WLE](#), [L&E](#), [AAS](#)) and numerous large-scale CGIAR-managed bilateral projects in Africa, Asia and the Pacific. Lessons from evaluations and impact assessments of these programs, and from recent high level research syntheses (e.g., the [Blue Food Assessment](#), [Illuminating Hidden Harvests](#)), inform and enhance the effectiveness of the proposed research and scaling approaches. These approaches include:

- Recognizing the importance of a highly inclusive and participatory initiative design process that foregrounds diverse perspectives and demand from partners spanning a mix of geographies, sectors, and disciplines.
- Integrating learning from the CGIAR's pioneering work on gender transformative approaches in fisheries and aquaculture across all Work Packages and activities.
- Integrating and leveraging from CGIAR's adaptive scaling of agricultural innovation (e.g., farmer-led irrigation, solar-powered technologies for water security, etc.) in sub-Saharan Africa.
- Fostering and growing longstanding partnerships that support natural resource governance and management of multi-functional landscapes¹⁶. while expanding nutrition and health-education-gender partnerships to enhance reach and impact.

- Heeding growing critiques of “fly in, fly out” research and increasing calls to “decolonize” agricultural research by seeking to leverage inputs from the Global North while creating spaces for partners from the Global South.
- Capitalizing on experience from over 20 years’ research on delivery of improved fish strains by expanding the range of species and geographies covered^{17,18,19}.
- Harnessing the growing prominence of aquatic food systems in recent high-profile research and policy forums (e.g., UN Food Systems Summit 2021, COP26, World Food Prize 2021, Arrell Food Innovation Award 2021, BFA) to leverage funding and scale impact.

A synthesis of key impact evaluation study findings in the above domains is in [Annex 2.3](#).

2.4. Priority-setting

The proposal design draws on three complementary systems perspectives: (1) identifying and supporting the properties of complex, adaptive systems that make them resilient; (2) identifying levers of change to make “deep change” in systems; and (3) using socio-technical transitions theory to learn how “niche innovations” are scaled to make large-scale changes in food systems²⁰.

We derived research questions and methods building from these conceptual framings, extensive literature reviews, and national and regional multi-stakeholder consultations (Sections 2.3 and 2.6). Insights from consultations conducted in 2019–2020 during development of the WorldFish 2030 Research and Innovation Strategy²¹ were also incorporated, as were insights from preparatory work for major proposals including the Two Degrees Initiative’s Blue Challenge in the Pacific and the Great Lakes of Africa, and the Fish for Africa Innovation Hub. Our approach also builds on learning from MELIA studies from CGIAR CRPs including FISH and WLE. Recent high level multi-stakeholder research syntheses, notably the [UN Nutrition paper on Aquatic Foods for sustainable healthy diets](#), [Blue Food Assessment](#), and national and regional consultations for the UN Food Systems Summit 2021 also inform the choice of priority actions.

Chosen **geographies** reflect an analysis of where aquatic foods contribute most to food consumption, employment, trade and resource rents, where aquatic foods are most important to the supply of micronutrients and essential fatty acids in diets of nutritionally vulnerable people²²,²³ and where impacts of climate change are projected to be among the highest in the world²⁴.

In selecting aquatic food **systems** for inclusion, our guiding principle was that the distinctive strength of AqFSs is their diversity, including in terms of; production technologies, species, food products, scales of operation, markets and product price-points, micronutrient composition, actors, and governance arrangements²⁵. We focus on small-scale capture fisheries and small and medium enterprise (SME) aquaculture, as well as SMEs in the supply chains that support these producers. These people account for 90% of actors engaged in aquatic food systems worldwide and dominate the supply of aquatic foods to nutritionally insecure consumers with a cultural history of aquatic foods consumption²⁶. Efforts to build RAqFS require a shift from traditional “single issue” or “magic bullet” approaches to approaches that simultaneously address multiple systemic challenges including market linkages, institutions, policies, and power structures, to achieve impact at scale, across all five CGIAR Impact Areas.

In terms of **crops** we prioritize tilapia, carps and catfish in aquaculture because they account for 84% of all farmed fish produced worldwide and have well-established production systems and high demand. We also have added novel focus on introducing and scaling production of nutrient-

dense small fish through aquaculture. In capture fisheries, we focus on inland and nearshore environments where the majority of fish in our target geographies are harvested.

In **partnership** modalities, the CGIAR Independent Science for Development Council (ISDC) has highlighted research legitimacy and effectiveness as historical areas most challenging for CGIAR centers to mainstream into planning management and practice²⁷. Impact at scale is more likely when organizations, hosting institutions or collaborating associations are participating on equal terms^{28, 29}. The Initiative thus understands co-producing partnerships as crucial impact pathways for sustainability outcomes³⁰.

2.5. Comparative advantage

- **R4D.** Little private research on aquatic foods contributes to meeting the SDGs. Most development-oriented aquatic foods research therefore takes the form of public goods or public-private partnerships. Few universities working on aquatic foods integrate development perspectives, multidisciplinary technical expertise and systems orientation in the same way as the CGIAR. CGIAR entities are competitive with top global fisheries and aquaculture universities in terms of research excellence, and our partnerships incorporate most leading researchers and institutions working in this field. The CGIAR has a strong track record of agenda setting and innovation, including the World Food Prize 2021, awarded to a CGIAR researcher for aquatic foods research, and 2012 Stockholm Water Prize awarded to IWMI.
- **In-country partnerships.** The CGIAR has long-term partnerships and unique institutional embeddedness in the countries where we work, a diverse workforce, a strong track record of implementing systems-oriented research programs, and pipeline of relevant research, innovation and policy uptake. RAqFS is a partnership between five CGIAR entities combining technical expertise on aquatic food, water systems and policies and diverse partners operating at multiple scales to support research excellence, implementation and uptake. This partnership is positioned to act as a knowledge broker to bridge disciplines, sectors, power relations, and geographies in the service of agrifood system resilience.
- **For and by the Global South.** In a context where most other leading aquatic foods research centers are located in the “Global North” and increasing calls to “decolonize” agricultural research³¹, RAqFS will leverage inputs from the Global North while creating spaces for AqFS actors and researchers from the “Global South” to set the agenda.

2.6. Participatory design process

The RAqFS IDT engaged actively in intensive stakeholder consultations from July 2021. The IDT facilitated **national consultations** in Bangladesh, Cambodia, Myanmar, Ghana, India and Zambia. Where possible, consultations were coordinated with other IDTs. These efforts involved over 150 stakeholders, including representatives of NARS, the private sector, NGOs, and government agencies and ministries. Consultations aimed to: (i) Identify priorities as set by national institutions; (ii) Identify existing policies and programs aligning with RAqFS; (iii) Provide an opportunity for stakeholders to express expectations on the RAqFS Initiative; and (iv) Identify partners to be again engaged during the inception phase. Reports from these events are provided in [Annex 2.6.A](#) and letters of support are available in [Annex 2.6.B](#). These consultations between the IDT and national partners allowed for adaptive and participatory design benefiting from the expertise and knowledge of multiple stakeholders. This consultative process will be continued

during the Initiative inception and implementation phases. Consultations were augmented by a desk review of key policy documents from all the focus countries of the RAqFS Initiative to ensure alignment of projected outputs and outcomes with national priorities ([Annex 2.6.A](#)).

The RAqFS Initiative design also integrated findings from **stakeholder engagement** conducted as part of other related activities. These included sessions organized at the World Water Week in August 2021 on fish-rice production systems and fish-friendly irrigation. Similarly, thematic sessions on aquatic foods were organized as side events and dialogues at the World Food Prize 2021, UN Food Systems Summit 2021 and COP26. These thematic events were used to solicit priority setting for the future scope of work from a broader and international audience.

The participatory design of the RAqFS proposal also builds on multiple ongoing **bilateral projects and partnerships** and a long legacy of multi-stakeholder integrated planning. For example, in Bangladesh generations of USAID-funded aquaculture and capture fisheries^{32,33}, and current discussions on the integration of fisheries and irrigation in the Mekong with ACIAR.

The Initiative Design team (IDT) is comprised of five CGIAR entities and a non-CGIAR reference group of experts who have played a central role in the design of the RAqFS and contributed technical and geographical expertise. This reference group includes eminent scientists from multiple disciplines, donor representatives, and leaders from national and regional institutions (Table 1). Work Package (WP) coordinators organized thematic discussions and led the development of the WP activities and Theory of Change (TOC) with support staff from different centers. Finally, a core writing team comprised of CGIAR scientists and support staff from two centers synthesized this participatory design process into the proposal.

2.7. Projection of benefits

RAqFS focuses on research-for-development to catalyze scaling of transformative innovations, policies and approaches to support aquatic foods in delivering more sustainable and healthy diets and livelihoods, within planetary boundaries. Thus, the RAqFS projected benefits have been derived from the number of people benefiting from RAqFS (CGIAR) innovations by 2030. RAqFS works through five Work Packages bundled together to deliver socio-technical innovations and policy actions that deliver benefits to all five One CGIAR Impact Areas. Apart from WP1 (which includes Kenya and Malawi) RAqFS will work mainly in Bangladesh, Cambodia, Ghana, India, Myanmar, Nigeria, Solomon Islands, Timor-Leste and Zambia. Therefore, the projection focuses on these nine countries, without considering spillover effects on other geographies resulting from global actions and policy co-developed with stakeholders.

The benefits, summarized in Table 2.7, are derived directly from the RAqFS ToC and related impact pathways. Contributions of each partner and stakeholders, as well as synergies with other CGIAR Initiatives in each geography were also considered as key elements influencing the magnitude of expected impacts.

The indicators selected for the different Impact Areas are:

1. Nutrition, Health and Food Security: **#people meeting minimum micronutrient requirements;**
2. Poverty Reduction, Livelihoods and Jobs: **#people benefiting from relevant CGIAR innovations;**
3. Gender equality, youth & social inclusion: **#women #people benefiting from relevant CGIAR innovations;**

4. Climate adaptation and mitigation: **#tonnes CO₂ equivalent emissions**; and
5. Environmental health & biodiversity: **#ha under improved management**;

RAqFS projected benefits methodology is fully described in the [Annex 2.7](#).

Conservatively, RAqFS expected benefits per Impact Area by 2030 are: 4 million people meeting their minimum micronutrient requirements; 7 million people benefiting from CGIAR innovations; 3.5 million women benefiting from CGIAR innovations; reduction of 5.28 MT CO₂ eq./y; 3.85 million hectares brought under sustainable management.

We anticipate synergies with other Initiatives as per our TOC. However, we have not estimated contribution or attribution, nor additional impacts from these synergies. We will further develop the synergies and factor these into future projections during the inception phase.

The COVID-19 pandemic has affected most countries, with severe impacts on the global economy. RAqFS projected benefits are developed on data which are mostly collected prior to the pandemic. Therefore, in making our estimation we assume that despite a significant disruption in the short run for production, consumption and trade, there will be a recovery from 2022³⁴.

Table 2.7 – Projected benefits of RAqFS by 2030

Impact Area	Breadth	Depth	Probability
Nutrition, health & food security #people meeting minimum micronutrient requirements	~200,000 people benefiting from a transformative impact by 2030 ~3,800,000 people benefiting from a significant impact by 2030	Transformative: severe disability prevented Significant: 10% permanent impact on income	Lower
Poverty reduction, livelihoods & jobs #people benefiting from relevant CGIAR innovations	~1,000,000 people benefiting from a transformative impact by 2030 ~6,000,000 people benefiting from a significant impact by 2030	Transformative: 100% permanent impact on income Significant: 100% of annual income or 10% permanent impact on income	Lower
Gender equality, youth & social inclusion #women benefiting from relevant CGIAR innovations	A total of ~3,500,000 women benefiting from a significant impact by 2030 ~1,750,000 people benefiting from a substantial impact by 2030	Substantial: The different needs of men and women are identified and differentially met	Lower
Climate adaptation & mitigation #tonnes CO ₂ equivalent emissions	~4.8 million MT of farmed fish will be produced with a 25% reduction in CO ₂ -emission => this will save 5.28 MT CO₂-eq/year	No depth category required	Medium
Environmental health & biodiversity #ha under improved management	3.85 million hectares brought under sustainable management	Significant	Medium

2.7.1 Nutrition, health, and food security

Micronutrient deficiencies account for one million premature deaths and countless severe disabilities worldwide annually^{35, 36}. AqFs improve human health by reducing micronutrient (for example, vitamin A, calcium and iron) deficiencies that can lead to subsequent disease and death^{37, 38, 39}. In RAqFS target countries there is a notable inadequacy of micronutrient intakes, however the nutrients from aquatic foods produced can help to meet the dietary requirements for these populations and could be particularly impactful for pregnant and lactating women and children under five years of age^{40, 41, 42, 43}. RAqFS Innovation Packages will increase production of aquatic foods and help to tackle the predicted aquatic foods supply gap of about 34 million MT in target countries by 2030⁴⁴.

Our projected benefits focus on adoption of RAqFs innovations to increase AqFs production in target countries^{45, 18}. With reference to the average level of malnourishment by target country^{46, 47} we estimate that increased production supported by RAqFS innovations can provide micronutrient adequacy to 4 million people in target countries. Based on current statistics on prevalence of anemia among pregnant women⁴⁸, we estimate the number of children and pregnant and lactating women in target countries. We then estimate that RAqFS nutrition sensitive innovations (i.e., carp-mola polyculture)⁴⁹ can provide micronutrient adequacy and have a transformational effect for 200,000 children and pregnant and lactating women as they consume AqFs^{50, 51, 52, 53, 54, 55, 56, 57}.

Despite the plausibility of our TOC and the strong trend of demands for aquatic foods in target countries, we believe we introduced some additional uncertainty due to the adoption of key innovations which will require to be further investigated at country level. In our estimations we included information about AqFs demand, while we did not consider price elasticity and national/international competition or alternatives offered by imports^{58, 59, 60}. Based on all this, we think that our estimation is a reasonably balanced probability assessment of “low certainty.” As we progress through implementation, we would anticipate this uncertainty to fall, and so our assessment of probability of success to increase.

2.7.2 Poverty reduction, livelihoods and jobs

In target countries, there are more than 70 million people (50% women) involved in the production and distribution of AqFs⁶¹ (estimation on census data and FAO, 2020) that could benefit from RAqFS innovations. Based on the evidence documenting the dissemination of aquaculture and fishery innovations, we estimate that RAqFS innovations, such as improved fish strains^{62, 63} and farming practices^{64, 65, 66, 67} and natural resource management^{68, 69, 70} can provide benefits to at least 10% of farmers and fishers in the target countries (7 million people). By considering the benefits associated with aquaculture and fishery growth, in terms of income, employment, new jobs in value chains and services, and increased contribution to fish consumption^{71, 72, 73, 74, 75}, and the current level of poverty in the target countries⁷⁶ – Poverty Index (ratio) between 0.1 to 0.3⁷⁷ – the adoption of RAqFS innovations can support a transformational change for 1 million people (15% of 7 million) – i.e., 10% permanent impact on income.

Despite the strong growth of aquaculture and fisheries, uncertainty remains about the extent of adoption of key innovations by poor actors and their access to jobs created in the food system in the specific geographies. Therefore, our probability assessment is “low certainty” considering that RAqFS will have to adopt key actions and approaches to ensure successful delivery of innovations to farmers and people living in poverty. As we progress through implementation, we anticipate our assessment of confidence in success to increase.

2.7.3 Gender equality, youth and social inclusion

The number of women benefiting from relevant CGIAR innovations were estimated as above – i.e. 7 million people benefiting from relevant CGIAR innovations – by assuming that women comprise 50% of those formally and informally employed in aquaculture and fisheries⁷⁸. Building on recent experiences in Bangladesh, Egypt, India and Solomon Island, RAqFS research and innovations will support the specific needs of 1.75 million women benefiting from aquaculture and fisheries (substantial effect).

2.7.4 Climate adaptation and mitigation

Lifecycle assessments of aquaculture in Egypt⁷⁹, Indonesia^{80, 81} and Bangladesh^{82, 83, 84} indicate that adoption of improved aquaculture management can deliver substantial reductions in greenhouse gas emissions and improvements in water and nutrient use efficiencies. Adoption of bundles of innovations, including improved tilapia and carp strains and best management practices (BMPs), modeled through a newly developed [digital tool](#), show reduction in 22–23% in global warming potential, 32–35% of eutrophication and 18%–22% of improved water use per unit farmed fish production.^{85, 86} We estimate the total farmed fish production in target countries in 2030 to be ~40 million MT. By considering a conservative 25% as a rate of adoption of BMPs based on experience in several countries^{87, 88, 89, 90, 91, 92} and 40% adoption of improved carp and tilapia strains (total projected production of about 17.2 million MT by 2030 in target countries) we expect to reduce GHG emission in 4.8 million MT of farmed fish.

One million metric tons of global aquaculture production (excluding seaweeds) releases 7.4⁹³ to 5.5⁹⁴ MT CO₂-equivalent per million metric tons of aquaculture production per year at farm gate. We assume the lower 5.5 MT CO₂-eq. per million metric tons for this calculation. A conservative 20% reduction in GHG emissions equals 1.1 MT CO₂-eq. for every million metric tons of fish produced. This 20% reduction applied to the 4.8 million MT of farmed fish, produced by adopting RAqFS innovations, will save 5.28 MT CO₂-eq./year (0.005 GT CO₂-eq./year). Uncertainties related to the potential number of adopters of BMPs limit our probability of success to a medium level.

2.7.5. Environmental health and biodiversity

Based on census data⁹⁵, references and direct experience through bilateral investments, there are about 330,000 sq km of shallow (<30 m deep) coastal habitat and about 55,000 sq km inland habitat in the RAqFs target geographies (see WP2 and WP3) and approximately 14,500,000 people (~2.9 million households) that depend on these^{96, 97, 98, 99}. RAqFS contribution sets on the assumption that the Initiative, in close collaboration with its partners, will be able to engage about 10% of these households. This estimation is very conservative as on the basis of our recent experiences in [Solomon Islands](#), [Timor-Leste](#), [Bangladesh](#), [Egypt](#) and [Cambodia](#), where we were able to engage around 20% of households through our partners and scaling networks. This data is also confirmed to be conservative based on recent literature about scaling nature conservation initiatives¹⁰⁰. Through this community engagement in management of coastal and inland ecosystems, including deltas, we estimate being able to impact about 10% of the coastal habitat mentioned above, reaching a target of 3.85 million ha by 2030 (1 ha = 0.01 sq km). This assuming a 1:1 ratio between numbers of households reached and the area that will be subject to improved management. In the current benefit estimate, we do not include the aquaculture area under BMP–improved management. During inception we will review the estimation in order to consider context specific conditions and include the hectares of aquaculture area under improved management. Additional assumptions and uncertainties related to the current assumptions limit our probability of success to a medium level.

3. Research plans and associated theories of change (TOC)

3.1. Full Initiative TOC

3.1.1. Full Initiative TOC narrative

Our **theory of change** (TOC) is that investing in partnership-based science and innovation around five key “levers of change” will accelerate sustainability transitions in aquatic food systems to foster human nutrition and health, gender-equitable and socially inclusive (GESI) livelihoods, climate adaptation and resilience.

The **five levers** are: (1) Data for evidence-based AqFS decision making; (2) Partnerships to prevent AqFS actors’ marginalization in the blue economy and in food systems transformations; (3) Inclusion of AqFS in cross-sectoral land-water-foodscape planning; 4) Genetic improvement of farmed fish to enhance productivity, profitability and resource use efficiency; and 5) Innovation platforms to scale novel technologies.

We propose that there is no single pathway to systemic change. Transitions will require diverse public sector policies and investments (WP1, 3, and 5), market-based approaches (WP3, 4 and 5) and engagement with social movements (WP1, 2, 3 and 5). Country- and issue-specific political economy analyses will inform the mix and sequencing of approaches.

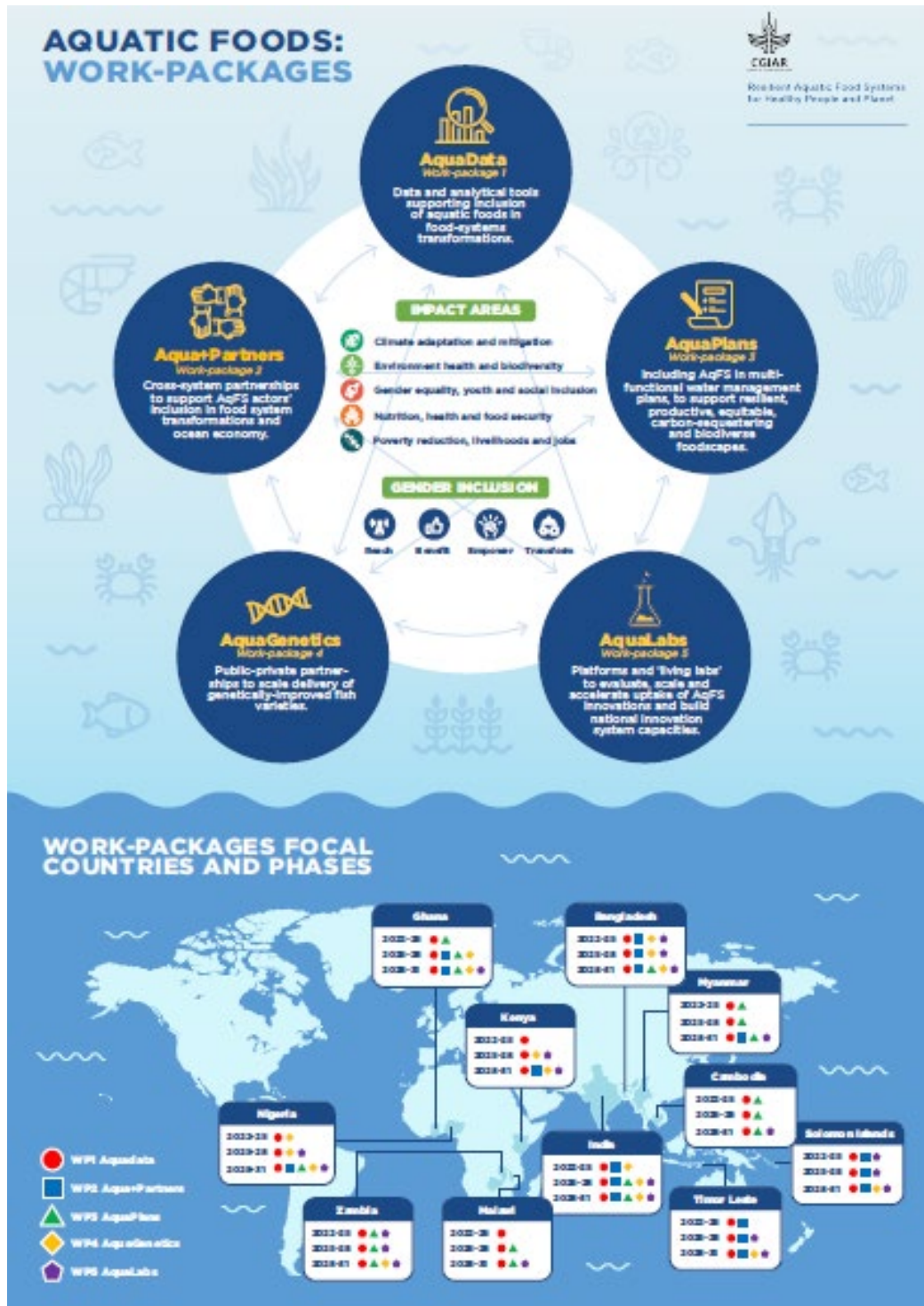
Cumulatively, WP outcomes (detailed in later subsections) will facilitate achievement of five **Eed-of-Initiative outcomes**: (1) Scaling partners and stakeholders in 11 countries use data to inform at least five evidence-based investments supporting AqFs transformation. (2) Secure rights bring livelihood benefits for 100,000 small-scale actors in AqFs in Asia-Pacific and more nutritious diets for 700,000 people. (3) GESI strategies to enhance food, livelihood, and water use outcomes in multifunctional land- and waterscapes adopted by stakeholders in two Asian and two African countries. (4) At least two tilapia, carp and catfish strains demonstrate increased productivity (+30%) and better environmental performance (-25% GHG emission reduction) in one African and two Asian countries. (5) Aquatic food system labs in three countries increase national innovation systems’ ability to identify, evaluate and scale socio-technical Innovations Packages.

These outcomes, delivered (to differing extent) in the RAqFS focus countries by Q1 of 2025, provide the foundation for a replicable aquatic food system transformation to realize the potential of aquatic food for nutrition and food security, poverty reduction, gender equality and youth inclusion, climate adaptation and environment health and biodiversity (2025–2030).

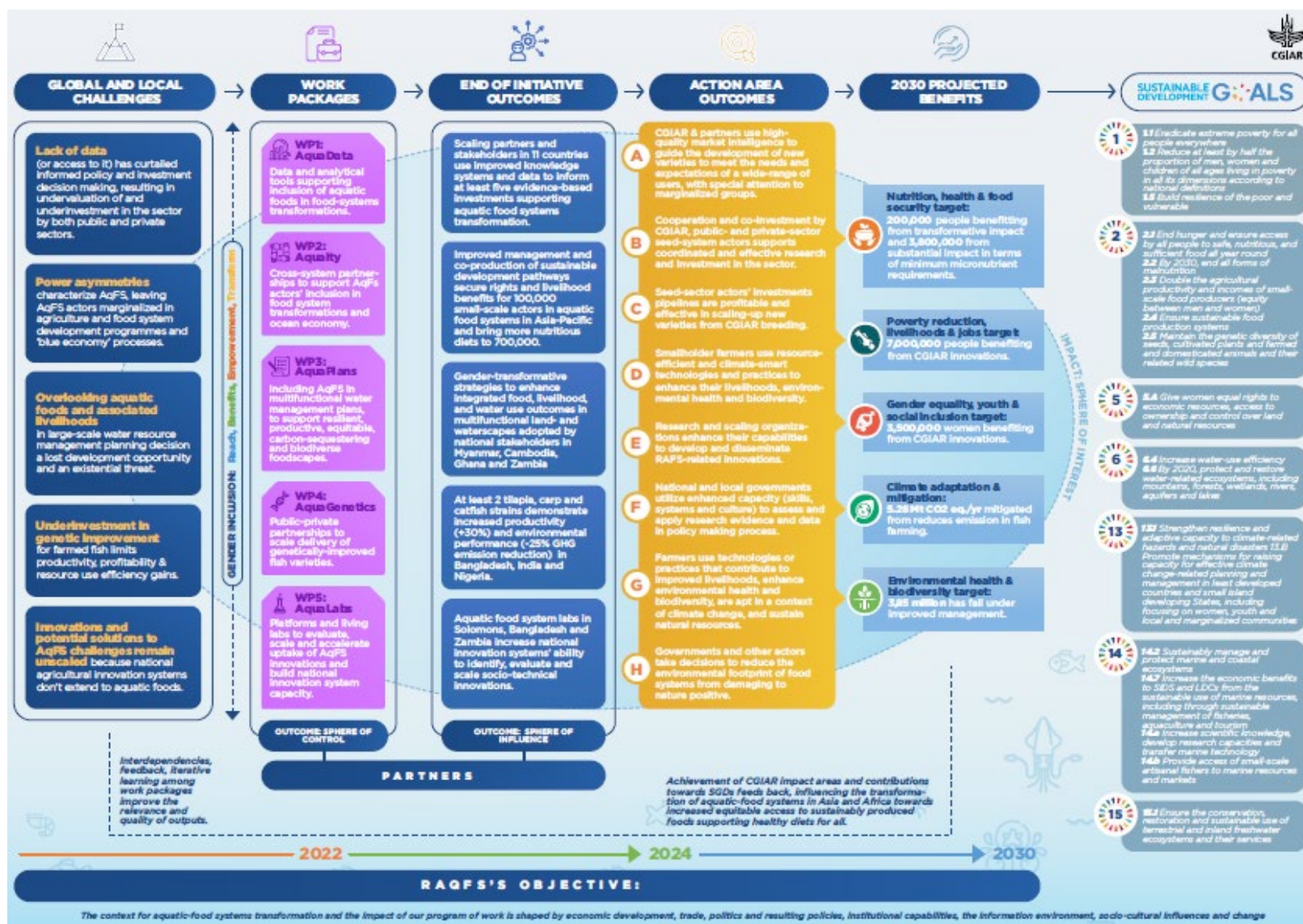
Causal pathways rely on the following **assumptions**: (A1) Stakeholders (fishers, farmers, businesses, policymakers) remain committed to their expressed desire to engage in activity co-development. (A2) Co-design processes generate context-relevant innovations that are adopted, scaled, and sustained. (A3) Partners (businesses, policymakers, investors) engage actively in scaling-out aquatic food innovations. (A4) RAqFS scientific evidence influences partner behavioral change and decision-making.

Under these assumptions, outcomes achieved in 2022–2024/5 influence wider transition by 2030, contributing to the five CGIAR Impact Areas and to SDGs 1 (No poverty), 2 (Zero hunger), 5 (Gender equality), 6 (Clean water and sanitation), 13 (Climate action), 14 (Life below water) and 15 (Life on land).

Key scaling and demand partners include community-based organizations, fishers, farmers, businesses, national and sub-national governments, regional organizations, civil society, NGOs and think tanks. RAqFS benefits from **synergies** with ACIAR, BMGF, FAO, AfDB programs. We will also work with seven ST Initiatives (AE-I; SHiFT; NPS; HER+; MITIGATE+; Markets and Value Chains; Foresight; Digital Technologies), two RAFS (Resilient cities; One Health) and four RII (AMD; ESA; TAFS-WCA; TAFSSA).



3.1.2. Full Initiative TOC diagram/



3.2. WP1 – AquaData

3.2.1. WP1 research plans and theory of change

<i>Work Package title</i>	AquaData
<i>Work Package main focus and prioritization</i>	The lack of robust and coherent data on AqFS performance is a fundamental barrier to realizing AqFS transformation ¹⁰¹ . AquaData will (a) synthesize existing data and produce new data to support equitable, evidence-based decisions and investments; (b) produce benchmarking data and structure AqFS monitoring and evaluation in real time; (c) improve evidence informing decisions and actions by farmers and fishers, private sector, and policymakers. Research will also: (i) increase availability of Findable, Accessible, Interoperable, and Reusable ¹⁰² data; (ii) demonstrate the use value of integrated AqFS datasets; (iii) structure basic indicators of competitiveness, inclusivity, and sustainability for aquatic foods.
<i>Work Package geographic scope</i>	Bangladesh, Cambodia, Ghana, India, Myanmar, Nigeria, Solomon Islands, Timor-Leste, Zambia (WP1-4 countries) + Kenya, Malawi + Global

The science

Table 3.2. WP1 Research questions, methods and outputs

Research questions	Scientific methods	Key outputs
Pathway 1 – Identifying data gaps in aquatic food systems		
<p>RQ1.1.1. What information and data do we need but don't have at different scales, to understand and transform AqFS in a changing climate?</p> <p>RQ1.1.2 How do AqFS innovations contribute to or challenge targets for sustainable development, ecosystem restoration, and climate resilience.</p>	<ul style="list-style-type: none"> • Gap analysis of the availability, quality, and usability of public data according to the various actors in AqFS • Mixed, participatory action methods, choice experiments, quantitative socio-economic and environmental analysis (i.e., on-farm trial and on-farm-performance studies) used to characterize AqFS in different geographies 	<p>OP1.1.1.1. Synthesized information, education and communication materials (IEC) on data needs and gaps in AFS that identify priorities and principles for design and implementation of data ecosystems</p> <p>OP1.1.1.2. Socio-economic and environmental characterization of aquatic food systems developed and implemented in seven different countries and/or key geographies</p> <p>OP1.1.2.1. A research and Innovation assessment framework to evaluate impact of AFS innovations across Work Packages 2-5</p>
Pathway 2 – New and derived data for aquatic food systems		
<p>RQ1.2.1. What tools, approaches and partnerships can we use to generate data (new or derived) at appropriate scales and over time that enable AFS transformation?</p> <p>RQ1.2.2. How can the contribution of aquatic foods to national targets and international objectives be better tracked and captured in real time?</p>	<ul style="list-style-type: none"> • Assembling and unifying existing datasets from available sources, and establishing new longitudinal gender sensitive data collection using innovative, low-cost digital monitoring protocols^{103, 104} to develop and deploy a set of integrated, publicly available, continuously updated aquatic food systems databases 	<p>OP1.2.1.1 Real time databases tracking AFS performance indicators such as prices of feeds and fish, levels of fishing effort, etc.</p> <p>OP1.2.1.2. Synthesized IEC materials on co-design, co-testing and scaling of data gathering tools and analytical methods based on digital approaches and artificial intelligence</p> <p>OP1.2.2.1. Integrated, publicly available aquatic food systems databases, assembled from existing socio-economic, climate and environmental datasets</p> <p>OP1.2.2.2. A unified monitoring, evaluation and learning framework for aquatic food systems in key target countries co-developed with partners and stakeholders (e.g., MEL4SSF)</p> <p>OP1.2.2.3. An Aquatic Foods Index evaluating and synthesizing outcomes against performance indicators from OP1.2.2.1 at local, national and international levels</p>

Pathway 3 – Informing decisions and policies on aquatic food systems through data		
<p>RQ1.3.1. How can artificial intelligence and cybernetics approaches be leveraged to provide adaptive guidance for decision-making in climate sensitive aquatic food systems at varying scales?</p> <p>RQ1.3.2. What are the social-economic and environmental benefits and trade-offs of production and consumption of sustainable aquatic foods in a changing climate?</p> <p>RQ1.3.3. How can the evidence generated by aquatic foods research influence policymaking and private-sector decisions and investments?</p>	<ul style="list-style-type: none"> • Action research in focus different geographies, to design and test how digital systems, remote sensing, analytics and artificial intelligence (such as cybernetics) can support stakeholders to identify actions and policies in AqFS. • Analyses of existing policy frameworks and benefit projection through foresight analysis. 	<p>OP1.3.1.1. Synthesized IEC materials on artificial intelligence data, tools, approaches and partnerships to support policy development and implementation for AqFS transformation</p> <p>OP1.3.2.1. New knowledge and case studies of the impact of digital decision support on climate resilience, socio-economic benefits and environmental sustainability in aquatic ecosystems</p> <p>OP1.3.3.1. Data use cases co-developed by researchers, public and private sectors, and local communities to affect policy, investments and decision-making at local, sub-national and national levels</p> <p>OP1.3.3.2. Partnerships, capacity building and dissemination approaches to increase demand and uptake of FAIR and inclusive AFS data for decision-making.</p>

Theory of change

Whilst multilateral organizations, national governments and large companies collect fisheries and aquaculture statistics, there is a notable lack of time-series data on AqFS performance and trade-offs. These data are crucial for timely and transparent decision-making process for multiple stakeholders¹⁰⁵. Also, with the goal to create a sustainable, equitable, inclusive and resilient food system worldwide, these data can support investments for the proactive adoption and diffusion of suitable Innovation Packages^{106, 107}. There is a clear demand for increased efforts and investments in quality data ecosystems, including monitoring protocols and analytical systems, and their interoperability in relation to aquatic foods at farm and system levels. WP1 builds on recent research undertaken with CRP and bilateral investments that demonstrated how private and public sectors, local communities, and the international community are interested in generating data for short- and medium-term solutions and investments, but also to structure data ecosystems in the long term.

The transformation of aquatic food systems requires reliable, FAIR, integrated, evidence-based, and actionable insights to guide demand, innovation, and scaling partners to coordinate and catalyze change. By integrating data sources and data generation within new data ecosystems based on co-development processes in the target contexts, WP1 will support investments and inform decisions and policy actions toward socially inclusive aquatic food systems transformation.

Data, tools and digital innovations will be made publicly available and open access according to FAIR principles. To guide policy and investments, researchers will establish data benchmarking through (a) an aquatic food system characterization; and (b) the testing of localized and AqFS level performance tools and models to integrate production with socio-economic, climate and environmental data. These data will be complemented with a review and analysis of policies affecting and accelerating AqFS transformation and a political economy analysis on data creation and use. Co-design processes and capacity development will increase local legitimacy and sustainability, boost data acquisition, and enhance curation and analytical capacities among national innovation partners.

We assume that:

- 1) Stakeholders and actors, including researchers, public and private sectors are available for collaboration, and engage in data co-generation.
- 2) Gender disaggregated data is accessed and co-generated.
- 3) COVID-19 pandemic don't represent a risk to primary data gathering efforts, and/or challenges to operations.
- 4) Target countries where researchers and partners are aiming to conduct primary data gathering efforts are stable and secure.
- 5) Governments are not too sensitive to datasets showing slow progress in development indicators.
- 6) Private sectors and big companies are not too sensitive to datasets showing their impact on people and the planet.
- 7) We finally assume that the data and evidence generated will be relevant and will enhance the use of data and evidence for improved decision-making in AqFS.

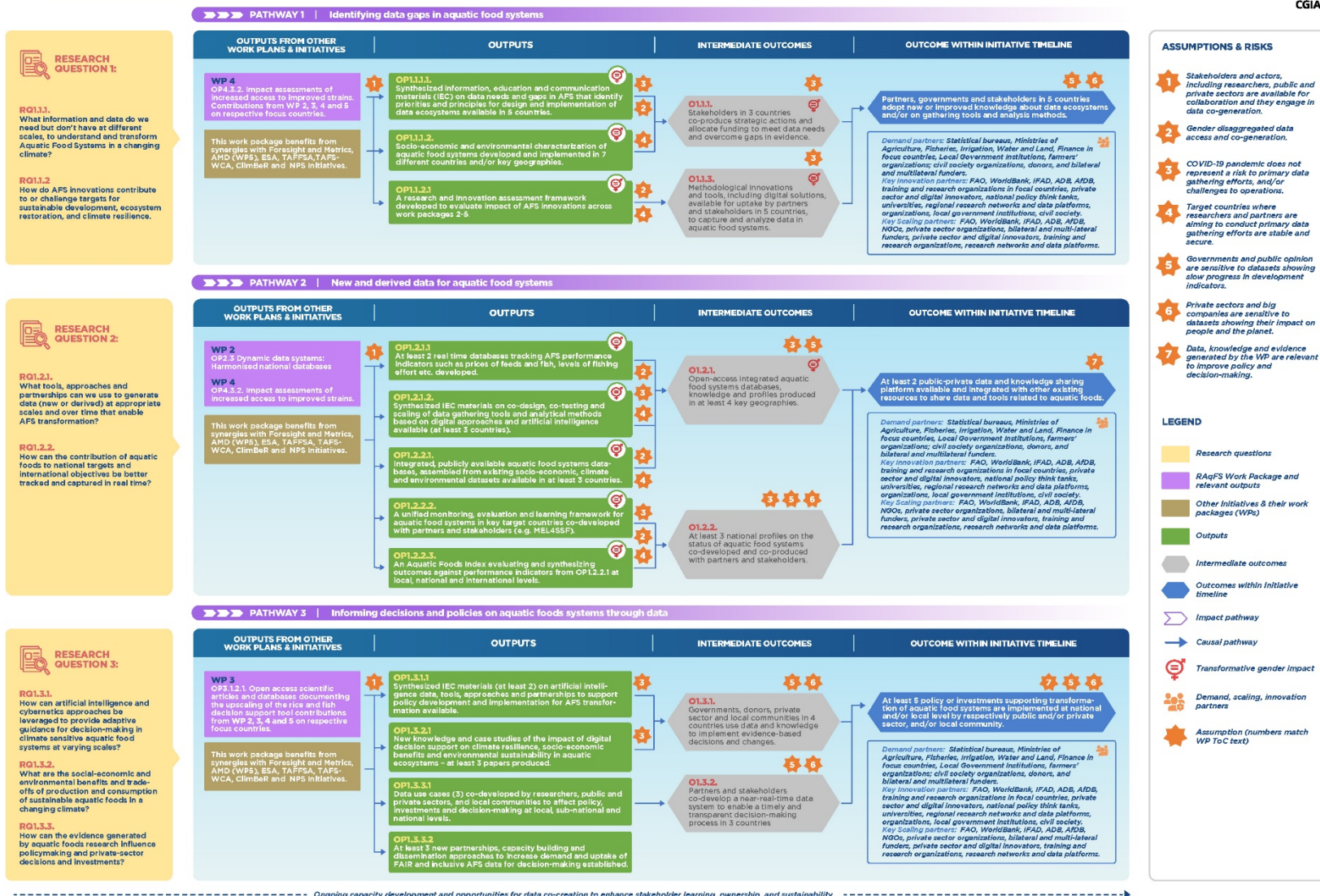
For 3) and 4), if encountered, these constraints will be surmounted using remote data gathering or crowdsourcing approaches. For 5) and 6), our prior experience suggests that relationship management and dialogue can overcome this challenge.

WP1 will work closely with all WPs and relevant stakeholders to identify evidence and data gaps and generate a data protocol supporting each WP. *AquaData* will work synergistically with the Data Initiative and Foresight Initiative and with private sector stakeholders to develop investments in real-time data monitoring and analysis tools for longer-term sustainability. It will also develop close interactions with public institutions as well as international and regional organizations to embed learning in national and global policies for statistics and data collection.

3.2.2. WP1 TOC diagram



RAqFS WORK PACKAGE 1 - AquaData



3.3. WP2 – Aqua+Partners: Partnering to realize the benefits of aquatic foods in sustainable development

3.3.1. WP2 research plans and theory of change

<i>Work Package title</i>	Aqua+Partners: partnering to realize the benefits of aquatic foods in sustainable development
<i>Work Package focus and prioritization</i>	The benefits of aquatic foods are challenged by unsustainable development and competing interests over the commons in the blue economy. Novel and co-producing partnerships that bridge sectors and levels of governance have important roles to play for transformative change in aquatic food systems. Building on extensive engagement in participatory research we will (1) scale up cost-effective models for community-based management and development systems that enable inclusive governance over ocean commons; (2) develop and strengthen novel partnerships that co-produce sustainable and nutrition sensitive development pathways with aquatic foods; and (3) synthesize place-based learning to enable aquatic food system actors’ strategic engagement in international transformative change processes. The WP builds scientific evidence in support of rights and practices of vulnerable aquatic food systems actors.
<i>Work Package geographic scope</i>	The WP will be implemented in (1) island food systems in Malaita and Western provinces in Solomon Islands and in Baucau and Lautem districts in Timor-Leste; and (2) on the shores of the Bay of Bengal, in Odisha State in India, and in the Meghna river delta in Bangladesh. From these place-based efforts the WP will synthesize learning for action at national and global levels, in partnership with new actors in “ocean citizen action coalitions”.

The science

Half of aquatic food production comes from commons, where small-scale actors dominate the sector in low- to middle income countries. Small-scale and community actors in the commons are therefore a key focus of this WP. The “blue economy” broadly aiming for sustainable ocean-based development, reflects competing – and potentially conflicting – demands for aquatic spaces, thereby presenting challenges for just and equitable partnerships for development¹⁰⁸. To harness the potential of aquatic foods in food systems, novel partners are needed that span beyond traditional reaches of “fisheries” or “aquaculture” to simultaneously engage with the emergent blue economy and the wider food system transformation process. We will address research questions to scale up community-driven practices that deliver locally demanded outputs supporting traditional and small-scale actors’ access rights and management systems and enables fisherfolk to prosper in the blue economy, and aquatic foods to be part of food system transformations. Research questions reflect the challenges identified by national partner consultations. They relate to external change (e.g., coastal development), weakened governance (e.g., revitalization of traditional institutions), capacity of national agencies to enable large-scale community-led management and development, opportunities to address challenges of household and child nutrition and the barriers to more gender equitable and just societies (e.g., research integration with women’s self-help groups and nutrition programs). The outputs that address these questions will generate new approaches for enabling small-scale actors’ autonomous efforts to sustainably govern aquatic resources, secure their rights in major coastal development policy transitions and pursue new opportunities in the blue economy and transformed food systems.

Table 3.3. WP2 Research questions, methods and outputs

Research Question	Methods	Outputs
Pathway 1: Refining and scaling up cost effective models in support of community-based management and development systems for inclusive governance over blue economy commons		
RQ2.1 How can access rights and management systems for aquatic food system multiple actors become self-sustaining with national civil society movements enabling improved resilience of coastal communities experiencing change?	<ul style="list-style-type: none"> • Mixed participatory methods with longitudinal surveys¹⁰⁹ • Participatory assessments of resource status and socio-economic livelihood benefits¹¹⁰ • Gender analysis to understand transformational role of women in managing fisheries and natural resources, including participation and engagement in leadership positions, • Participatory cyclic review of management and livelihood innovation^{111, 112} • Innovative catch and effort monitoring protocols¹¹³ 	OP2.1. Community networks: Small-scale food system actors collaborate in novel coalitions to share knowledge and experiences for management and locally led development
		OP2.2. IEC: National information, education and communication (IEC) materials on community-led management and development that enable uptake at greater scale and strengthens collective action.
		OP2.3. Dynamic data systems: Harmonized national databases for monitoring reach and uptake of sustainable practices as well as resource utilization/status
Pathway 2: Co-producing sustainable and nutrition sensitive development pathways in the blue economy through novel partnerships		
RQ2.2 How can multiple national agendas and programs co-produce pathways for action that ensures the benefits of aquatic foods and small-scale actors in sustainable development?	<ul style="list-style-type: none"> • Place-based forums with novel partners bridging sectors and levels of governance¹¹⁴ 	OP2.4. Co-production: Sustainable development pathways shaped from forums, with scientific outputs informing policymakers and academia. Including tribal or local language products for small-scale aquatic food system actors supporting their place in development planning.
	<ul style="list-style-type: none"> • Participatory research approaches including gender transformative approaches as an interface for multiple-knowledge systems¹¹⁵, including methods created by indigenous and non-indigenous peoples in a way that reflects indigenous belief systems and history¹¹⁶ 	
Pathway 3: Synthesis research from WP countries to enable strategic engagement and small-scale food system actor voice in international the blue economy and other transformative agendas		
RQ 2.3 How can the rights and practices of traditional, Indigenous and small-scale food system actors be elevated in the blue economy?	<ul style="list-style-type: none"> • Case study learning from WP countries through common analytical framework¹¹⁷ 	OP2.5. New knowledge: New knowledge on how tensions between local demand and competing ocean economy aspirations can be reconciled, synthesizing the learning of how indigenous, traditional and small-scale food system actors can thrive in the blue economy.
	<ul style="list-style-type: none"> • Strategic communication and integration with international change agendas 	OP2.6. Communication: Communication materials (e.g., blogs, briefs, interactive media) and activities (e.g., events, panels) that elevate a voice of small-scale actors in international change agendas.

Theory of change

Equitable partnerships and change coalitions are crucial for consensus-based development as we recognize that there are different knowledge systems and multiple actors that influence outcomes¹¹⁸. The ability to nurture equitable and effective partnerships underpins assumptions in outcome pathways^{119, 120}. Program actions (co-design, co-implement, co-interpret and co-publish) have begun in the design of this WP to improve equity in partnerships necessary for adoption and learning from outputs^{121, 122}. CGIAR, acting as a convenor, will share power with national agencies, indigenous leaders, local academics, community groups and other actors that govern the aquatic commons. Some of these partners use indigenous epistemologies, consensus-based decision-making methodologies, and consent protocols, different to the scientific and economic prioritization methods more familiar in the CGIAR, which offer pathways to legitimate practice and knowledge adoption. This experience and grounding in local institutions will ensure that the WP is conducted in a manner consistent with emancipatory approaches and cements shared power

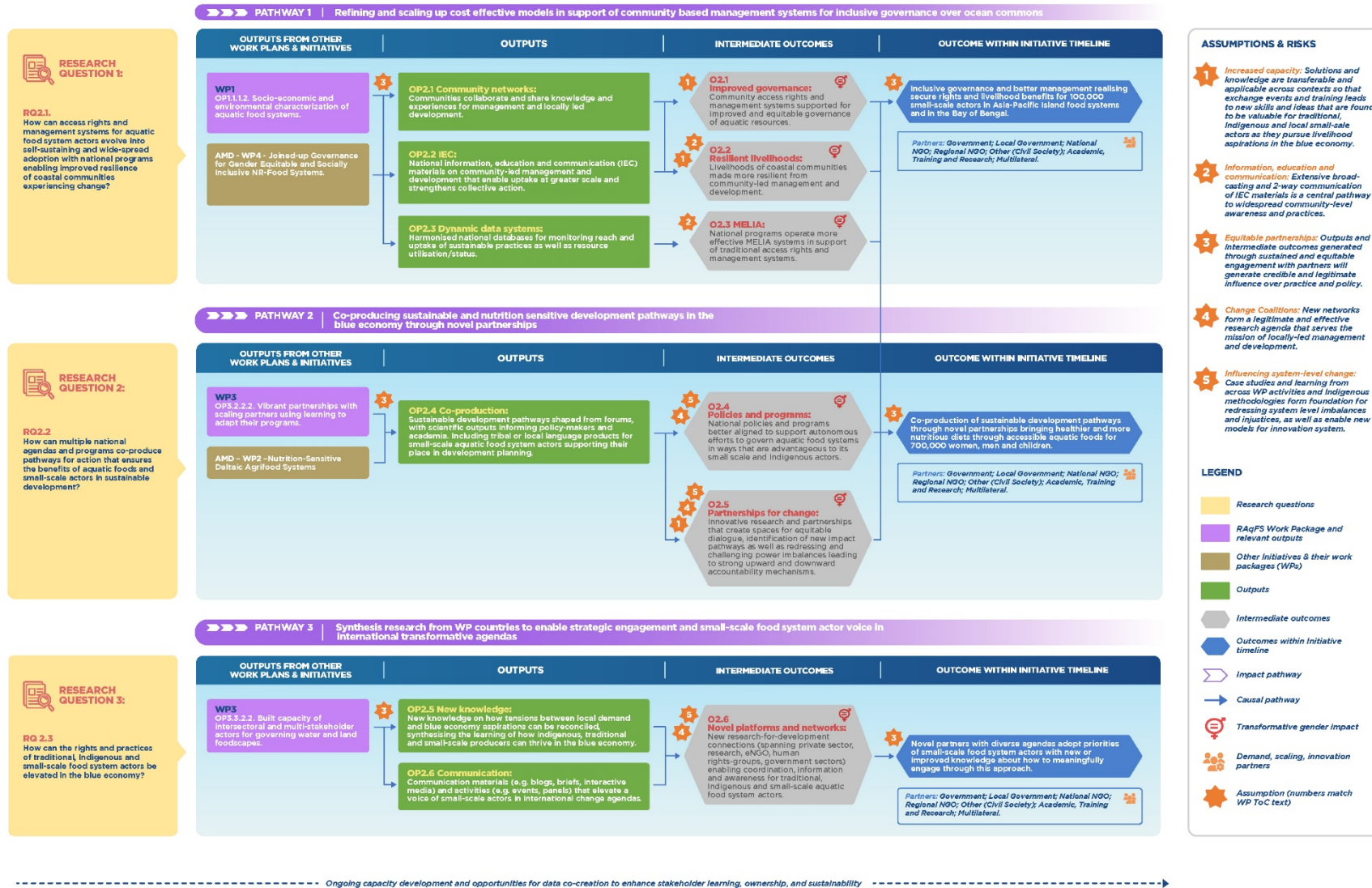
and control over outputs. Critically, our approach to a causal logic for uptake of outputs through embedded programming addresses concerns about mainstreaming planning for CGIAR research legitimacy and effectiveness, as proposed by ISDC¹²³.

An embedded approach builds on the foundation of co-production through partnerships as ways of working for demand-driven research planning^{124, 125} development. Novel partnerships across levels of governance and sectors will form change coalitions to both evolve the definition of local research demand and to serve the priorities of diverse food system actors. Case-study learning from the WP contexts will inform a strategic engagement in international policy agendas to secure a place for small-scale actors in ongoing change agendas.

The WP will work with local research institutions and academics to enable modelling indigenous ways of research ([Annex 3](#)). In this modality, partners are both identifying demand and, in being part of the research process, enable system level change as an analogy of scaling^{126, 127}. This WP interacts closely with WP1, WP3 and WP4 and contributes to WP5.

3.3.2. WP2 TOC diagram

RAqFS WORK PACKAGE 2 - Aqua+Partners:
Partnering to realize the benefits of aquatic foods in sustainable development



3.4. WP3 – AquaPlans: Integrated Aquatic Food Systems in Water and Land Foodscapes

3.4.1. WP3 research plans and theory of change

<i>Work Package title</i>	AquaPlans: Integrated aquatic food systems in water and land foodscapes
<i>Work Package focus and prioritization</i>	<p>Acknowledging the loss of biodiversity resulting from monoculture¹²⁸, the unmet demand for nutritious aquatic food¹²⁹, and the vulnerability of water and landscapes to multiple stressors^{130, 131} and building on previous investments^{132, 133, 134, 135}, WP3 aims to co-design (with users, implementers and scalers) integrated packages and investments to apply at scale a suite of multifunctional water and landscape innovations. These will result in more inclusive, diverse, resilient and sustainable aquatic and agricultural production systems.</p> <p>AquaPlans will (1) co-design and upscale integrated land and water production systems in multifunctional landscapes, (2) co-design and upscale aquatic food production in the ecosystems created by water infrastructure, and (3) develop participatory diagnostics of the governance of water and land foodscapes to supporting institutional innovations.</p> <p>This Work Package builds on scientific evidence for adaptive, reflective, and inclusive scaling of innovations in multifunctional land and water systems to reduce poverty, improve environmental and climate performance and sustain nutrition and food diversity.</p>
<i>Work Package geographic scope</i>	Myanmar, Ayeyarwady Delta (Pathway 1); Ghana, North East (Pathway 2); Zambia, Kafue lower basin (Pathway 3), Cambodia, Tonle Sap basin (Pathway 3)

The science

The Work Package is organized into three pathways: (1) Integrated production system in multifunctional landscapes; (2) Aquatic food production in ecosystems created by water infrastructures; and (3) Governance of water and land foodscapes. These pathways and their specific geographies emerged from the prioritization exercise and the consultations with in-country stakeholders. Pathway 1 will work in the Ayeyarwady Delta of Myanmar; Pathway 2 will focus on North-East Ghana, and Pathway 3 will be deployed in Zambia and Cambodia, respectively, in Kafue and Tonle Sap basins. The three pathways will start concomitantly with the phases of co-design (Q2–Q3 2022), upscaling (Q3 2022-onwards), and diagnostic (Q2–Q4 2022), while the phases of learning (Q4 2023-onwards) and adaptation (Q1 2024-onwards) will follow.

Table 3.4. WP3 Research questions, methods and outputs

Research questions	Scientific methods	Key outputs
Pathway 1 – Integrated production system in multifunctional landscapes		
RQ3.1.1. DESIGN AND UPSCALE INNOVATION - How to upscale water and land integrated production system and foster the adoption by small-holder farmers?	<ul style="list-style-type: none"> • Co-design, refinement and implementation of rice and fish decision support tool (DST) with smallholder farmers, NGOs and private partners. • Preparation of gender and youth inclusive business models and financing strategies. 	<p>OP3.1.1.1. Rice and fish decision support tool deployed by at least two partner organizations.</p> <p>OP3.1.1.2. Policy briefs of design and implementation principles of rice and fish decision support tool. Business models and financing strategies.</p>
RQ3.1.2. LEARN AND ADAPT - Which scaling pathways of integrated production systems is more effective (breadth, depth, probability of poverty, nutrition, gender and environmental impacts)?	<ul style="list-style-type: none"> • Quantitative and participatory assessment of the upscaling of the rice and fish decision support tool. • Assessment of women empowerment and gender parity, using women empowerment and fisheries index (WEFI) tool. 	<p>OP3.1.2.1. Open access scientific articles and databases documenting the socially inclusive upscaling of the rice and fish decision support tool.</p> <p>OP3.1.2.2. Vibrant partnerships with scaling partners using learning to adapt their programs.</p>
Pathway 2 – Aquatic food production in ecosystems created by water infrastructures		
RQ3.2.1. DESIGN AND UPSCALE INNOVATION - How to upscale aquatic food production in water infrastructures and enhance social inclusion of integrated systems into project design and policies?	<ul style="list-style-type: none"> • Co-design and implementation of aquatic food production in small dams with smallholders' farmers, landless, NGOs and public partners. • Multi-stakeholder learning platforms to increase awareness amongst land-use and water planners, engineers, and investment decision-makers. 	<p>OP3.2.1.1. Policy briefs of design and implementation principles of aquatic food production in small dams.</p> <p>OP3.2.1.2. Aquatic food production in small dams piloted in at least four sites.</p> <p>OP3.2.1.3. Vibrant multi-stakeholder platforms at the national and sub-national levels mobilizing evidence to include integrated systems into project design and policies.</p> <p>OP3.2.1.4. Tertiary education module on fish-friendly irrigation and integrated production systems developed and delivered in water planners and engineers' degrees.</p>
RQ3.2.2. LEARN AND ADAPT - What design principles and lessons can be applied to investments in aquatic food production in water infrastructures to ensure the achievement of multiple inclusive outcomes?	<ul style="list-style-type: none"> • Quantitative and participatory assessment of aquatic food production in water infrastructure programs or pilots, including in relation with intersectional inequalities to establish the evidence required for policy uptake. 	<p>OP3.2.2.1. Open access scientific articles and databases documenting the achievements of aquatic food production in water infrastructures programs or pilots.</p> <p>OP3.2.2.2. Vibrant partnerships with scaling partners using learning to adapt their programs.</p>
Pathway 3 – Governance of water and land foodscapes		
RQ3.3.1. DIAGNOSTIC - How do climate and other external drivers of landscape integrity create vulnerability to water and land foodscapes?	<ul style="list-style-type: none"> • Participatory risk and vulnerability mapping • Quantitative risk and vulnerability mapping combining geophysical, institutional, and socio-economic data sources. 	OP3.3.1. Participatory and quantitative risk and vulnerability maps and scenarios
RQ3.3.2. DESIGN INNOVATION - How to build the capacity of diverse stakeholders and support the emergence of endogenous governance mechanisms to deal with existing and forthcoming risks at the landscape level?	<ul style="list-style-type: none"> • Institutional analysis, social network analysis, actor-stakeholder mapping. • Behavioral studies on cooperation based on experimental games and surveys. • Multi-stakeholder dialogues to collaboratively explore sustainable and integrated development scenarios and resolve key governance challenges. 	OP3.3.2.1 Built capacity of intersectoral and multi-stakeholder actors for governing water and land foodscapes

Theory of change

The AquaPlans WP: Integrated Aquatic Food Systems in Water and land foodscapes¹³⁶ is organized into three pathways: (1) Integrated production systems in multifunctional landscapes; (2) Aquatic food production in ecosystems created by water infrastructure; and (3) Governance of water and land foodscapes.

The first pathway aims to design innovations that will upscale water and land integrated production systems in multifunctional landscapes, foster the adoption by smallholder farmers and learn and adapt by identifying the most effective scaling mechanisms. The Initiative will support the deployment of the

rice and fish decision support tool under development for the Ayeyarwady Delta in Myanmar by at least two partners' organizations through different implementation tools. Business models, policy briefs of the design and implementation principles supported by open access scientific articles and databases documenting the upscaling of water and land integrated production system are the co-produced outputs expected to act as a multiplier beside stakeholder engagement resulting in buy-in by other implementers (NGOs, private agricultural firms), investments by donors and policy support. The expected end-of-Initiative outcomes are that upscaled land and water integrated production systems in beneficiaries' multifunctional landscapes reduce poverty, lessen environmental impacts and restore capture-fisheries, and sustain low-income households' nutrition intake by increasing the consumption of animal proteins and food diversity^{137, 138}.

The second pathway focuses on aquatic food production in ecosystems created by water infrastructure and similarly follows two research questions to jointly design and upscale innovations and learn and adapt. Multi-stakeholders' learning platforms will catalyze at the national and sub-national levels the evidence to include integrated systems into project design and policies. In Ghana, co-design and implementation of aquatic food production pilots in small dams with irrigation and fisheries departments, NGOs and communities combined with impact assessments will feed the platforms with the required evidence to achieve inclusive¹³⁹ uptake and upscaling toward poverty reduction, women's and youth empowerment¹⁴⁰, enhanced agro-ecosystem functions and reduced malnutrition^{141, 142, 143, 144}.

The third pathway responds to the vulnerability of water and land foodscapes and landscape integrity¹⁴⁵ to multiple stressors by assessing those risks and vulnerability and by elaborating participative development scenarios¹⁴⁶. The elaboration of the scenarios in Cambodia and in Zambia will raise awareness, co-ordination¹⁴⁷, build the capacity of multiple stakeholders¹⁴⁸ and form the momentum to support the emergence of inclusive institutional arrangements¹⁴⁹ resulting in improved resilience of multifunctional production systems^{150, 151}.

Ministries of Agriculture, Fisheries, Irrigation, Water and Land, Finance in focus countries, local government institutions, Mekong River Commission, FAO, ACIAR, USAID, farmers' organizations, civil society organizations, and bilateral and multilateral funders will be engaged from the inception phase and throughout the business cycle. Innovation and scaling will build on partnerships with training and research organizations in focus countries, national policy think tanks, networks, universities, regional research organizations, local government institutions, NGOs and private sector organizations ([Annex 3](#)).

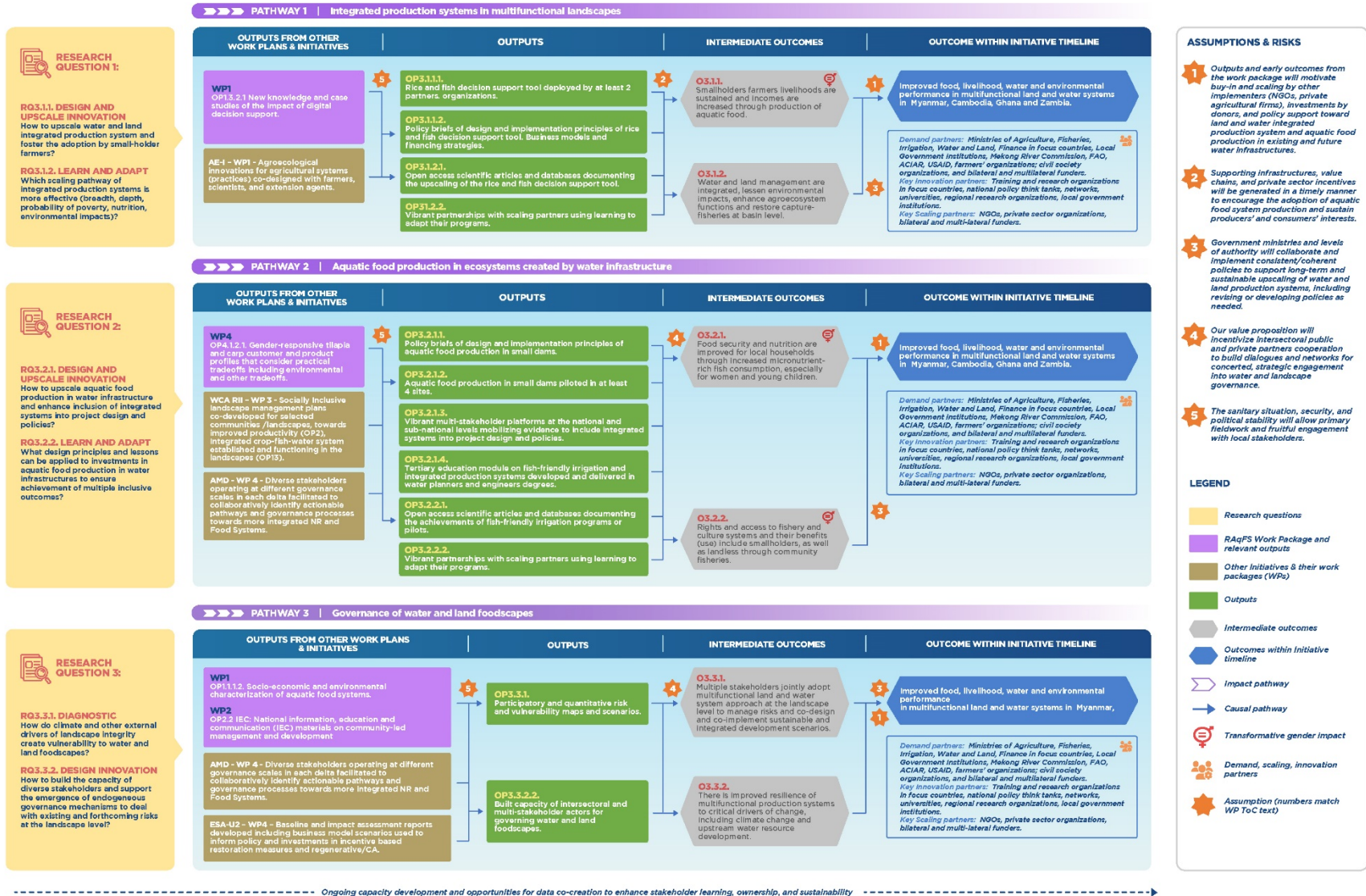
This TOC is underpinned by assumptions that:

- 1) Outputs and early outcomes from AquaPlans motivate buy-in and scaling by other implementers (NGOs, private agricultural firms), investments by donors, and policy support toward land and water integrated production system and aquatic food production in existing and future ecosystems created by water infrastructures.
- 2) Supporting infrastructures, value chains and private sector incentives are generated in a timely manner to encourage the adoption of aquatic food system production and sustain producers' and consumers' interests.
- 3) Government ministries and levels of authority collaborate and implement consistent/coherent policies to support long-term and sustainable upscaling of water and land production systems, including revising or developing policies as needed.
- 4) Our value proposition incentivizes intersectoral public and private partners cooperation to build dialogues and networks for concerted, strategic engagement into water and landscape governance.
- 5) The sanitary situation, security, and political stability allow primary fieldwork and productive engagement with local stakeholders.

This WP benefit from synergies with WP1, WP2, WP4 and WP5 which contribute to WP3 outputs and outcomes through data, methods, innovations and partners engagement. This WP will also benefit from close coordination and alignment with AMD (WP1), AE-I (WP4), ESA-U2 (WP4) and WCA (WP3).

3.4.2. WP3 TOC diagram

RAqFS WORK PACKAGE 3 - AquaPlans: Integrated Aquatic Food Systems in Water and Land Foodscapes



3.5. WP4 – AquaGenetics: Delivering gains from genetic improvements in farmed fish through public-private partnerships

3.5.1. WP4 research plans and theory of change

<i>Work Package title</i>	AquaGenetics: Delivering gains from genetic improvements in farmed fish through public-private partnerships
<i>Work Package focus and prioritization</i>	WP4’s focus is to reduce aquatic food supply-demand gaps by accelerating the development of better-performing strains of widely farmed fish (tilapias, carps and catfish) and their uptake in countries where aquatic foods are nutritionally important to large populations of low-income consumers and where aquaculture potential is high. Sub-Saharan Africa and South Asia fit these criteria. Priority objectives are to improve productivity, profitability and environmental performance of aquaculture systems, while building disease and climate-change resilient farming systems, that meet low-income consumers’ demand for nutritious food, through the rapid development and delivery of improved fish strains.
<i>Work Package geographic scope</i>	Global, West Central Africa Region (Nigeria), South Asia Region (Bangladesh and India).

The science

WP4 will address supply demand gap for fish through: 1) making available better-performing strains of carp, tilapia and African catfish (currently representing > 28% of world finfish aquaculture production); 2) developing more rapid and sustained delivery of improved strains to smallholder farmers; and therefore 3) improving performance in important aquatic agricultural farming systems. The research has potential global reach but the species targeted are particularly relevant to South Asia and sub-Saharan Africa. The three pathways will start concomitantly with the phases of co-design (Q2–Q3 2022), upscaling (Q2 2022-onwards), and diagnostics (Q2–Q4 2022), followed by the phases of learning and adaptation (Q3 2023–Q1 2025) to achieve a growing practical pipeline of innovation products over the next decade.

Table 3.5. WP4 Research questions, methods and outputs

Research questions	Scientific methods	Key outputs
Pathway 1: Better performing strains of carp, tilapia and African catfish		
RQ4.1.1. How to develop faster growing tilapia with additional resilience traits that improve returns for smallholders while reducing environmental impact?	• Genomic and quantitative genetic techniques with digital approaches for phenotyping to include resilience traits (feed and oxygen efficiency, disease resistance) with fast growth.	OP4.1.1.1. Faster growing tilapia strains released through PPP to farmers from 2022 and with at least one additional resilience trait, by 2024. OP4.1.1.2. Efficient index selection protocols.
RQ4.1.2. How to develop faster growing strains of carp for multispecies rearing systems that improve returns for smallholders while reducing environmental impact?	• Genomic and quantitative genetic techniques and digital approaches for phenotyping to achieve three faster growing carp species adapted to highly productive multispecies farming systems.	OP4.1.2.1. Faster growing (+30%) rohu carp strains released to farmers from 2022 and silver carp in 2024. OP4.1.2.2. Efficient selection protocols.
RQ4.1.3. How to develop sustainable genetic improvement programs for unimproved species in high demand - African catfish?	• Scoping molecular parental assignment and novel hatchery processes to permit genetic improvement for growth in African catfish.	OP4.1.3.1. Hatchery protocols for effective selection for increased growth of African catfish by 2023. OP4.1.3.2. Establishment of an African catfish genetic improvement program by 2024.

RQ4.1.4. How can the trait preferences of different women and men users (e.g., producers, processors, traders and consumers) from different market segments, and those required to meet global environmental challenges, be prioritized in tilapia, carp and catfish genetic improvement programs?	<ul style="list-style-type: none"> • Mixed-methods and tradeoff studies to prioritize traits for value chain actors and user groups, highlighting gender differences to ensure that they are considered when target customer segments are defined. 	<p>OP4.1.4.1. Gender-responsive tilapia and carp customer and product profiles that consider practical tradeoffs including environmental and other tradeoffs.</p> <p>OP4.1.4.2. Decision support tools for prioritization of traits.</p>
Pathway 2. More rapid and sustained delivery of improved strains to smallholder farmers		
RQ4.2.1. How to increase access to improved strains that meet women and men smallholder farmer preferences and needs?	<ul style="list-style-type: none"> • Measurement of adoption rates and profitability analysis for different suppliers and farmer groups to assess effectiveness of dissemination modes. 	<p>OP4.2.1.1. Fish seed supply dissemination models.</p> <p>OP4.2.1.2. Assessment of the effectiveness (adoption and profitability to supplier and farmer) of the tested fish seed supply systems.</p>
Pathway 3. Improved performance in farming systems		
RQ4.3.1. What is the actual performance of improved strains in farming systems in Nigeria, India and Bangladesh and how could that be enhanced?	<ul style="list-style-type: none"> • Performance assessment using digital tools for controlled on-farm trials and farm surveys. • Mixed-methods studies to differentiate technical and social factors. 	<p>OP4.3.1.1. Benchmarking data on productivity, profitability, resource use efficiency and GHG emissions: technical and social effects.</p> <p>OP4.3.1.2. Information on actual health feed and husbandry practices affecting fish performance</p>
RQ4.3.2. What are the benefits of increased access to improved strains by women, men, and youth smallholders?	<ul style="list-style-type: none"> • Impact assessments of increased availability and access to improved strains by different smallholder actors (depending on their gender, age, socio-economic status) on their economic and food and nutrition security and social wellbeing. 	<p>OP4.3.2.1. Impact assessments of increased access to improved strains.</p>

Theory of change

AquaGenetics will reduce the supply-demand gap for nutritious fish for low-income consumers through improvements in aquaculture productivity, farm profitability and farmer livelihoods, while reducing aquaculture environmental impact and building climate resilient farming systems through three pathways.

The first pathway addresses the lack of better performing fish strains which constrains aquaculture productivity globally and farmer livelihoods and food security in low- and middle-income countries specifically. The research is focused on developing faster growing and more resilient strains of fish that meet user needs for three species in high demand in South Asian and sub-Saharan Africa which, building on the work achieved in the FISH CRP, will be for available for delivery to farming systems from 2022 onwards.

The second pathway addresses the need for putting more rapid and sustainable delivery of improved strains of fish on a sound commercial basis through partnership with aquaculture industry enterprises. The research will measure the success of the commercial partnerships. It will be supported by core breeding teams and developed to deliver improved strains. Research will evaluate the mechanisms used to deliver to smallholders, assess adoption rates and the profitability of these delivery mechanisms for both suppliers and smallholders.

The third pathway addresses the need for achieving improved performance in the farming systems through monitoring the realized performance of the introduced strains, identifying and responding to any yield gaps identified. Utilizing existing industry members for distribution of improved seed, together with other inputs and advice, seeks to minimize potential yield gaps but it is recognized further adaptation will be required.

Achievement of all three of these pathways will increase productivity and profitability of farmers, providing more secure livelihoods and greater food security for communities in low- and middle-income countries.

The WP is aligned with demand partners including producer organizations, Departments of trade, fisheries and aquaculture in India, Bangladesh and Nigeria, Regional Intergovernmental bodies (e.g., SADC). Advanced research centers (e.g., Roslin Institute, Earlham Institute) and local research organizations (e.g., RGCA, ICAR-CIFA, BAU, University of Ibadan) will support the innovations while private sector organizations (e.g., Confederation of Indian Industries, RGCA-MPEDA, BRAC Enterprises, Fishtec, PAL), NGOs (e.g., IDH), Departments of Fisheries (national and state), large-scale development programs (e.g., BAA, BMGF IDEA project) will drive scaling. The detailed list of potential partners is available in [Annex 3](#).

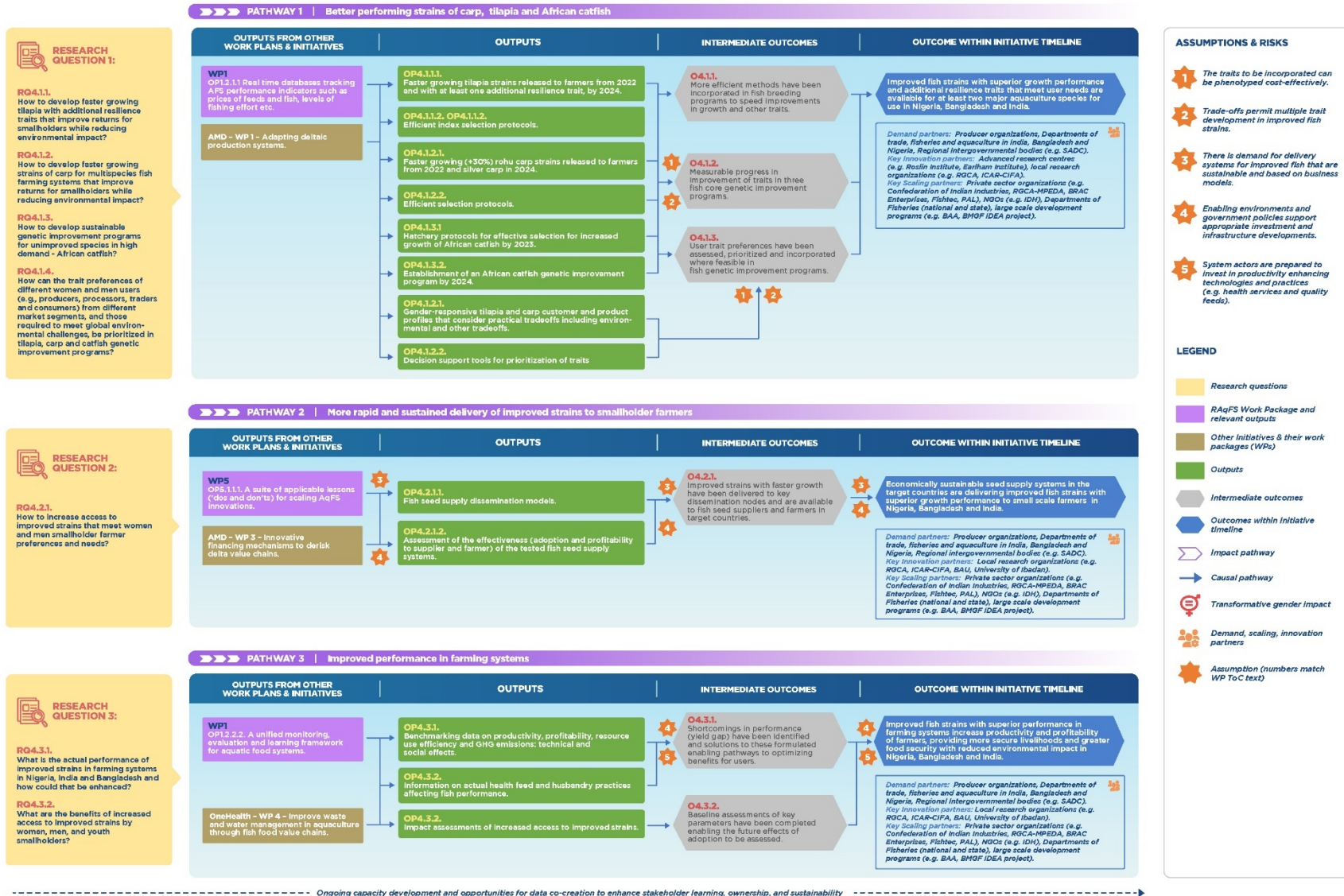
This TOC is underpinned by assumptions that:

- 1) The traits to be incorporated can be phenotyped cost effectively. There is demand for improved fish from producers based sustainable business models.
- 2) Trade-offs permit multiple trait development in improved fish strains. Enabling environments and government policies support appropriate investment and infrastructure developments for aquaculture.
- 3) There is demand for delivery systems for improved fish that are sustainable and based on business models.
- 4) Enabling environments and government policies support appropriate investment and infrastructure developments.
- 5) System actors are prepared to invest in productivity enhancing technologies and practices (e.g., health services and quality feeds).

This Work Package is supported by WP1 for monitoring and assessment of adoption and impact. WP3 and WP5 provide opportunities to assess the demand for technologies developed in WP4 and tests and benchmark WP4 improved strains and associated support as do WP4 activities in one Health, the AMD and WCA regional Initiatives.

3.5.2. WP4 TOC diagram

RAqFS WORK PACKAGE 4 - AquaGenetics: Delivering gains from genetic improvements in farmed fish through public-private partnerships



3.6. WP5 – AquaLabs: National innovation platforms for aquatic food systems

3.6.1. WP5 research plans and theory of change

<i>Work Package title</i>	AquaLabs: National Innovation platforms for Aquatic Food Systems
<i>Work Package focus and prioritization</i>	WP5 research supports the design and implementation of “AquaLabs” to scale proven innovations and Innovation Packages in AqFS and accelerate co-creation of future innovations. AquaLabs will develop tools, partnerships and processes to identify, evaluate, pilot and scale new technologies and institutional innovations. AquaLabs will help to embed CGIAR research in national research and market systems and shift the locus of innovation closer to target AqFS actors. AquaLabs are platforms for AqFS actors, researchers, policymakers, private sector firms and investors to co-design, pilot, accelerate and upscale improved ways to grow, harvest, process, distribute, market and govern AqFS.
<i>Work Package geographic scope</i>	Solomon Islands, Bangladesh, and Zambia

The science

AquaLabs uses participatory action research on agrifood innovation systems to bring together AqFS actors and stakeholders, researchers, private sector firms and investors to co-evaluate, co-pilot and scale innovations in nutritious, climate-smart aquatic foods. Example Innovations Packages combine: i) novel aquaculture feeds, culture of new species, emergent sectors such as seaweed farming for human food and expanded shellfish aquaculture; ii) value-addition and waste-reduction technologies; iii) new social movements to revive nutritious traditional diets; and iv) pro-poor and marginalized group empowerment technologies. AquaLabs are gender and youth-inclusive, foster peer-to-peer learning and stimulate local innovations through PPP. Research to support their establishment has three phased pathways, the first two of which will build on innovations already co-developed by CGIAR and the third which will focus on bringing ideas led by AqFS actors further into the innovation system.

Research on AIS is well established in the CGIAR and partners^{152, 153, 154, 155} but is less often applied in an aquatic foods context, so its lessons have not been fully transferred¹⁵⁶. Building on nascent aquatic systems applications of “scaling science”^{157, 158}, “Aquaculture Innovation Systems”¹⁵⁹ including the novel “Fish for Africa Innovation Hub” concept, we aim to apply this research to strengthening the national innovation system in three contrasting AqFS. Coupled with concurrent bilateral investments of related processes in three other countries, lessons from these case studies in building innovation systems will be used to ultimately establish AquaLabs in 11 countries by 2030.

Table 3.6. WP5 Research questions, methods and outputs

Research questions	Scientific methods	Key outputs
Pathway 1: Learning how to build a successful AquaLab		
RQ5.1.1. What have been the key determinants of success and failure in large-scale adoption of previous AqFS innovations?	<ul style="list-style-type: none"> • Systematic mapping of impact evaluation studies on research-based AqFS interventions • Benefit-cost analysis of successfully scaled innovations to identify "best bets" in contributing to the five CGIAR Impact Areas. 	<p>OP5.1.1.1. A suite of applicable lessons (dos and dont's) for scaling AqFS innovations in a range of national contexts.</p> <p>OP5.1.1.2. "Best bets" for investment in innovations identified and characterized; methodology for financial evaluation of innovations developed (and applied in Pathways 2 and 3)</p>
RQ5.1.2. What role did innovation platforms and living lab type structures play in these outcomes?	<ul style="list-style-type: none"> • Transition dynamic studies looking at what have been key factors in enabling bundled innovations and the roles of AquaLab type structures 	<p>OP5.1.2.1. Best-practice methodologies and institutional-design models to build sustainable innovation systems</p>
Pathway 2: Testing AquaLabs as accelerators of already piloted/proven innovations		
RQ5.2.1. How can identified bottlenecks in innovation systems (from Pathway 1 and scaling readiness analysis) be addressed by new AquaLabs in efficient, equitable and sustainable ways?	<ul style="list-style-type: none"> • Innovation system diagnostics drawing on review and consultations on national priorities, principles of regenerative and restorative agriculture and NRM¹⁶⁰, gender and culturally sensitive innovation system analysis. 	<p>OP5.2.1.1. A set of 8-12 aquatic foods innovation system case-studies from three countries that have been successfully scaled and which identify inclusive, cost-effective and sustainable mechanisms to accelerate uptake of other AqFS innovations developed by CGIAR and partners.</p> <p>OP5.2.1.2. Achievable national plans, built on national needs and priorities and proven and emergent innovations for AqFS to deliver nutritious, climate-smart, accessible, culturally preferred and sustainable aquatic foods to all.</p>
Pathway 3: Building sustainable national AqFS innovation systems		
RQ5.3.1. How can AqFS innovations as well as the AquaLabs organization structures be sustainably embedded within national agrifood innovation systems for long-term sustainability?	<ul style="list-style-type: none"> • Gender- and culturally sensitive capacity assessment methods of innovation systems with site-visits, stakeholder dialogues and key informant interviews to identify suitable institutional homes for national AquaLabs • Review of innovative inclusive business models and financing mechanisms to identify fair models for financial sustainability 	<p>OP5.3.1. Plans for self-sustaining, nationally owned AquaLabs in Solomon Islands, Bangladesh and Zambia.</p>
RQ5.3.2. How can AquaLabs better support small-scale actors' own innovations?	<p>Methodologies to study and include Local and Indigenous Technical Knowledge in innovations, and tools for social and financial inclusion developed in Pathways 1 and 2 will be combined for transdisciplinary co-innovation between CGIAR researchers and AquaLabs networks.</p>	<p>OP5.3.2. Identified best-practices to evaluate, incubate, accelerate and scale small-scale AqFS actor-led innovations to reduce dependence on external innovation "pipelines."</p>

Theory of change

CGIAR and partners' research on AqFS has generated technological innovations for productivity growth,^{161,162} institutional innovations that have created equitable employment^{163,164,165} and management plans and policies to improve productivity, resilience and environmental performance of AqFS^{166,167,168}. However, there has been an under-investment in designing and delivering systems to scale technological and social innovations with private sector actors¹⁶⁹ and arguably an over-reliance on successfully influencing national policies (which may lack investment in implementation) as a means to turn research into impact at scale¹⁷⁰. Under-investment in innovation systems for micro, small and medium enterprise in AqFS (to enable inclusive and also frugal innovations) has led to continued dependence on external technical expertise in some geographies (e.g., Solomon Islands, Zambia) and to weak linkages with autonomous innovation and entrepreneurship in others (e.g., Bangladesh and India)¹⁷¹.

By working with aquatic food sector actors and private sector firms to design and build three AquaLabs to strengthen the capacity of national research systems to innovate in the AqFS, we will both out scale tested innovations and Innovation Packages (many from FISH CRP and other CGIAR research programs, see [Annex 4.1](#)) and build local and national capacity to co-create the AqFS innovations of the future, as well as CGIAR capacity to learn from its in-country partners. The guiding vision is to move from a donor and research-provider driven model to a “co-production of innovation” system¹⁷² that will eventually generate its own funding through investor buy-in. In essence, it represents a decisive shift away from a “transfer of technology” to an “Agrifood Innovation System” approach¹⁷³.

By 2025, AquaLabs will introduce/scale innovations in three or more countries (see synergies) that support the aquatic food production/consumption of aquatic foods that culturally and contextually appropriate and ecologically sustainable, providing economic opportunities and affordable, nutritious, micronutrient-rich diets locally. To succeed, Aqualabs will need to: i) incentivize actors to join innovation networks; ii) manage power differentials to improve effectiveness of knowledge co-production and (inclusive) business collaboration/partnerships; and iii) deliver research support, technologies, and financial and business advisory services to AqFS actors sustainably and equitably.

The Initiative will use a multi-stakeholder approach, under the AquaLabs umbrella, to integrate the national agricultural research services (NARS), private sector firms, academia, local NGOs, international NGOs, the civil society (including women, youth and indigenous peoples) to co-design, co-pilot and co-scale with diverse products and services resulting from demand-driven innovations. Involvement and capacity development of the national agricultural research services and other key actors will perpetuate the benefits of the Initiative beyond 2030.

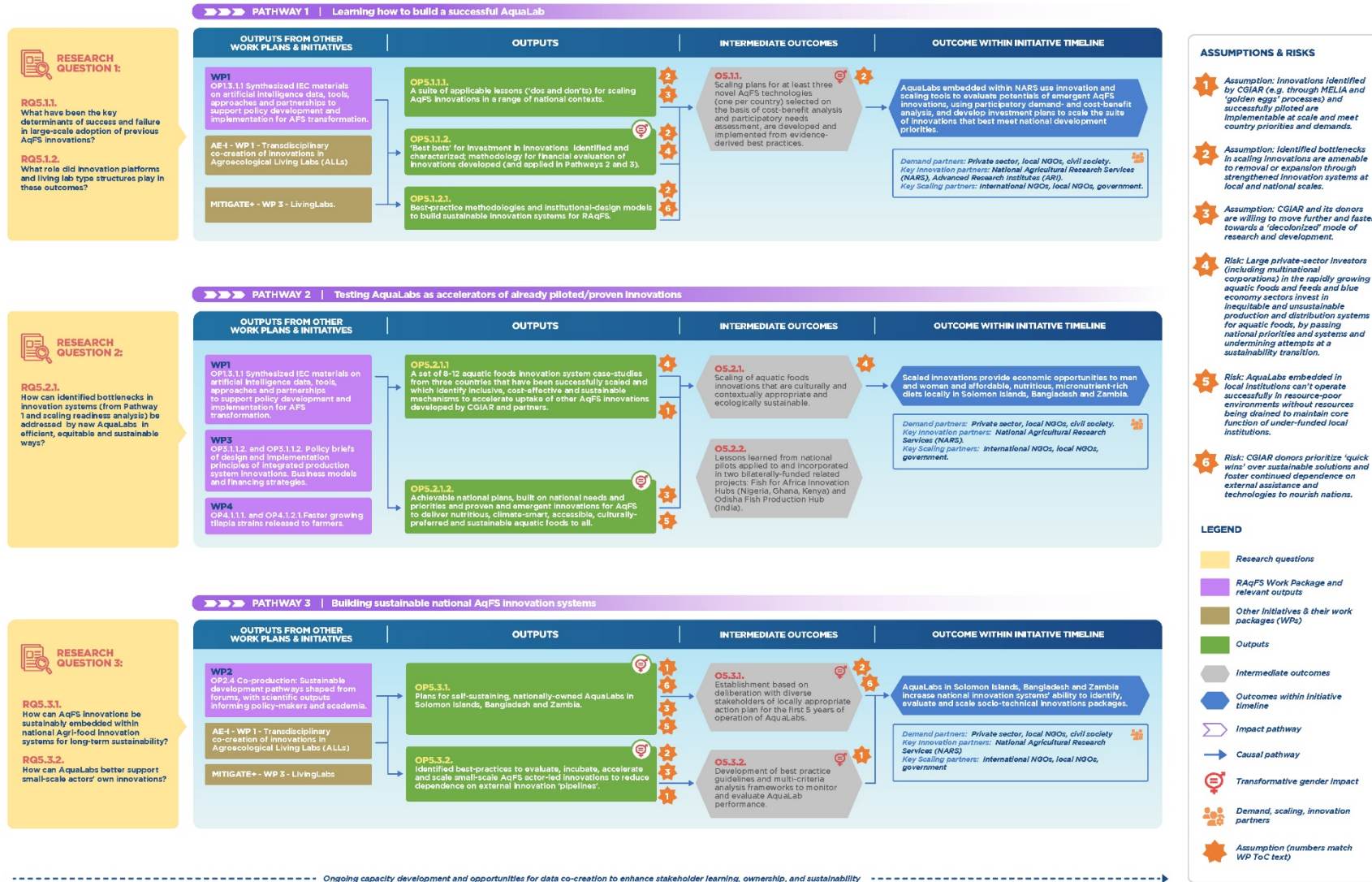
Key assumptions are that:

- 1) Innovations identified by CGIAR (e.g., through MELIA and “golden eggs” processes) and successfully piloted are implementable at scale and meet country priorities and demands.
- 2) Identified bottlenecks in scaling innovations are amenable to removal or expansion through strengthened innovation systems at local and national scales.
- 3) CGIAR and its donors are willing to follow the health sector’s lead¹⁷⁴ in moving further and faster towards a “decolonized” mode of research and development¹⁷⁵.

AquaLabs aims to build on the work of the other four Work Packages. There are opportunities for collaboration and shared learning with AE-I (WP1) and MITIGATE+ (WP3) Initiatives, both of which propose innovation hubs or “living laboratories” to foster co-creation of knowledge and accelerate innovations, with one focused on sustainable agro-ecosystems and the other on reducing the carbon footprint of food production. Both Initiatives include aquatic foods. The list of demand, innovation and scaling partners is provided in [Annex 3](#).

3.6.2. WP5 TOC diagram

RAqFS WORK PACKAGE 5 - AquaLabs: National innovation platforms for Aquatic Food Systems



4. Innovation Packages and Scaling Readiness Plan

4.1 Innovation Packages and Scaling Readiness Plan

Scaling is consistently embedded in RAqFS Work Packages and is key to delivery of the expected outcomes described in the above TOC. Each of the WP 1, 2, 3 and 4 will aim to design and upscale innovations and Innovations Packages that will respond to users' needs and be context specific. WP5 is designed to learn from and act upon the outputs of the scaling readiness plan. A list of potential Innovations Packages emerging from the Work Packages is provided in [Annex 4.1](#). From this list, some Innovations Packages are already developed (e.g., "Decision Support Tool" for rice and fish integrated production in Myanmar) and for those the scaling readiness will first aim to assess the bottlenecks and opportunities for scaling and second to design the scaling strategies. Other Innovation Packages are at a nascent stage and in those cases the scaling readiness approach will support the profiling and design of the innovation and the development of the Innovation Package by analyzing the supporting environment.

The RAqFS will prioritize six Innovation Packages to develop the scaling readiness approach. The existing literature, learning from other contexts and a participative approach will be applied to finalize the selection. A list of existing innovations at different stages of development and scaling is provided in [Annex 4.1](#).

The Innovation Packages from the different Work Packages may be at different steps, but we will start in the first wave of scaling backstopping with more mature innovations while others will follow. Under that assumption, the light track will start from Q3, 2022 onwards and standard track from Q2, 2023. The advanced track aiming at Initiative-level portfolio prioritization and management would therefore start after April 2025, in a possible second phase of the RAqFS Initiative. By April 2025, the ambition is to have the Innovation Packages and Scaling Readiness approach applied to 51–75% of the total Initiative innovation portfolio.

We have allocated US\$420,000 to implement the Innovation Packages and scaling readiness plan (2022: US\$70,000; 2023: US\$210,000; 2024: US\$140,000). Dedicated activities, deliverables, indicators and line-items are included in the Management Plan's MELIA and Budget Sections.

5. Impact statements

5.1. Nutrition, health and food security

Challenges and prioritization. Aquatic foods are rich sources of bioavailable micronutrients in the diet of billions of people across the global south. They contribute substantially – through direct consumption, income-generation, resource rents and export revenues¹⁷⁶ to global nutrition, health and food security (NHFS) – and could contribute more^{177, 178}. In most RAqFS target countries, production is sufficient to meet demand, but access is inequitably distributed, but in sub-Saharan Africa supply-demand gaps for aquatic foods persist. Investment in maintaining or increasing production and addressing inequities in access to aquatic foods can help to meet dietary requirements for populations in target countries and could be particularly impactful for pregnant and lactating women and children under five years of age¹⁷⁹. However, these potentials are often not realized due to limited awareness of and investment in aquatic foods' contribution to NHFS, compounded by power asymmetries in governance of aquatic commons that exclude the nutritionally vulnerable from access to AqFS benefits.

Research questions. To address these challenges, the Initiative will investigate: How the knowledge deficits that hinder AqFS inclusion in NHFS policies can be overcome (WP1, RQ1.2.2)? What types of partnerships can accelerate inclusion of aquatic foods in on-going food system transitions to healthier and more nutritious diets (WP2, RQ2.2.1)? How AqFS actors can be supported to claim space for food production in increasingly crowded coastal waters (WP2, RQ 2.3.1)? How to implement the most effective pathways to scale “nutritionally sensitive” integrated aquatic food systems (e.g., rice and fish; WP3, RQ 3.1.2)? What the benefits are of increased access to improved strains of farmed fish by women, men and youth smallholders (WP4, RQ4.3.2)? What is needed to scale promising new technologies to reduce food waste and loss in value chains and make nutritious new aquatic food products accessible to nutritionally vulnerable consumers? (WP5, RQ5.2.1)

Components of Work Packages – outputs and outcomes. Work to develop, test and disseminate an “Aquatic Food Systems Sustainability” index (OP1.2.2.3), built from integrated publicly available AqFS databases (OP1.2.2.1) will better track and report in real time significant changes in AqFS that have potential impact on NHFS policies and investments. New and more equitable partnerships across sectors and levels of governance (OP2.4), will co-produce nutrition-sensitive and culturally preferred AqFS knowledge and practices. Lessons from scaling an open-access socially inclusive rice-fish decision-support tool (OP3.1.2.1) will bring nutritional benefits to 5,000 smallholder households through the adoption of rice and fish integrated production systems, while increased access to improved strains of farmed fish, verified through impact assessments (OP4.3.2.1).

Measuring performance and results. Eol outcome is that RAqFS bring healthier and more nutritious diets (inclusive of aquatic foods) to an additional 700,000 individuals, at least 50% of whom are women relative to the 2021 baseline. The number of people consuming more fish is the metric to be used and monitored.

Partners. Key demand partners include Indigenous community organizations, small-scale fisherfolk and wetland farmers, farmer cooperatives and women's self-help groups, and public health nutrition departments in state and national governments. Innovation partners include the above demand partners, plus universities (e.g., Khulna University, ANCORS) NGOs (e.g., BRAC, PointB). Scaling partners include UN FAO, private sector companies (e.g., Aquaspark), local and international NGOs, and civil society organizations (e.g., HKI, Safe Water Network).

Human resources and capacity development of Initiative team. NHFS work is included in all Work Packages and will be guided by inputs from a senior nutrition and health expert, supported by 8% of the

global cross-cutting budget. Dedicated nutrition and health expertise is also allocated within each WP, and partnership with health sector organizations is planned and budgeted within each country. Social and economic equity is ensured by close synergies with the gender and social inclusion cross-cutting team and dedicated expertise and partnerships within each Work Package and region.

5.2. Poverty reduction, livelihoods and jobs

Challenges and prioritization. More than 90% of the world's fisherfolk are characterized as “small-scale”. Most are in the Global South and the majority work in production systems and value chains associated with capture-fisheries. Beyond just income poverty, small-scale aquatic food producers face a number of socio-institutional challenges including landlessness, lack of access to health and education, financial exclusion, and marginalization from political decision making. Therefore, it is paramount that the CGIAR investment is directed towards poverty eradication and creating viable livelihood opportunities among these groups. There are more than 70 million people (50% women) involved in production and distribution of aquatic foods in RAqFS target countries. For those, access to aquatic commons or farm-based production systems is an important social safety net, or a significant wealth-generating opportunity – or, often, both^{180,181}. The AqFS actors will benefit from the Initiative's inclusive socio-technical innovations (e.g., improved fish strains; improved natural resource governance); more rapid scaling of these innovations through novel and transformed partnerships – leading to better inclusion of AqFS demands in policy and agrifood sector investments.

Research questions. To address these challenges, the Initiative will investigate: How can the rights and practices of traditional, indigenous and small-scale food system actors be elevated in the blue economy (WP2, RQ2.3)? How can inclusive technologies and practices for aquatic foods be most effectively incorporated in water resources projects and plans (WP3, RQ3.2.2)? What are the benefits of increased access to improved farmed fish strains by women, men, and youth smallholders (WP4, RQ4.3.2.)? How can job-creating and livelihood-enhancing technologies be scaled more rapidly through AquaLabs (WP5, RQ5.2)?

Components of Work Packages. Dialogues between AqFS actors and “blue economy” planners and stakeholders (WP2) will identify risks and opportunities in maritime sector employment (OP2.5), enabling indigenous, traditional and small-scale food system actors in two island nations in Asia-Pacific and two South Asian countries bordering the Bay of Bengal to prosper. In inland waters (WP3) uptake of a socially inclusive planning tool for integrated rice-fish cultivation (OP3.1.2.1) will maintain livelihoods and generate cash income for >50,000 small-scale farmer-fishers on floodplains, riverbanks and lakeshores in four countries. New jobs in aquaculture production systems and in aquatic foods value chains will be generated by 10–40% profitability increases from genetic gains in Nigeria, India and Bangladesh (WP4) and additional innovations in farming systems, market chains and food environments in Solomon Islands, Bangladesh and Zambia (WP5).

Measuring performance and results. Cross-initiative activities will collectively result at the end of the Initiative in secure rights and livelihood benefits for 100,000 small-scale actors in aquatic food systems. The number of small-scale actors benefitting/adopting improved pathways and the number of people with improved livelihoods are the metric to be used to measure progress on this Impact Area.

Partners. Key demand partners include Ministries of Agriculture, Fisheries, Irrigation, Water and Land, Finance in focus countries, local government institutions, farmers' organizations, civil society organizations, and bilateral and multilateral funders. Innovation partners include farmers' organizations and networks (e.g., African Women Fish Processors and Traders Network).

Human resources and capacity development of Initiative team. The Initiative's work in this Impact Area will be led by a senior social scientist specializing in social and economic inclusion (including gender), with 8% of cross-cutting budget supporting coordination across WPs. Additionally, each WP and country supporting research in this Impact Area will have multidisciplinary specialists in livelihoods, gender and social and economic development. Partner organizations bring national expertise.

5.3. Gender equality, youth and social inclusion

Challenges and prioritization. Gender equality, women's empowerment and youth flourishing are globally recognized priorities, yet inequalities persist. Gender inequalities and inequities¹⁸² in aquatic food means women: (i) have less ownership and control of assets; (ii) have less power in making decisions in their households (purchases, farming, trading) and in their communities (natural resources/fisheries management)¹⁸³; (iii) bear a greater share of unpaid work, are paid less and tend to be involved in less profitable nodes of the value chains and (iv) may have restricted mobility, market access and economic participation¹⁸⁴, and consume smaller portions (or none) of micro-nutrient rich foods such fish, when compared to men and boys, making them to be prone to malnutrition. These inequalities have been exacerbated by the effects of COVID-19¹⁸⁵ and increase in climate hazards and other shocks. To address these challenges, RAqFS will examine: (i) gender inclusiveness and responsiveness in innovations (technological, social, financial and institutional); (ii) ways of wealth generation and improving livelihoods of people relying on SSF and Sustainable Aquaculture; (iii) inclusive governance of land and water commons; and (iv) underlying structural barriers through gender transformative approaches (GTA).

Research questions. RAqFS examines: How can national civil society movements enable improved resilience of coastal communities experiencing change (WP2, RQ2.1)? What is the most effective pathway for implementing planning guidelines for (gender) equitable inclusion of aquatic foods in large-scale water management plans and program (WP3, RQ3.1.2)? What are the benefits of increased access to improved strains by women, men, and youth smallholders (WP4, RQ4.3.2)? In addition, AquaData (WP1) and AquaLabs (WP5) both ask how these components of the agrifood research systems can be gender inclusive and, where possible, gender transformative.

Components of Work Packages contributing to gender-related outputs and outcomes are: gender-disaggregated data in all databases and increased use of gender metrics and tools (e.g. WIFI) to inform policy and investment choices (WP1), IEC materials on community-led management and development that enable uptake at greater scale and which strengthen collective action (OP2.2), dynamic data systems and harmonized national databases for monitoring reach and uptake of sustainable practices as well as resource utilization/status (OP2.3), open-access scientific articles and databases documenting the socially inclusive upscaling of aquatic-food inclusive decision-support tools (e.g. for rice and fish; OP3.1.2.1) and impact assessment of increased access to improved strains (OP4.3.2.1). AquaLabs designed with full participation of women and youth, will help to accelerate existing innovations in socially just and inclusive ways and to develop gender-transformative innovation capacity in national AqFS (WP5, all outputs and outcomes).

Measuring performance and results. The EoI outcome considered is that gender-transformative strategies to enhance integrated food, livelihood and water use outcomes in multifunctional land- and waterscapes be adopted by national stakeholders in two Asian and two African countries. The number of GTAs developed and the number partners/stakeholder adopting gender-transformative strategies by country are the indicators measuring the performance of RAqFS on this Impact Area.

Partners. National and local government institutions (e.g., Western Province Provincial Government, Solomon Islands; Women and Child Development Department, Odisha) national and international NGOs

and women farmers organized or in formal groups are among the demand partners. Potential innovation and scaling partners include NGOs (e.g., Save the Children), union and network of farmers (e.g., African Women Fish Processors and Traders Network, Orissa Traditional Fish Workers Union) as well as civil society organizations.

Human resources and capacity development of Initiative team. The Initiative's work in this Impact Area will be led by a senior gender specialist, with 8% of cross-cutting budget supporting coordination across WPs and specific country analysis. Additionally, WP2 and WP3 will have gender and social inclusion researchers embedded into the research teams.

5.4. Climate adaptation and mitigation

Challenges and prioritization. Global climate change already impacts global food systems and is predicted to accelerate in the coming years. AqFS and the people who depend on them are particularly affected through gradual warming, ocean acidification, de-oxygenation, sea-level rise and changes in the frequency, intensity, and location of extreme events. By 2100, marine and freshwater fisheries and freshwater aquaculture in all countries are expected to face high levels of climate threat, with low-income countries experiencing the most significant risk to health, equity and sustainability as a result¹⁸⁶. Therefore, in line with Article 2 of the Paris Agreement, the Initiative will contribute to both the reduction of GHG emissions and enhance ecological and social resilience through its improved fish strains, better management practices, integrated fish-rice production systems, and fish friendly irrigation systems. RAqFS will thus offer cost-effective and equitable pathways to transition to low-carbon aquatic foods food systems.

Research questions. To respond to these challenges, the Initiative will consider: What are the social-economic and environmental benefits and trade-offs of production and consumption of sustainable aquatic foods in a changing climate (WP1, RQ1.3.2.)? How do climate and other external drivers of landscape integrity create vulnerability to water and land foodscapes (WP3, RQ3.3.1.)? What is the most effective breeding strategy to develop faster growing tilapia and carp with additional resilience traits that improve returns for smallholders while reducing environmental impact – including GHG emission reduction (WP4, RQ4.1.1. and RQ4.1.2)? WP2 and WP5, by asking questions around sustainable ocean development pathways and efficient production systems and value chains also contribute indirectly towards climate mitigation and adaptation.

Components of Work Packages. Each Work Package seeks to contribute, through different system pathways, to increasing the climate change resilience of the AqFS and lowering emissions associated with the sector. Outputs and outcomes from these pathways are: new knowledge and case studies of the impact of digital decision support on climate resilience (OP1.3.2.1); participatory and quantitative risk and vulnerability maps and scenarios (OP3.3.1.1); faster growing tilapia strains released through PPP to farmers from 2022 and with at least one additional resilience trait, by 2024 (OP4.1.1.1); faster growing (+30%) rohu carp strains released to farmers from 2022 and silver carp in 2024 (OP4.1.2.1); reduced waste and loss in AqFS (OP5.2.1.1) and transition to lower carbon AqFS, such as seaweeds, accelerated by AquaLabs (OP5.2.1.1)

Measuring performance and results. Expected impacts include: improved strains of farmed fish will result in a 25% reduction in greenhouse gas emissions (GHG) and 10% increase in water and nutrient-use efficiency per MT of fish produced – equivalent to 6.25 MT CO₂ eq per year. Conservatively, we have not included potentially positive impacts mitigation and adaptation benefits from improved management of rice-fish systems, improved stewardship of coastal ecosystems for both fishery productivity, livelihood resilience, and carbon sequestration and reduced waste and loss in AqFS value-chains.

Partners. The demand partners include governmental organizations (e.g., Ministry of Fisheries and Marine Resources of Solomon Islands), NGOs, as well as farmers themselves. Universities (e.g., Stockholm Resilience Center), NGOs, private organization (e.g., Smart Power, PumpTech) and NARS (e.g., Natural Resources Development College in Zambia) can be mobilized as innovation partners while upscaling partners will include NGOs (e.g., MercyCorps) private organizations and farmers groups.

Human resources and capacity development of Initiative team. Climate adaptation and mitigation is considered in all Work Packages and will be guided by inputs from a senior expert, supported by 8% of the global cross-cutting budget. Dedicated expertise is also allocated within each WP and will be supported by global and in-country partnerships.

5.5. Environmental health and biodiversity

Challenges and prioritization Functional aquatic ecosystems in the tropics are highly biodiverse but face a range of environmental threats. In aquaculture, intensification, reduced reliance on wild-caught fish meal in feeds and improved management practices all offer routes to a “restorative aquaculture”¹⁸⁷. improved management practices for inland water bodies, terrestrial agroecosystems (such as rice field fisheries) and in coastal fisheries ecosystems can all help to optimize production of diverse, nutritious foods while conserving biodiversity and ecosystem functions (including carbon sequestration – see 5.4)¹⁸⁸. Positive outcomes from research and policy engagement by the CGIAR in these processes, though this and other initiatives, will result in maintenance or restoration of ecosystem function and biodiversity in 9,991 sq km of coastal and riverine/floodplain habitats in our target countries. Community engagement in management of coastal ecosystems, will result in restoration and sustainable management of 0.25 million ha of biodiverse wetlands in SE Asia and Sub-Saharan Africa by 2030.

Research questions in all five Work Packages address environment and biodiversity conservation as a cross-cutting issue. In WP1, we ask how AqFS innovations contribute to or challenge targets for sustainable development, ecosystem restoration, and climate resilience (RQ1.1.2). WP2 emphasises research of modes of effective engagement and empowerment of local partners and co-production of knowledge on the environmental sustainability of resource systems they steward. WP3 similarly asks how multi-stakeholder forums can scale proven technologies and institutional structures that keep biodiverse aquatic foods within modified land-waterscapes. WP4 addresses key aspects of aquaculture innovation, asking how breeding can reduce environmental impact, while delivering economic benefits to smallholders. In WP5, questions on how to scale innovations to reduce waste and loss in value chains and how to bring low-trophic level species (seaweeds, bivalves) into profitable production all have strong environmental components (RQ5.2.1.1).

Components of Work Packages. Environmental characterization of aquatic food systems developed and implemented in seven countries and/or key geographies (WP1, OP1.1.1.2), community access rights and management systems for improved resource governance (WP2, O2.1.1) and community-led management and development to maintain food production in the blue economy (WP2, O2.1.2) support goals of aquatic resources sustainability and biodiversity in marine spatial planning. Similar processes in inland waters and wetlands (WP3) will ensure that water and land management are integrated, lessen environmental impacts, enhance agroecosystem functions and restore capture fisheries at river-basin level (WP2, O3.1.2).

Measuring performance and results. In Zambia and Cambodia, improved governance of 50,000 hectares of multifunctional water and land systems supports healthier ecosystems (fish stock restoration +25%). In Solomon Islands, Timor Leste, Bangladesh and Odisha State, India, 110,000 km of coastal

waters are brought under local fishing community stewardship and/or conservation management, leading to conservation or restoration of ecosystem function and biodiversity. Metrics for results measurements are still being developed with conservation NGO partners. Potential indirect benefits to environment and conservation from improved data (WP1), improved environmental performance in aquaculture (WP4, 5) and food system efficiency gains (WP5) have not been calculated.

Partners: Synergies between CGIAR development goals and environmental conservation will be pursued through a network of local and international conservation NGOs as well as community natural resource management groups (see Section 5.2) and government partners (e.g., Water Resources Commission, Ghana). All are involved in driving demand, innovating, and scaling at national and international levels, according to their remits. They include: Myanmar Mangrove Service Network, Environmental Defence Fund, Marine Conservation Council (MCC), Conservation International, International Union for the Conservation of Nature (IUCN), Flora and Fauna International (FFI), UNESCO, Wildfowl & Wetlands Trust (WWT), Wildlife Conservation Society (WCS) and James Cook University (JCU).

Human resources and capacity development of Initiative team: This Impact Area will be led by a senior scientist supported by 8% of the cross-cutting budget and natural resources management expertise is included in WPs 1,2 and 3. We have strong and evolving partnerships with conservation organizations that currently dominate funding to aquatic ecosystems conservation and they are increasingly linking conservation to food systems. WCS and JCU will co-fund a postdoctoral position within the Initiative (WP2).

6. Monitoring, evaluation, learning and impact assessment (MELIA)

6.1. Result framework

CGIAR Impact Areas				
Nutrition, health and food security	Poverty reduction, livelihoods and jobs	Gender equality, youth and social inclusion	Climate adaptation and mitigation	Environmental health and biodiversity
Collective global 2030 targets (The collective global 2030 targets are available centrally here to save space).				
End hunger for all and enable affordable, healthy diets for the 3 billion people who do not currently have access to safe and nutritious food.	Reduce by at least half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Close the gender gap in rights to economic resources, access to ownership and control over land and natural resources for over 500 million women who work in food, land and water systems.	Turn agriculture and forest systems into a net sink for carbon by 2050, with emissions from agriculture decreasing by 1 Gt per year by 2030 and reaching a floor of 5 Gt per year by 2050.	Stay within planetary and regional environmental boundaries: consumptive water use in food production of less than 2,500 km ³ per year (with a focus on the most stressed basins), zero net deforestation, nitrogen application of 90 Tg per year (with a redistribution towards low-input farming systems) and increased use efficiency; and phosphorus application of 10 Tg per year
Common impact indicators				
#people meeting minimum micronutrient requirements	#people benefiting from relevant CGIAR innovations	#women benefiting from relevant CGIAR innovations	#tonnes CO ₂ equivalent emissions	#ha under improved management
SDG targets				
2.1; 2.2; 2.3; 2.4; 2.5	1.1; 1.2; 1.5	5.a;	6.4; 6.6; 13.1; 13.B	14.2; 14.7; 14.a; 14.b; 15.1
Action Areas Outcomes and Indicators				
Action Area outcomes			Action Area outcome indicators	
GI 2 - CGIAR & partners use high-quality market intelligence to guide the development of new varieties to meet the needs and expectations of a wide-range of users, with special attention to marginalized groups. GI 5 - Cooperation and co-investment by CGIAR, public- and private-sector seed-system actors support coordinated and effective research and investment in the sector. GI 6 - Seed-sector actors' investments pipelines are profitable and effective in scaling-up new varieties from CGIAR breeding. RAFS 1 - Smallholder farmers use resource-efficient and climate-smart technologies and practices to enhance their livelihoods, environmental health and biodiversity. RAFS 2 - Research and scaling organizations enhance their capabilities to develop and disseminate RAFS-related innovations. ST & RAFS 2 - National and local governments utilize enhanced capacity (skills, systems and culture) to assess and apply research evidence and data in policy making process. ST 1 - Farmers use technologies or practices that contribute to improved livelihoods, enhance environmental health and biodiversity, are apt in a context of climate change, and sustain natural resources.			Gli 2.1 Proportion of new released varieties developed in alignment with market intelligence-informed product profiles Gli 5.2 Number of public/private sector cooperation agreements Gli 6.1 number of CGIAR-NARES-SME new varieties being scaled-up by seed-sector actors RAFSi 1.1 Number of resource-efficient and climate-smart technologies at stage IV (uptake by next user), disaggregated by type RAFSi 2.1 Number of organizations STRAFSi 2.1 Number of policies/strategies/laws/regulations/budgets/investments/curricula (and similar) at different scales that	

ST 3 - Governments and other actors take decisions to reduce the environmental footprint of food systems from damaging to nature positive.	were modified in design or implementation, with evidence that the change was informed by CGIAR research. STi 1.2 - Number of farmers using agro-ecological practices disaggregated by gender STi 3.1 Area of land under improved mitigation plans (or area that is decreasing in net carbon emissions – more ambitious and longer term)
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Initiative and Work Package outcomes, outputs and indicators											
Result type	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of data collection	Baseline value	Baseline year	Target value	Target year
Eol Outcome	Scaling partners and stakeholders in 11 countries use improved knowledge systems and data to inform at least five evidence-based investments supporting aquatic food systems transformation.	Number of stakeholders at national level adopting/deploying; Policies (strategies, investment, law/legislation) adopted; Platforms and/or tools/systems practices developed/adopted	Number	National, Regional, Global	Primary (Initiative monitoring records/database; reports); meetings; Secondary sources (partners, national statistics/database; official documents/news)	Stakeholder consultations/surveys; Official news; Online information resources	Annual	n/a	n/a	5 5 2	2025
Eol Outcome	Improved management and co-production of sustainable development pathways secure rights and livelihood benefits for 100,000 small-scale actors in aquatic food systems in Asia-Pacific and bring more nutritious diets to 700,000.	Small-scale actors benefitting/adopting improved pathways; People with improved livelihoods; People consuming more fish	Number/hh Percent Number	Asia; Pacific	Reports/Initiative monitoring Evaluations & Impact studies	Surveys; Focus groups;	Annual	n/a	n/a	100,000 70% of adopters 700,000	2025
Eol Outcome	Gender-transformative strategies to enhance integrated food, livelihood, and water use outcomes in multifunctional land- and waterscapes adopted by national stakeholders in 2 Asian and 2 African countries.	Number of GTAs developed; Number partners/stakeholder adopting gender-transformative strategies by country	Number; Number	Asia; Africa;	Reports/Initiative monitoring Evaluations & Impact studies	Stakeholder consultations/surveys; Focus groups	Annual	n/a	n/a	4 4	2025
Eol Outcome	At least 2 of tilapia, carp and catfish strains demonstrate increased productivity (+30%) and environmental performance (-25% GHG emission reduction) in 1 African & 2 Asian countries	Strains by type with increased productivity (+30%) by country; Strains with increased environmental performance (-25% GHG emission reduction) per country. Productivity value Input/output CO2 equivalent emission reduced;	Number	Asia; Africa;	Reports/Initiative monitoring Evaluations & Impact studies; Productivity & environmental performance studies	Fields/farmers surveys; Stakeholder surveys; data from scientific assessment studies	Annual	n/a	n/a	1 strain by type in at least 3 countries 1 strain by type in at least 3 countries	2025

			Ratio Input/output Mt CO2-eq./yr					Current productivity Current CO2 eq. emission	2022	+30%		
									2022	-25%		
Eol Outcome	Aquatic food system labs in Solomon Islands, Bangladesh and Zambia increase national innovation systems' ability to identify, evaluate and scale socio-technical innovations	AquaLab established and operating in the 3 countries; Socio-technical innovations by stage	Number	Asia; Africa; Pacific	Reports/Initiative monitoring Evaluations & Impact studies; Stakeholders' data;	Fields & Stakeholder consultations/surveys;	Annual	n/a	n/a	1 x country 3 x country	2025	
AquaData												
WP 1 Outcome	O1.1.1. Stakeholders in 3 countries co-produce strategic actions and allocate funding to meet data needs and overcome gaps in evidence	Actions/strategies/investment developed;	Number/ US \$	Bangladesh, India, Nigeria	Reports/Initiative monitoring database Partners; Official documents/news)	Fields & Stakeholder consultations/surveys;	Annual	n/a	n/a	3	2025	
WP 1 Outcome	O1.1.3. Methodological innovations and tools, including digital solutions, available for uptake by partners and stakeholders in 5 countries, to capture and analyze data in aquatic food systems	Countries up-taking innovations/digital tools	Number	Bangladesh, India, Nigeria, Timor-Leste, Zambia	Reports/Initiative monitoring database Partners data;	Fields & Stakeholder consultations/surveys;	Annual	n/a	n/a	5	2025	
WP 1 Outcome	O1.2.1. Open-access integrated aquatic food systems databases, knowledge and profiles produced in at least 4 key geographies	Countries where open-access integrated aquatic food systems databases, knowledge and profiles are available	Number	Bangladesh, Nigeria, Timor-Leste, Zambia	Reports/Initiative monitoring database Partners; Online knowledge based/information sites	Publications records; knowledge repositories	Annual	n/a	n/a	4	2025	
WP 1 Outcome	O1.2.2. At least 3 national profiles on the status of aquatic food systems co-developed and co-produced with partners and stakeholders	National profiles	Number	Bangladesh, India, Nigeria	Reports/Initiative monitoring database Partners; Online knowledge based/information sites	Publications; Stakeholder consultations	Annual	n/a	n/a	3	2025	
WP 1 Outcome	O1.3.1. Governments, donors, private sector and local communities in 4 countries use data and knowledge to implement evidence-based decisions and changes	Countries using data and knowledge to implement evidence-based decisions and changes; Policies, strategies, investment as result of data and knowledge use	Number	Bangladesh, Cambodia, Ghana, India, Myanmar, Nigeria, Solomon Islands,	Reports/Initiative monitoring database Partners data; Official documents/news)	Official news/documents; Secondary information sources;	Annual	n/a	n/a	4 4	2025	

				Timor-Leste, Zambia		Stakeholder consultation/surveys; KII					
WP 1 Outcome	O1.3.2. Partners and stakeholders co-develop near-real-time data system to enable a timely and transparent decision-making process	Stakeholders in 3 countries co-developing near-real-time data system;	Number	Bangladesh, India, Timor-Leste	Reports/Initiative monitoring database Partners; Online sites/database	Stakeholder consultation; records tracking-web search;	Annual	n/a	n/a	3	2025
WP 1 Output	OP1.1.1.1. Synthesized information, education and communication materials (IEC) on data needs and gaps in AFS that identify priorities and principles for design and implementation of data ecosystems available in 5 countries	Countries where communication materials (IEC) are produced;	Number	Same as outcome	Reports/Initiative monitoring database	Publications records; Stakeholder consultations	Annual	n/a	n/a	5	2023
WP 1 Output	OP1.1.1.2. Socio-economic and environmental characterization of aquatic food systems developed and implemented in 7 different countries and/or key geographies	Countries with socio-economic and environmental characterization of aquatic food systems developed	Number	Same as outcome	Reports/Initiative monitoring database Partners;	Publications records; Web search; Stakeholder surveys; KII	Annual	n/a	n/a	7	2024
WP 1 Output	OP1.1.2.1 A research and Innovation assessment framework developed to evaluate impact of AFS innovations across Work Packages 2-5	Framework developed	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publication Records	Annual	n/a	n/a	1	2024
WP 1 Output	OP1.2.1.1 At least 2 real-time databases tracking AFS performance indicators such as prices of feeds and fish, levels of fishing effort etc. developed	Databases available tracking at least 1 relevant indicator	Number	Same as outcome	Reports/Initiative monitoring (MIS); Online database(s)	Database data; Knowledge repository;	Annual	n/a	n/a	2	2023
WP 1 Output	OP1.2.1.2. Synthesized IEC materials on co-design, co-testing and scaling of data gathering tools and analytical methods based on digital	Countries for which IEC materials are developed	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records/ repository;	Quarterly	n/a	n/a	4	2024

	approaches and artificial intelligence										
WP 1 Output	OP1.2.2.1. Integrated, publicly available aquatic food systems databases, assembled from existing socio-economic, climate and environmental datasets available in at least 3 countries	Countries accessing aquatic food systems databases	Number	Same as outcome	Reports/Initiative monitoring database; Online database (s)	Publications records; Web search	Annual	n/a	n/a	4	2024
WP 1 Output	OP1.2.2.2. A unified monitoring, evaluation and learning framework for aquatic food systems in key target countries co-developed with partners and stakeholders (e.g., MEL4SSF)	Framework developed; Countries part of the framework;	Number	Same as outcome	Reports/Initiative monitoring database; Partners data	Stakeholder consultation; Web search; Official news;	Annual	n/a	n/a	1 3	2023 2024
WP 1 Output	OP1.2.2.3. An Aquatic Foods Index evaluating and synthesizing outcomes against performance indicators from OP1.2.2.1 at local, national and international levels	Index available/implemented; Countries using the index	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records; Web sources/news	Annual	n/a	n/a	1 3	2023 2024
WP 1 Output	OP1.3.1.1 Synthesized IEC materials on artificial intelligence data, tools, approaches and partnerships to support policy development and implementation for AFS transformation	Countries for which IEC materials are developed	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records	Quarterly	n/a	n/a	3	2024
WP 1 Output	OP1.3.2.1 New knowledge and case studies of the impact of digital decision support on climate resilience, socio-economic benefits and environmental sustainability in aquatic ecosystems	Countries for which open access synthesis publications produced	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records;	Quarterly	n/a	n/a	3	2024
WP 1 Output	OP1.3.3.1 At least 3 data use cases co-developed by researchers, public and private sectors, and local communities to affect policy, investments and decision-making at local, sub-national and national levels	Data use cases co-developed;	Number	Same as outcome	Reports/Initiative monitoring database (MIS); Knowledge sharing sites; Partners' data.	Publications records; Official news; Stakeholder consultations	Annual	n/a	n/a	3	2024
WP 1 Output	OP1.3.3.2 At least 3 new partnerships, capacity building and dissemination	Partner agreements; Cap. Dev. Activities/Dissemination Approaches;	Number	Same as outcome	Reports/Initiative monitoring database; Stakeholders;	Publications; Stakeholder consultations;	Annual	n/a	n/a	3	2023

	approaches to increase demand and uptake of FAIR and inclusive AFS data for decision-making established				Secondary sources;	Web search; Official news/information channels						
Aqua+Partners: Partnering to realize the benefits of aquatic foods in sustainable development												
WP2 Outcome	O2.1.1. Community access rights and management systems supported for improved and equitable governance of aquatic resources	Policies/strategies to improve access rights and management systems adopted	Number	Solomon Islands; Timor-Leste; India (Odisha State); Bangladesh	Reports/Initiative monitoring database Partners data; Official documents/news)	Household questionnaires, KIIs, Stakeholder consultations; Official news	Annual	n/a	n/a	4	2025	
WP2 Outcome	O2.1.2. Livelihoods of coastal communities made more resilient from community-led management and development	Community-led management and development solutions for more resilient livelihood identified and implemented by geography	Number	Solomon Islands; Timor-Leste; India (Odisha State); Bangladesh	Initiative monitoring database;	Household questionnaires, KIIs, secondary sources	Annual	n/a	n/a	At least 1 by country	2025	
WP2 Outcome	O2.1.3. National programs operate more effective MELIA systems in support of traditional access rights and management systems	Countries operating more effective MELIA systems in their national programs;	Number	Solomon Islands; Timor-Leste; India (Odisha State); Bangladesh	Reports/Initiative monitoring database Partners data; Official documents/news)	Official News; Stakeholder interviews	Annual	n/a	n/a	4	2025	
WP2 Outcome	O2.2.1. National policies and programs better aligned to support autonomous efforts to govern aquatic food systems in ways that are advantageous to its small-scale actors	Policies/programs improved in support to more inclusive governance of aquatic food systems;	Number	Solomon Islands; Timor-Leste; India (Odisha State); Bangladesh	Reports/Initiative monitoring database Partners data; Official documents/news)	Official news/documents; Stakeholder consultation; Secondary sources	Annual	n/a	n/a	4	2025	
WP2 Outcome	O2.2.2. Innovative research and partnerships that create spaces for equitable dialogue, identification of new impact pathways as well as redressing and challenging power imbalances leading to strong upward and downward accountability mechanisms	Partnerships established/agreement signed;	Number	Solomon Islands; Timor-Leste; India (Odisha State); Bangladesh	Reports/Initiative monitoring database Partners data; Official documents/news); Agreements	Stakeholder consultations; Agreement documents	Annual	n/a	n/a	4	2025	
WP2 Outcome	O2.3.1 New research-for-development connections (spanning private sector, research, eNGO, human rights-groups, government sectors) enabling coordination, information	Novel platforms/networks/partnerships established; Cap Dev activities;	Number	Same as outcome	Reports/Initiative monitoring database Partners data; Online sources	Stakeholder Interviews; Publications records; Cap dev records	Annual	n/a	n/a	At least 1 at national level and 1 international level	2024	

	and awareness for traditional, Indigenous and small-scale aquatic food system actors											
WP 2 Output	OP2.1.1.1. Communities collaborate and share knowledge and experiences for management and locally led development	Networks/collaboration/lesson sharing events.	Number	Same as outcome	Reports/Initiative monitoring database Partners data; Online sources	Stakeholder Interviews; Publications records; Cap dev records	Annual	n/a	n/a	4	2024	
WP 2 Output	OP2.1.1.2. National information, education and communication (IEC) materials on community-led management and development that enable uptake at greater scale and strengthens collective action.	Countries for which IEC products published/available	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records;	Quarterly	n/a	n/a	4	2024	
WP 2 Output	OP2.1.1.3. Harmonized national databases for monitoring reach and uptake of sustainable practices as well as resource utilization/status	Countries with national harmonized databases	Number	Same as outcome	Reports/Initiative monitoring database; Partners data; Official news/secondary data	Literature review; Official news; Online records	Annual	n/a	n/a	4	2024	
WP 2 Output	OP2.2.1.1. Sustainable development pathways shaped from forums, with scientific outputs informing policymakers and academia. Including tribal or local language products for small-scale aquatic food system actors supporting their place in development planning.	Co-development events/multi-stakeholders forums to shape Sustainable development pathways for small-scale aquatic food system actors;	Number	Same as outcome	Reports/Initiative monitoring database – cap.dev. data; Partners data; Official news/secondary data	Capacity development records; Stakeholder's consultations; Official news	Annual	n/a	n/a	At least 1 at regional/ international level	2023	
WP 2 Output	OP2.3.1.1. New knowledge on how tensions between local demand and blue economy aspirations can be reconciled, synthesizing the learning of how indigenous, traditional and small-scale producers can thrive in the blue economy	Knowledge products delivered	Number	Same as outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publication records	Quarterly	n/a	n/a	3: - at least 1 peer reviewed; - at least 1 with high Altmetric score	2023	
WP 2 Output	OP2.3.1.2. Communication materials (e.g., blogs, briefs, interactive media) and activities (e.g., events, panels) that elevate a voice of small-scale actors	Events/Panels Communication materials	Number	Same as outcome	Reports/Initiative monitoring database – cap.dev. data; Partners data; Official news/secondary data	Capacity development records; Stakeholder's consultations; Official news	Annual	n/a	n/a	At least 1 at regional/ international level 4	2024	

	in international change agendas.											
AquaPlans: Integrated Aquatic Food Systems in Water and Land Foodscapes												
WP3 Outcome	O3.1.1. Smallholder farmers' livelihoods are sustained and incomes are increased through production of aquatic food.	Farmers reporting increased income	Number	Myanmar, Irrawaddy delta	Reports/Initiative monitoring; Evaluations & Impact studies	Field studies; farmers' surveys; Semi-structured interviews;	Annual	n/a	2022	5000	2025	
WP3 Outcome	O3.1.2. Water and land management are integrated, lessen environmental impacts, enhance agroecosystem functions and restore capture-fisheries at basin level.	Capture fisheries levels/overfished stock Farmers using agro-ecological practices; Area of land/water under improved mitigation plans	% Number Hectares	Myanmar, Irrawaddy delta	Reports/Initiative monitoring; Evaluations & Impact studies	Household questionnaires, KIIs, secondary sources	Annual	tbd	2022	+25% 5000 25,000	2025	
WP3 Outcome	O3.2.1. Food security and nutrition are improved for local households through increased micronutrient-rich fish consumption, especially for women and young children	Households consuming more fish disaggregated by gender and age (young children)	HH	Ghana, North East	Reports/Initiative monitoring; Evaluations & Impact studies	Household questionnaires, KIIs, secondary sources	Annual	n/a	n/a	5000	2025	
WP3 Outcome	O3.2.2. Rights and access to fishery and culture systems and their benefits (use) include smallholders, as well as landless through community fisheries	Polices/strategies influenced to improve rights and access;	Number	Ghana, North East	Reports/Initiative monitoring database; Partners data; Official news/secondary data	Official news; Stakeholder consultation;	Annual	n/a	n/a	1	2025	
WP3 Outcome	O3.3.1. Multiple stakeholders jointly adopt multifunctional land and water system approach at the landscape level to manage risks and co-design and co-implement sustainable and integrated development scenarios.	Area under improved multifunctional land and water system;	Hectares Number	Zambia, Kafue lower basin Cambodia, Tonle Sap	Reports/Initiative monitoring database; Evaluation Studies; Partners data; Official news/secondary data	Stakeholder consultation; secondary sources; official news/web search.	Annual	n/a	n/a	50,000	2025	
WP3 Outcome	O3.3.2. There is improved resilience of multifunctional production systems to critical drivers of change, including climate change and upstream water resource development.	Resource-efficient and climate-smart technologies/innovations;	Number	Zambia, Kafue lower basin Cambodia, Tonle Sap	Reports/Initiative monitoring database; Partners data; Official news/secondary data	Field surveys; Official news; Stakeholder consultation; Secondary official data consultation	Annual	n/a	n/a	4	2024	
WP 3 Output	OP3.1.1.1. Rice and fish decision support tool deployed by at least 2 partners/organizations	Countries in which decision support tool has been deployed;	Number	Same as Outcome	Reports/Initiative monitoring database; Partners' data	Field records; Stakeholder consultation	Annual	n/a	n/a	2	2024	

WP 3 Output	OP3.1.1.2. Policy briefs of design and implementation principles of rice and fish decision support tool	Briefs	Number	Same as Outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Knowledge records/repositories (MIS)	Quarterly	n/a	n/a	1	2024
WP 3 Output	OP3.1.2.1. Open access scientific articles and databases documenting the upscaling of the rice and fish decision support tool	OA scientific publications; Datasets	Number	Same as Outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records	Quarterly	n/a	n/a	3	2024
WP 3 Output	OP3.1.2.2. Vibrant partnerships with scaling partners using learning to adapt their programs	Partnerships established/partners engaged	Number	Same as Outcome	Reports/Initiative monitoring database; Partners' data	Records – agreement documents; Stakeholder meeting records	Annual	n/a	n/a	2	2024
WP 3 Output	OP3.2.1.1. Policy briefs of design and implementation principles of aquatic food production in small dams.	Briefs	Number	Same as Outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Publications records/repositories	Quarterly	n/a	n/a	1	2024
WP 3 Output	OP3.2.1.2. Aquatic food production in small dams piloted in at least 4 sites.	Sites piloted; Farmers engaged/adopting	Number	Same as Outcome	Reports/Initiative monitoring database;	Field monitoring – surveys; mapping	Annual	n/a	n/a	4 1000	2024
WP 3 Output	OP3.2.1.3. Vibrant multi-stakeholder platforms at the national and sub-national levels mobilizing evidence to include integrated systems into project design and policies.	Multi-stakeholder platforms	Number	Same as Outcome	Reports/Initiative monitoring database; Partners' data; Online sources	Stakeholder meeting records; Events records; Official news; Online info	Quarterly	n/a	n/a	At least 1	2024
WP 3 Output	OP3.2.1.4. Tertiary education module on fish-friendly irrigation and integrated production systems developed and delivered in water planners and engineers' degrees.	Module available and in use;	Number	Same as Outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Knowledge records/repositories (MIS); Stakeholder consultations.	Quarterly	n/a	n/a	1	2024
WP 3 Output	OP3.2.2.1. Open access scientific articles and databases documenting the achievements of fish-friendly irrigation programs or pilots	OA scientific articles and databases.	Number	Same as Outcome	Reports/Initiative monitoring database; Knowledge sharing sites	Knowledge records/repositories (MIS); web search	Quarterly	n/a	n/a	1 + 1	2024
WP 3 Output	OP3.2.2.2. Vibrant partnerships with scaling partners using learning to adapt their programs.	Partnerships established/partners engaged	Number	Same as Outcome	Reports/Initiative monitoring database; Partners' data	Records – agreement documents; Stakeholder meeting records	Annual	n/a	n/a	2	2024
WP 3 Output	OP3.3.1.1 Participatory and quantitative risk and vulnerability maps and scenarios	Scenarios/maps	Number	Same as Outcome	Reports/Initiative monitoring database	Publications records/repositories	Annual	n/a	n/a	2	2023
WP 3 Output	OP3.3.2.2 Built capacity of inter-sectoral and multi-	Inter-sectoral and multi-stakeholder capacity building activities organized	Number	Same as outcomes	Reports/Initiative monitoring database;	Stakeholder meeting records;	Annual	n/a	n/a	At least 1	2024

	stakeholder actors for governing water and land foodscapes				Partners' data; Online sources	Events records; Official news; Online info						
AquaGenetics: Delivering gains from genetic improvements in farmed fish through public-private partnerships												
WP 4 Outcome	O4.1.1. More efficient methods have been incorporated in fish breeding programs to speed improvements in growth and other traits.	Methods developed; Method incorporated in breeding programs to speed improvements in growth and other traits	Number	Global, West Central Africa Region (Nigeria), South Asia Region (Bangladesh and India).	Initiative monitoring database; Partners' data; Scientific papers/reports;	Breeding protocols; Reports	Annual	n/a	2022	3 3	2024	
WP 4 Outcome	O4.1.2. Measurable progress in improvement of traits in three fish core genetic improvement programs	Genetic improvements measured (quantified) for traits developed in the 3 fish core genetic programs	% or Number	Global, West Central Africa Region (Nigeria), South Asia Region (Bangladesh and India).	Initiative monitoring database; Partners' data; Scientific papers/reports; Assessment studies/datasets	Lab records/data; Scientific assessment/studies; Field surveys;	Annual	Various based on the trait considered	2021	At least 3	2023, 2024, 2025	
WP 4 Outcome	O4.1.3. User trait preferences have been assessed, prioritized and incorporated where feasible in fish genetic improvement programs in 3 countries	Trait preferences assessed & incorporated in fish genetic programs	Number	Global, West Central Africa Region (Nigeria), South Asia Region (Bangladesh and India).	Initiative reports; User trait preferences studies;	Studies; surveys; choice experiments	Annual	n/a	n/a	3	2024	
WP 4 Outcome	O4.2.1. Improved strains with faster growth have been delivered to key dissemination nodes and are available to fish seed suppliers and farmers in target countries.	Improved strains delivered; Suppliers and farmers by country using improved strains	Number Number	Global, West Central Africa Region (Nigeria), South Asia Region (Bangladesh and India).	Initiative reports; monitoring data; dissemination reports; Evaluation/impact studies; Stakeholders' data.	Field surveys; farmers records/mapping; Partners/stakeholders' consultation;	Annual	n/a	n/a	3 20% of suppliers and farmers related to the dissemination nodes	2022, 2023, 2024	
WP 4 Outcome	O4.3.1. Shortcomings in performance (yield gap) have been identified and solutions to these formulated enabling	Yield gap performance identified and report produced. Solution pathways (innovations/tools/decision making/	Number	Nigeria, Bangladesh and India	Initiative reports; Data; Findings communication material; Assessment studies	Farm trials; Surveys; mixed-methods studies	Annual	n/a	n/a	3 3	2023, 2024	

	pathways to optimizing benefits for users	strategies) to close the yield gap identified and report produced	Number								
WP 4 Outcome	O4.3.2. Baseline assessments of key parameters have been completed enabling the future effects of adoption to be assessed.	Key parameters of adoption benefits identified/data (baseline report produced)	Number	West Central Africa Region (Nigeria), South Asia Region (Bangladesh and India).	Initiative reports; Baseline/impact studies data; Monitoring and Evaluation database.	Impact assessment; surveys; semi-structured interviews; stakeholders' consultations	Annual	Various based on the parameter	2021	At least 3	2023, 2024, 2025
WP 4 Output	OP4.1.1.1. Faster growing tilapia strains released to farmers from 2022 and with at least one additional resilience trait, by 2024.	Faster growing tilapia strains released by country	Number	Same as outcome	Initiative reports; Evaluation/impact studies data; Monitoring and Evaluation database.	Farmers' surveys; Semi-structured interviews; stakeholders' consultations	Annual	n/a	n/a	4	2022 and 2024
WP 4 Output	OP4.1.1.2. Efficient index selection protocols.	Index selection protocols available	Number	Same as outcome	Initiative reports; Monitoring database; Datasets	Monitoring MIS review; Knowledge repository review	Quarterly	n/a	n/a	2	2022 and 2024
WP 4 Output	OP4.1.2.1. Faster growing (+30%) <i>rohu</i> carp strains released to farmers from 2022 and silver carp in 2024.	<i>Rohu</i> Carp strains released by country Silver carp Strained released by country	Number	Same as outcome	Initiative reports; Evaluation/impact studies data; Monitoring and Evaluation database.	Farmers' surveys; Semi-structured interviews; stakeholders' consultations	Annual	n/a	n/a	2 1	2024
WP 4 Output	OP4.1.2.2. Efficient selection protocols	Selection protocols available	Number	Same as outcome	Initiative reports; Monitoring database; Datasets	Monitoring MIS review; Knowledge repository review	Quarterly	n/a	n/a	2	2022 and 2024
WP 4 Output	OP4.1.3.1 Hatchery protocols for effective selection for increased growth of African catfish by 2023	African catfish selections hatchery protocols available	Number	Same as outcome	Initiative reports; Monitoring database; Datasets	Monitoring MIS review; Knowledge repository review	Quarterly	n/a	n/a	1	2023
WP 4 Output	OP4.1.3.2. Establishment of an African catfish genetic improvement program by 2024	African catfish genetic improvement program in place;	Number	Same as outcome	Initiative reports; Monitoring database; Knowledge repository; Partnership agreements	Activities' recording; Knowledge products produced; Capacity development activities records;	Annual	n/a	n/a	1	2024
WP 4 Output	OP4.1.2.1. Gender-responsive tilapia and carp customer and product profiles that consider practical trade-offs including environmental and other	Profiles assessed/produced by country	Number	Same as outcome	Initiative reports; Monitoring database; Knowledge repository;	Knowledge repository tracking; Internal Monitoring MIS data check;	Quarterly	n/a	n/a	3	2024

WP 4 Output	OP4.1.2.2. Decision support tools for prioritization of traits	Decision-support tools produced per species	Number	Same as outcome	Initiative reports; Monitoring database;	Knowledge repository tracking; Internal Monitoring data check;	Yearly	n/a	n/a	3	2024
WP 4 Output	OP4.2.1.1. Fish seed supply dissemination models.	Dissemination models available/ready	Number	Same as outcome	Initiative reports; Monitoring database;	Internal Monitoring data check (indicator tracking);	Annual	n/a	n/a	3	2024
WP 4 Output	OP4.2.1.2. Assessment of the effectiveness (adoption and profitability to supplier and farmer) of the tested fish seed supply systems.	Assessments of fish seed supply systems completed by country	Number	Same as outcome	Initiative reports; Monitoring database;	Knowledge repository tracking; Internal Monitoring data check;	Annual	n/a	n/a	3	2025
WP 4 Output	OP4.3.1. Benchmarking data on productivity, profitability, resource use efficiency and GHG emissions: technical and social effects.	Data available; Related communication materials produced;	Number	Same as outcome	Initiative reports; Monitoring database;	Knowledge repository tracking; Internal Monitoring data check;	Quarterly	n/a	n/a	5	2025
WP 4 Output	OP4.3.2. Information on actual health feed and husbandry practices affecting fish performance	Publications and other relevant materials providing key information	Number	Same as outcome	Initiative reports; Monitoring database; Knowledge repository	Knowledge repository tracking; Internal Monitoring MIS check;	Quarterly	n/a	n/a	5	2025
WP 4 Output	OP4.3.2. Impact assessments of increased access to improved strains.	Impact assessment completed	Number	Same as outcome	Initiative reports; Internal Monitoring database; Datasets	Knowledge repository tracking; Internal Monitoring MIS check;	Annual	n/a	n/a	3	2025
AquaLabs: National innovation platforms for Aquatic Food Systems											
WP 5 Outcome	O5.1.1. Scaling plans for at least three novel AqFS technologies (one per country) selected on the basis of cost-benefit analysis and participatory needs assessment, are developed and implemented from evidence-derived best practices	Scaling plans for AqFS technology developed and implemented per country	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Evaluation/impact studies data; Needs assessment reports; Cost-benefit analysis; Monitoring and Evaluation database.	Farmers' surveys; Semi-structured interviews; stakeholder consultations	Annual	n/a	n/a	3	2024
WP 5 Outcome	O5.2.1. Scaling of aquatic foods innovations that are culturally and contextually appropriate and ecologically sustainable in 3 countries	Aquatic foods innovations adopted at scale by country	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Evaluation/impact studies data; Monitoring and Evaluation database.	Farmers' surveys; Semi-structured interviews; stakeholder consultations	Annual	n/a	n/a	8	2025
WP 5 Outcome	O5.2.2. Lessons learned from national pilots applied to and incorporated in two	Action plans for AquaLabs operation established	Number	Solomon Islands; Bangladesh;	Initiative reports; Monitoring database; Knowledge	Activities' recording; Knowledge	Annual	n/a	n/a	4	2024

	bilaterally-funded related projects: Fish for Africa Innovation Hubs (Nigeria, Ghana, Kenya) and Odisha Fish Production Hub (India).			Zambia	repository; Partnership agreements	products produced; Capacity development activities records;						
WP 5 Outcome	O5.3.1. Establishment based on deliberation with diverse stakeholders of locally appropriate action plan for the first 5 years of operation of AquaLabs	Local action plans developed with stakeholders for 5 years by country	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Datasets; Stakeholders' data; Meeting Reports, Reports	Knowledge repository tracking; Internal Monitoring MIS check; stakeholder consultations	Quarterly	n/a	n/a	3	2024	
WP 5 Outcome	O5.3.2. Development of best practice guidelines and multi-criteria analysis frameworks to monitor and evaluate AquaLab performance.	Best practices guidelines & frameworks developed and implemented;	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Datasets; Stakeholder's data;	Knowledge repository tracking; Internal Monitoring MIS check; stakeholders' consultations	Quarterly	n/a	n/a	3	2024	
WP 5 Output	OP5.1.1.1. A suite of applicable lessons ('dos and don'ts) for scaling AqFS innovations in a range of national contexts	Nationally suitable AqFS scaling lessons/best practices developed and published	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Publications	Knowledge repository tracking; Internal Monitoring MIS check;	Quarterly	n/a	n/a	3	2024	
WP 5 Output	OP5.1.1.2. 'Best bets' for investment in innovations identified and characterized; methodology for financial evaluation of innovations developed (and applied in Pathways 2 and 3)	Methodologies and models developed	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Reports	Knowledge repository tracking; Internal Monitoring MIS check;	Quarterly	n/a	n/a	2	2023 and 2024	
WP 5 Output	OP5.1.2.1. Best-practice methodologies and institutional-design models to build sustainable innovation systems for RAqFS	Financial related tools/frameworks developed	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Reports	Knowledge repository tracking; Internal Monitoring MIS check;	Quarterly	n/a	n/a	3	2023 and 2024	
WP 5 Output	OP5.2.1.1. A set of 8-12 aquatic foods innovation system case-studies from three countries that have been successfully scaled and which identify inclusive, cost-effective and sustainable mechanisms to accelerate uptake of other AqFS innovations developed by CGIAR and partners	Case studies developed	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Stakeholders' data; Reports or publications	Knowledge repository tracking; Internal Monitoring MIS check; Stakeholder consultation;	Quarterly	n/a	n/a	At least 8	2024	

WP 5 Output	OP5.2.1.2. Achievable national plans, built on national needs and priorities and proven and emergent innovations for AqFS to deliver nutritious, climate-smart, accessible, culturally-preferred and sustainable aquatic foods to all.	National plans co-developed with stakeholders by country	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Stakeholders' data	Knowledge repository tracking; Internal Monitoring MIS check; Stakeholder consultation;	Annual	n/a	n/a	3	2024
WP 5 Output	OP5.3.1.1 Plans for self-sustaining, nationally-owned AquaLabs in Solomon Islands, Bangladesh and Zambia.	National owned plans/strategies developed and in place	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Internal Monitoring database; Stakeholders' data	Knowledge repository tracking; Internal Monitoring MIS check; Stakeholder consultation;	Annual	n/a	n/a	3	2024
WP 5 Output	OP5.3.2.1 Identified best-practices to evaluate, incubate, accelerate and scale small-scale AqFS actor-led innovations to reduce dependence on external innovation 'pipelines'.	Best practices for evaluating and scaling innovations identified and collated in case-studies from countries (reports or publications)	Number	Solomon Islands; Bangladesh; Zambia	Initiative reports; Monitoring and Evaluation database. Stakeholders' data; Secondary official sources.	Knowledge repository tracking; Internal Monitoring MIS check; Stakeholder consultation; Official news/web search	Annual	n/a	n/a	4	2024

6.2. MELIA plan

RAqFS is fully integrated with the CGIAR PRMF and it is aligned to relevant SGDs, and priorities of country targets. In line with this, RAqFS will facilitate its monitoring evaluation and learning process through the CGIAR's management information system (MIS) following guiding key principles:

- **Result orientation:** MELIA will be designed to support the management functions of the RAqFS such as steering, planning and budgeting, coordinating, reporting, and to enable appropriate adaptive adjustments towards expected results and impacts.
- **Participation and alignment:** through the integration with WP1, MELIA will be aligned to national and international monitoring initiatives related to Aquatic Foods and will consolidate the use of common indicators, data collection methods and statistical services to monitor long-term outcomes and impacts.
- **Gender sensitivity:** MELIA will apply and integrate gender lens at various levels from the design of gender-sensitive indicators to the periodic assessment and analysis of outputs, outcomes and impact pathways. Learning activities on gender will take place annually through a systematic and participatory review of progress and lessons along the spheres of control, influence and interest.
- **Viability and user-friendly:** MELIA will follow a result-based approach/structure while being reasonably simple and cost effective, and it will be integrated with a user-friendly, near-real time digital dashboard to capture and communicate results effectively for various stakeholders.
- **Credibility:** MELIA will generate credible results and show how outputs are contributing to outcome achievement (causality and impact pathway). Quality check mechanisms will be implemented to ensure quality and consistency of data and data analysis.
- **ToC Approach:** MELIA will rely on nested country WPs TOCs to review its assumptions, develop annual priorities and milestones. These will feed to the overall TOC and adapt and strengthen the plausibility of the plan for impacts through annual TOC workshops.
- **Early planning for evaluation and impact assessment:** RAqFS will plan its impact studies and evaluations at the beginning of the three-year cycle and review this plan annually ensuring efficiency and effectiveness. Baselines will be established from existing datasets and/or from the implementation of specific surveys. Data and information will be collected on a regular basis to support the generation of evidences and the implementation of evaluations and impact assessments.
- **Mid-Term and Final-Evaluation:** A mid-term and a final impact evaluation will be carried out to evaluate progress of RAqFS against the baseline. The independent evaluations will address key components of the TOC including partnerships.
- **Learnings:** Learning will focus on testing hypothesis of our WP TOC and understanding how RAqFS innovations promote system transformation, gender-equity and inclusion, and impacts. Learning activities through impact assessments, cost-benefit analysis and adoption studies are embedded in WP1, 2, 3, 4 and 5. Learning will be integrated into annual planning and reporting processes and lessons will be systematically collected and logged. Identified key lessons will be shared and discussed with relevant internal and external stakeholders.

The MELIA plan will be facilitated by a MEL and IA lead and supported by a MIS Initiative team, who will work closely with WP leaders. Impact assessment specialists will contribute to WP learning activities to design a small number of rigorous causal studies and support other methods. Deliverables, including grey literatures, reports, publications and data produced by RAqFS will be open-access and available in dedicated repositories (Dataverse and DSpace).

6.3. Planned MELIA studies and activities

Type of MELIA study or activity	Result or indicator title that the MELIA study or activity will contribute to	Anticipated year of completion (based on 2022–24/25 Initiative timeline)	Co-delivery of planned MELIA study with other Initiatives	How the MELIA study or activity will inform management decisions and contribute to internal learning
Independent Mid-term Program Evaluation	It uses measurement and analysis to answer specific questions about how well RAQFs is achieving its outcomes and why. The assessment will focus on relevance, efficiency, efficacy, and sustainability of RAQFS	Mid-term Evaluation – half of the Initiative	Synergies with other initiatives will be also evaluated	In synergy with the performance measurement based on CGIAR PRMF, the mid-term program evaluation will help identify areas of RAQFS that need improvement and determine whether adjustment will be required to achieve goals and objectives. The evaluation will help identify early signs of unintended, positive and negative, results especially in relation to gender aspects.
Independent Final Program Evaluation	It uses measurement and analysis to answer specific questions about how well RAQFs has achieved its outcomes and why. The assessment will focus on relevance, efficiency, efficacy, and sustainability of RAQFS	Final Evaluation – end of Initiative	Synergies with other initiatives will be also evaluated	The final program evaluation will focus on RAQFS results and how and why they will be achieved (or not). This will help identify lessons learned to guide future interventions and/or inform the decision about RAQFS possible continuation – new business cycle. It will also help the RAQFS and CGIAR in meeting accountability needs.
Baseline Assessments	In synergy with the work developed by the WP1, baseline assessments and characterization studies in country targets will be carried out and/or identified at program start with benchmarking purpose. Baselines will be identified in reference to the Impact Area Indicators as identify by the CGIAR	2022	During the inception period, synergies will be established at national level with the aim of consolidating common baselines and increase efficiency.	Baseline assessments will provide a critical reference point for assessing changes and impact, as it will establish a basis for comparing the situation before and after an intervention (single innovations or policy actions), and for making inferences as to the RAQFS effectiveness.
Surveys to assess dissemination and adoption of key innovations	Based on different RAQFs Innovation Packages, and their maturity level, surveys will be implemented to assess adoption and use at farm and individual level.		The synergies will be established at country level on the basis of specific innovation bundles. Therefore, the synergies with other initiatives will be specifically defined during the inception period.	These surveys will help RAQFs to evaluate the reach of its innovations and provide info to adjust dissemination strategy accordingly. This has high relevance to guide decision-making and investments for innovation related to WP4, but also to adjust RAQFs scaling approach
Impact assessment studies	In great synergy with baseline assessments, impact assessments will be implemented to evaluate and measure changes promoted by RAQFs on key Impact Area Indicators. Causality of WP impact pathways hypothesis will be tested and evaluated to identify RAQFS's innovations contribution to CGIAR Impacts Areas.	2023, 2024	The synergies will be established at country level on the basis of specific innovation bundles.	The impact assessment of specific innovations will test the causal pathways of the TOC and help refine the design for future implementation and upscaling.
Scaling Readiness Assessment Study	Number of Initiative Innovation Packages that have undergone evidence-based and quality controlled/validated Scaling Readiness assessments informing innovation and scaling strategies	2024 (6)	AE-1, U2, AMD and WCA RII	The studies will inform the design, implementation and monitoring of the innovation and scaling strategy
Learning though ToC annual review	Review of the TOCs at country level will inform the review of the RAQFs ToC. Relevance, milestones and change mechanisms will be re-evaluated and re-considered to ensure plausibility and strategic positioning of RAQFs into the aquatic food systems transformation.	2022, 2023, 2024	AE-1, U2, AMD and WCA RII Other synergies will be considered as they emerge	

7. Management plan and risk assessment

7.1 Management plan

Aquatic Food systems – and indeed all food (sub)systems – are complex, dynamic and multidimensional (social, economic, political, environmental, climatic). As a response, RAqFS will be managed following an adaptive process that systematically reviews and tests ToC assumptions to learn and adapt.

The RAqFS leadership team will oversee the overall management of the Initiative. This team, consisting of the Initiative leader and deputy leader, WP leaders, country leads, MELIA leads and three cross-cutting thematic leads for nutrition and health, gender and social inclusion and climate and environment, will be responsible for the revision of the overall Initiative and WP TOCs, as well as the MELIA plan, scaling readiness process and risk management plan, in conjunction with partners and stakeholders, by six months after the project start (end of Q3 2022). These will then be revisited every year (Q1 2023, Q1 2024, Q1 2025) to evaluate progress against milestones and targets and to validate/revise the assumptions. The AquaData framework (WP1) will provide disaggregated (e.g., by gender and age) data for evaluation of impact and progress in each focus country. After the establishment of a baseline (Q2 2022), we will report on progress against MELIA targets annually (Q1 2023, Q1 2024, Q1 2025). Based on external feedback from a wide community of stakeholders and from a science advisory board, we will adjust TOCs, scaling readiness, as well as project activities, in the annual plan of work and budget. The projected benefits and assumptions underpinning them will be revised annually based on progress made, additional data available and enhanced understanding of uptake in each focus country.

7.2. Summary management plan Gantt table

	2022			2023				2024				2025	Key deliverables
Work Packages	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	
Work Package 1: AquaData													
Pathway 1 - Closing data gaps in aquatic food systems		1		2		3	4						1. Synthesis report of data needs and gap, 2. Policy briefs, 3. Open-access publications, 4. Cost-benefit analysis reports,
Pathway 2 - New and consolidated data for Aquatic Food systems					1	2	3						1. Integrated, publicly available aquatic food systems databases, 2. Open-access publications, 3. Aquatic Foods Index
Pathway 3 - Policy engagement and investments in aquatic food								1	2	3			1. Synthesis reports, 2. Data use cases, 3. Open access synthesis publications
Work Package 2: Partnering to realize the benefits of aquatic foods													
Pathway 1 – Refining and scaling up cost effective models			1	2									1. Education and communication (IEC) materials, 2. Harmonized national databases
Pathway 2 – Co-producing sustainable and nutrition sensitive development pathways							1						1. Open access publications
Pathway 3 – Strategic engagement									1	2			1. Communication materials, 2. Open access publications
Work Package 3: Water and Land Foodscapes: Governing Integrated Aquatic Food Systems													
Pathway 1 – Integrated production system in multifunctional landscapes			1	2	3							3	1. Policy briefs, 2. Business models reports, 3. Open access publications
Pathway 2 – Aquatic food production in ecosystems created by water infrastructures			1	2	3							3	1. Policy briefs, 2. Tertiary education modules, 3. Open access articles
Pathway 3– Governance of water and land foodscapes				1	3							3	1. Risk and vulnerability maps and scenarios reports, 2. Open access publications
Work Package 4: AquaGenetics													
Pathway 1 – Better performing strains of carp, tilapia and African catfish				1	2	3							1. Efficient index selection protocols, 2. Hatchery protocols, 3. Decision support tool for prioritization of traits
Pathway 2 – More rapid and sustained delivery of improved strains to smallholder farmers					1			2					1. Adoption reports, 2. Open access publications
Pathway 3 – Improved performance in farming systems								1		2			1. Impact assessments of increased access to improved strains, 2. Open access publications
Work Package 5: AquaLabs: Innovation Hubs for Aquatic Food Systems													
Pathway 1 – Learning how to build a successful innovation hubs			1	2									1. Policy briefs, 2. Methodologies and processes reports
Pathway 2 – Testing AquaLabs as accelerators of piloted or proven innovations					1	3							1. Case specific innovations reports, 2. Open access publications
Pathway 3 – Building sustainable national AqFS innovation systems								1		3			1. Education and communication (IEC) materials, 2. Open access publications
Innovation Packages & Scaling Readiness													
						1			2				Light track scaling readiness reports, 2. Standard track scaling readiness reports
MELIA													
	1	3	2		3	2				3	2		1. Baseline MEL report, 2. Reports on MEL targets, 3. IA studies
Project management													
	1, 2	4	3		4	3			4	4		3, 4	1. Kick-off meetings and inception phase to review TOC, MELIA plan, scaling readiness plans, risks management plan, and design detailed workplans per country. 2. Partners contracts. 3. Annual progress review of TOC and adjustment of activities as required. 4. Annual technical and financial reports

7.3. Risk assessment

The Initiative design team undertook a risk assessment exercise to identify and evaluate the main risks and mitigating actions for the Initiative. Risks considered included around science, cohesion (including intended and unintended consequences of technologies/innovations for natural resources, GHG emissions, and social and economic aspects), legacy work, partnerships, talent, operational, ethical and legal and other. At this phase the risk assessment is used to highlight areas of concern and improvement recommendations for the Initiative. It also provides visibility to different bodies that is needed from a good governance perspective in line with the Risk Management Framework of the CGIAR System. Following the Initiative's approval, the risk assessment will be integrated into the Initiatives workplan for continuous monitoring and management. The main risks identified are set out in the below table.

Top 5 risks to achieving impact	Description of risk	Likelihood	Impact	Risk score <i>Likelihood x Impact</i>	Mitigations
		Rate from 1-5	Rate from 1-5		
The Risk of continuation/reintroduction of COVID-19 related restrictions and lockdowns. (All WPs)	The COVID-19 related restrictions and lockdowns had a significant impact on CGIAR centers' ability to implement research and development programs and with recent surge of cases across the World it brings a risk of reintroduction of 2020-2021 restrictions.	4	3	12 [Medium]	Integration of lessons learned from last two years of operations into RAqFS. Implementation of rigorous guidelines and Standard Operating Procedures and maximize the use of digital tools and platforms.
Private sector and other partners' ability/interest to invest into and adopt new technologies. (WP2, WP5)	Limited business operations and supply chain disruption over the last two years put significant capital constraints on private sector firms and other industry actors. This may limit their ability to invest in new technologies and/or willingness to adopt new technologies, which have elements of risks or unknown.	3	3	9 [Medium]	In developing and introduction of new and innovative technologies and management practices RAqFS will apply systems approach, technologies tested and brought to scale will be comprehensive and include tools that focus on efficiencies, productivity gains and present solutions to economic and environmental stresses.
Policy regulatory constraints and lack of political will. (WP1)	As countries focus available and scarce public resources on economic recovery and the surges in public debt, may affect host governments' ability/interest in supporting/pursuing inclusion of RAqFS in sector policies.	3	3	9 [Medium]	RAqFS will work closely with the host governments and key stakeholders from the initial phase and use data to demonstrate importance of RAqFS in economic recovery, poverty reduction, and support of marginalized communities and other key priorities of these recovery plans.
Climate change related biotic and abiotic stresses. (WP3, WP4)	Over the last several years the world countries suffered a number of very significant droughts, forest fires, floods and other environmental events. Stresses incurred on agricultural/aquaculture production systems as a result of changes in the climatic conditions has been the most influencing factor affecting agricultural/aquaculture production. These stresses have a potential of erasing years of progress in some of the targeted communities.	3	3	9 [Medium]	RAqFS will also be looking for adaptation strategies by developing species and technologies that are resilient to the effect of climate change. RAqFS will engage with wide range of traditional and non-traditional partners to provide more holistic and systemic solutions to beneficiary countries and communities.
Mismatch of expertise and challenge of alignment of new partner's business needs with RAqFS programmatic priorities. (WP2)	The move to establish novel and transformed partnerships and engagement of new non-traditional partners brings a risk of mismatch of expertise and challenge of alignment of new partner's business needs with RAqFS programmatic priorities.	3	3	9 [Medium]	In the initial phase of the RAqFS efforts will be dedicated for scoping of new partners, identify partners with right expertise and interests. Focused consultations and capacity building of new partners to ensure there is an alignment of new partner's business needs with RAqFS programmatic priorities.

8. Policy compliance, and oversight

8.1. Research governance

Researchers involved in the implementation of this Initiative will comply with the procedures and policies determined by the System Board to be applicable to the delivery of research undertaken in furtherance of CGIAR's 2030 Research and Innovation Strategy, thereby ensuring that all research meets applicable legal, regulatory and institutional requirements; appropriate ethical and scientific standards; and standards of quality, safety, privacy, risk management and financial management. This includes CGIAR's [CGIAR Research Ethics Code](#) and to the values, norms and behaviors in CGIAR's [Ethics Framework](#) and in the [Framework for Gender, Diversity and Inclusion in CGIAR's workplaces](#).

8.2. Open and FAIR data assets

The Resilient Aquatic Food Systems for Health People and Planet Initiative will align with the OFDA Policy's Open and [FAIR requirements](#) ensuring:

- Rich metadata conforming to the [CGIAR Core Schema](#) to maximize Findability, including geolocation information where relevant.
- Accessibility by utilizing unrestrictive, standard licenses (e.g. [Creative Commons](#) for non-software assets; General Public License ([GPL](#))/Massachusetts Institute of Technology ([MIT](#)) for software), and depositing assets in open repositories.
- Wider access through deposition in open repositories of translations and requiring minimal data download to assist with limited internet connectivity.
- Interoperability by annotating dataset variables with ontologies where possible (controlled vocabularies where not possible).
- Adherence to [Research Ethics Code](#) (Section 4) relating to responsible data (through human subject consent, avoiding personally identifiable information in data assets and other data-related risks to communities).
- Deliverables, including grey literatures, reports, publications and data produced by RAqFS will be open-access and available in dedicated repositories (Dataverse and DSpace).

9. Human resources

9.1. Initiative team

Category	Area of expertise	Short description of key accountabilities
Cross-cutting		
Research	Aquatic Food Systems, Partner engagement, CGIAR leadership	Research leadership, Initiative lead and co-leadership, Initiative delivery and WPs coordination
Research	Innovation and scaling readiness	Scaling Assessments, WP backstopping
Research	Monitoring, Evaluation, Learning and Impact Assessment	Reporting, MELIA, database management, WP backstopping
Research	Nutrition and Health	Science leadership, coordinating role
Research	Gender and Inclusive Development	Science leadership, coordinating role
Research	Climate, Environment and Biodiversity	Science leadership, coordinating role
Research Support	Regional coordination	Market and in-country intelligence, stakeholder coordination, policy demand and uptake
Research Support	Communication	Strategic multi-audience communication, reporting
Research Support	Program technical management	Planning and technical/financial reporting
Research Support	Project Management and corporate systems	Project Management Support
Research Support	Grants and Contracts	Contractual compliance & partnership agreements
Work Package 1 – AquaData		
Research	Social science: economics, aquaculture	Research leadership, WP lead
Research	Social science: economics, aquaculture	Research leadership, WP co-lead
Research	Social science: natural resource management, data, artificial intelligence	WP data-lead
Research	Social science: data, coding, machine learning	Data scientist – Post-doc
Research	Social science: economics	Impact baseline/assessment
Research	Social science: economics	Policy analyst
Research	GIS, data	GIS Specialist, mapping
Research	Social Science: aquaculture and fishery specialist, economics	Country coordinators in Solomon, India, Myanmar, Zambia, Egypt, Nigeria, Cambodia
Research	Data Management, Statistics, Survey, Coding	Data Management and Open Access Officer
Research	Data Analyst, Statistics, Survey, Coding	2 Research Analysts
Research Support	Project Coordinator	Project support, quality delivery, link between country research team research, corporate services
Work Package 2 – Aqua+Partners		
Research	Transdisciplinary social sciences and environmental governance	Each WP country is staffed with a PhD level scientist that coordinates the country-level co-design and implementation of Pathway 1 (RQ2.1) and contributes to Pathway 3 (RQ2.3)
Research	Aquatic food systems, nutrition and community development, Indigenous methodologies	Each WP country is staffed with a PhD level scientist that coordinates the country-level co- design and implementation of Pathway 2 (RQ2.2) and contributes to Pathway 3 (RQ2.3)
Research	Community and partner engagement	Each WP country is staffed with a research team member that implements activities towards Pathway 1 (RQ2.1) and Pathway 2 (RQ2.2)
Research	Policy analysis, advocacy	Synthesis research in WP Pathway 3 (RQ2.3)
Research	Food systems, rural livelihoods, environmental governance	Research coordination in Island food systems (Solomon Islands and Timor-Leste)

Research	Food systems, rural livelihoods, environmental governance	Research coordination in Bay of Bengal food systems (India and Bangladesh)
Research Support	Project Coordinator	Project support, quality delivery, link between country research team research, corporate services
Work Package 3 – Water and Land Foodscapes: Governing Integrating Resilient Aquatic Food Systems		
Research	Social and institutional science	Co-design of integrated aquatic food system innovation – RQ 1.1.1.; 1.2.1. Institutional analysis, support of multi-stakeholder's dialogues – RQ 1.2.1; 1.3.2.
Research	Economics, Impact assessment	Design and implementation of impact assessments, baseline and follow-up studies, behavioral studies – RQ 1.1.2.; 1.2.2.
Research	Modeling, GIS, RS	Risk and vulnerability mapping – RQ 1.3.1.
Research	Biology, Ecology	Co-design of integrated aquatic food system innovation – RQ 1.1.1.; 1.2.1.
Research	Gender	Co-design of integrated aquatic food system innovation – RQ 1.1.1.; 1.2.1.
Research Support	Project Coordinator	Project support, quality delivery, link between country research team research, corporate services
Work Package 4 – AquaGenetics: productivity-enhancing technologies		
Research	Genetics, Bioinformatics, biology, fish health	Design and implementation of fish genetic improvement RQ 4.1.1; 4.1.2; 4.1.3.
Research	Social science: gender, economics, genetics	User trait preferences RQ 4.1.4
Research	Social science: economics	Seed system performance RQ 4.2.1
Research	Social science: economics; fish health feed, aquaculture specialists	On-farm performance RQ 4.3.1
Research	Social science: economics	Impact baseline/assessment RQ 4.3.2
Research Support	Project Coordinator	Project support, quality delivery, link between country research team research, corporate services
Work Package 5 – AquaLabs		
Research	Senior/Principal Scientist: Innovation Systems	Lead WP5 to strengthen national innovation systems
Research	Scientist: economics and finance	Benefit-cost analysis of candidate Innovations Packages for scaling (RQ1.1); financial inclusion (RQ2.1)
Research	Postdoctoral fellows (x3): Agrifood Innovation systems; participatory action research and organizational development	Based in Solomon Islands, Bangladesh and Zambia to lead field-based learning on designing (RQ1.2), running (RQ2.1) and sustaining (RQ3.1) Aqualabs
Research	Social science: gender equity and social inclusion	Ensuring all analysis is gender-disaggregated and all innovation systems designs and activities involve and engage women, youth and other historically marginalized groups (RQ1.1, RQ1.2, RQ2.1, RQ3.1).
Research	Aquaculture production systems specialists	Assess novel feeds and novel species/production systems to meet demand for affordable, culturally preferred and sustainable aquatic foods and feeds (RQ2.1, RQ3.1)
Research	Food technologist: Food processing, food waste and loss	Identify, evaluate, scale and accelerate innovation in value chain governance and technology to reduce food waste and loss (RQ2.1, RQ3.1)
Research	Nutritionist/Food Systems Scientist	Scaling institutional and technological innovations in delivering novel nutrition-focused aquatic food products (e.g., in school feeding programs, and in women's nutrition) RQ2.1, RQ3.1)
Research Support	Project Coordinator	Project support, quality delivery, link between country research team research, corporate services

9.2. Gender, diversity and inclusion in the workplace

The leadership of RAqFS is evenly balanced (one male as Lead, one female as Co-Lead). Of the sixty-five members involved in Initiative Design Team (Table 1), 48% are female, exceeding the CGIAR's gender target of a minimum of 40% women in professional roles, and is comprised of individuals from diverse backgrounds and ages. While planning for RAqFS implementation, we will ensure balanced gender representation and encourage women and men from diverse national backgrounds to occupy the roles required for the Initiative implementation (Section 9.1). The Initiative team is committed to meeting and exceeding CGIAR's gender target of a minimum of 40% women in professional roles and inclusion of individuals from diverse backgrounds. Women and other under-represented groups in CGIAR will hold leadership roles in the Initiative team. This will be seen in the composition of our senior team and will extend to the fair allocation of leadership activities and accountabilities.

RAqFS will use best practices within the CGIAR to establish and implement professional development, mentoring, and leadership development tracks for women and other underrepresented groups during the inception phase and in the course of the Initiative implementation.

9.3. Capacity development

RAqFS outcomes and impacts (Section 2.2) are anchored in genuine partnership-based science, innovations and capacity development. We aim to give target and local communities important roles in the production and validation of knowledge. Ensuring that both the learning process and the ownership of outputs is shared between CGIAR, host-country partners and communities will contribute to an equalizing of power relations (WP2 and WP5). Therefore, there is a need to couple the co-design of aquatic food innovations and scaling strategies with the empowerment and capacity building of junior level team members, partners and stakeholders of RAqFS. This process guarantees that a variety of internal and external actors will continue influencing aquatic food system transformation and its outcomes in the future. Capacity development will be achieved by: i) offering platforms for dialogue to catalyze knowledge sharing where young, female and male representatives of national and international research centers, institutions, and communities can participate (WP3); ii) offering demand-driven and users tailored IEC materials (WP2) including tertiary education modules (WP3) and trainings to stakeholder representatives and farmers; and iii) supporting post-doctoral fellowship (WP5) and training to researchers.

In addition, and as per CGIAR standards:

- Initiative team leaders and managers will complete training on inclusive leadership within three months of launch.
- Within six months of launch, Initiative team members will complete training on gender, diversity and inclusion, including on whistleblowing and how to report concerns.
- The Initiative kick-off will include an awareness session on CGIAR's values, code of conduct and range of learning opportunities available within CGIAR.

10. Financial resources

10.1. Budget

Table 10.1 – Activity breakdown

USD millions	2022/2023	2023/2024	2024/2025	Total
Crosscutting across Work Packages	1,480,000	2,440,000	3,130,000	7,050,000
Work Package 1	750,000	1,140,000	1,620,000	3,510,000
Work Package 2	800,000	1,140,000	1,560,000	3,500,000
Work Package 3	1,000,000	1,370,000	1,260,000	3,630,000
Work Package 4	2,500,000	4,780,000	5,490,000	12,770,000
Work Package 5	900,000	1,420,000	1,800,000	4,120,000
Innovation Packages & Scaling Readiness	70,000	210,000	140,000	420,000
Total	7,500,000	12,500,000	15,000,000	35,000,000

Table 10.2 – Geography breakdown

USD millions	2022	2023	2024	Total
Nigeria	900,000	1,700,000	1,980,000	4,580,000
Ghana	320,000	450,000	460,000	1,230,000
Zambia	620,000	920,000	1,060,000	2,600,000
Kenya	70,000	100,000	150,000	320,000
Malawi	70,000	100,000	150,000	320,000
Bangladesh	1,400,000	2,460,000	2,970,000	6,830,000
India	1,090,000	1,970,000	2,370,000	5,430,000
Cambodia	320,000	450,000	460,000	1,230,000
Myanmar	320,000	450,000	460,000	1,230,000
Solomon Islands	570,000	860,000	1,130,000	2,560,000
Timor-Leste	270,000	390,000	540,000	1,200,000
Global or multi-country	1,550,000	2,650,000	3,270,000	7,470,000
Total	7,500,000	12,500,000	15,000,000	35,000,000

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