



# **Sustainable Animal and Aquatic Foods Program**

**Full design document**

**September 2024**

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## List of acronyms

AAF	Animal and aquatic foods
ABC	Alliance for Bioversity and CIAT
AMR	Antimicrobial resistance
AMU	Antimicrobial use
AfDB	African Development Bank
AI	Artificial intelligence
AoW	Areas of Work
ARI	Advanced research institutes
AWMYM	All women, men, youth and marginalized individuals
CA	Comparative advantage
CBO	Community-based and grassroots organizations
CDC	Centers for Disease Control and Prevention
CRP	Consortium Research Program
DPI	Digital public infrastructure
FAIR	Findable, Accessible, Interoperable and Reusable (data principles)
GALS	Gender Action Learning System
GESI	Gender Equality and Social Inclusion
GHG	greenhouse gas emissions
GTA	Gender transformative approaches
GYSI	Gender, Youth and Social Inclusion Program
HEAL	The One Health for Humans, Environment, Animals and Livelihoods
HLO	High-level outputs
ICARDA	International Center for Agricultural Research in the Dry Areas
ILRI	International Livestock Research Institute
IFRC	International Federation of Red Cross
INGO	International nongovernment organization
IPG	International public goods
IPSR	Innovation Packaging and Scaling Readiness

IT	Information technology
IWMI	International Water Management Institute
MEL	Monitoring evaluation and learning
PO	Program Outcome
NARS	National Agriculture Research System
SAPLING	Sustainable Animal Productivity for Livelihood Nutrition and Gender Inclusion
SAAF	Sustainable Animal and Aquatic Foods
STIB	social, technical and innovation bundles
TVET	Technical vocational education and training
UNEP	United Nations Environment Programme
VSF	Vétérinaires Sans Frontières
WHO	World Health Organization
FAO	Food and Agriculture of the United Nations
WOAH	World Organisation for Animal Health

# 1. Executive Summary

Sustainable Animal and Aquatic Foods (SAAF) offers a unique pathway to sustainably increasing access to more nutritious foods while emitting fewer GHGs and creating resilient and inclusive livelihoods. Livestock and aquatic food systems encompass a range of production systems, species and ecological zones and require a high degree of contextualization. Bringing animal and aquatic food systems into one program offers new opportunities to demonstrate true system integration to tackle location-specific challenges.

SAAF's vision

*"People's lives and well-being in low- and middle-income countries are improved by sustainably transforming animal and aquatic food systems, so they foster inclusive, healthy and nutrient-dense food supply chains that are climate and environmentally friendly."*

SAAF addresses all five CGIAR Impact Areas, with significant contributions to i) nutrition, health and food security; ii) poverty reduction, livelihoods and jobs; and iii) climate adaptation and mitigation.

SAAF's comparative advantage lies in its human capital for delivering outcomes, which are being continued from the Initiatives, the excellent laboratory facilities of CGIAR Centers, the living labs in site-specific areas, and its close relationships with local partners, including research institutions, government agencies and the private sector.

Impact is achieved by delivering eight Program Outcomes (PO). Four focus on innovation adoption by producers, market actors and communities, facilitated by co-design and capacity sharing. Four focus on behavior change for gender-equitable norms, increased investment, more supportive policies and integration of animal and aquatic source foods into the diets of producing households

To deliver impact, SAAF has six interlinked Areas of Work (AoW) designed to work together to achieve SAAF's vision of sustainably transforming animal and aquatic food systems:

1. Productivity+
2. Climate and the Environment
3. One Health
4. Market systems, Policy Solutions and Scaling
5. Gender, Youth and Social Inclusion, and
6. Digital and Data Solutions

SAAF builds on CGIAR Research Initiatives including Aquatic Foods, Livestock and Climate, One Health, and Sustainable Animal Productivity for Livelihoods, Nutrition and Gender Inclusion (SAPLING). It also builds on several bilateral projects.

The priority countries identified are Kenya, Ethiopia, Mali, Tanzania, Uganda, Vietnam, Bangladesh, India, Nepal, Colombia, Guatemala, Senegal, Tunisia, Cambodia, Ghana, Nigeria, Timor Leste, Zambia, Malaysia and Egypt.

Key partners include national agriculture, livestock and fisheries research institutes, government agencies, UN Agencies including the Food and Agriculture Organization, World Health Organization, UN Environment Programme and World Organisation on Animal Health, advanced research institutes, universities, NGOs and development organizations, market actors, the private sector and food producer groups.

SAFF has prioritized working with five Programs/Accelerators. The focus is on producing healthy and sustainable animal and aquatic-sourced foods (Better Nutrition). It complements work from Sustainable Farming, Multifunctional Landscapes, Climate Action and Policy Innovations by focusing on animal and aquatic food systems versus whole-farm, multifunctional landscape or system-wide contexts. Through its cross-cutting AoWs (Market Systems, Policy Solutions and Scaling, Gender, Youth and Social Inclusion, and Digital and Data Solutions) we will work with Scaling for Impact, Gender Equity & Social Inclusion, Shared Capacity and Digital Transformation

We have identified US\$84 million in funds from 18 bilateral projects mapped to Sustainable Animal and Aquatic Foods. There are 10 donors for these projects, which suggests broad support for SAAF Program Outcomes.

## 2. High-level vision in response to challenges and megatrends

### 2.1. Challenges and megatrends

By 2050, 66% of global livestock emissions will be from low- and middle-income countries (LMICs) as animal agriculture responds to growing populations and incomes.<sup>1</sup> Overfishing and destructive fishing methods have led to a one-third decrease in fish stocks and loss of biodiversity, resulting in declining fish catches.<sup>2</sup> Demand for healthy and affordable animal-sourced foods will increase by 30%.<sup>3, 4</sup> Addressing this requires a transformative approach to how we produce animal and aquatic-sourced foods.

These foods are important sources of macro and micronutrients, particularly for pregnant women and children in their early years.<sup>5, 6</sup> They offer an important source of livelihood opportunities for millions in vulnerable communities and provide a buffer for climatic and socioeconomic shocks. Nearly two-thirds of livestock producers and half the workers in fisheries and aquaculture are women.

The main challenges are: i) limited access and affordability in animal and aquatic food value chains (MT 2 changing consumption patterns); ii) a lack of comprehensive data that constrains investment and policy decisions in value chains (MT1 Demographic patterns), iii) productivity gaps and understanding what bundles of solutions work in specific contexts; and iv) AAF systems impact and are impacted by climate change (MT 4 Climate change).<sup>7, 8</sup> Other challenges include terrestrial and aquatic ecosystem degradation through poor governance and food loss and waste<sup>9</sup> (MT 5 environmental degradation) resulting in the further spread of animal disease and antimicrobial resistance<sup>10</sup> (MT 6 global health challenge).

### 2.2. High-level vision

SAAF's vision

*"People's lives and well-being in low- and middle-income countries are improved by sustainably transforming animal and aquatic food systems, so they foster inclusive, healthy and nutrient-dense food supply chains that are climate and environmentally friendly."*

To achieve this vision, we must transform production systems to produce more nutrient-dense foods, emit less, and be more nature-positive and adaptable and resilient to climate shocks.<sup>11</sup> Livestock and aquatic food systems encompass a range of production systems, species and ecological zones and require a high level of contextualization.

Bringing animal and aquatic food systems into one program offers new opportunities to demonstrate system integration to tackle location-specific challenges. Integration offers opportunities to share solutions across systems (marine, riverine, lake and wetlands, mixed farming, semi-intensive, pastoral animal systems and community fisheries). These systems face similar challenges, such as i) managing disease and food safety, ii) increasing sustainable feed resources, iii) genetic improvements, iv) addressing environmental and climate concerns, and v) complex market chains. Women play a central role in both animal and aquatic food systems. They produce, sell and use animal and aquatic foods which have a direct impact on household livelihoods and nutrition.

SAAF contributes to all five CGIAR Impact Areas and directly to nine of the eleven high-level outcomes.

## **2.3. What is new in this Program?**

1. Genomic innovations in animal and aquatic breeding for more productive and climate-friendly breeds and strains adapted to local conditions (6.1).
2. Food fortification solutions for nutrient-dense animal and aquatic source foods (6.1).
3. Integrated surveillance systems, including risk-based approaches to ensure food safety and prevent the emergence and spread of zoonotic and emerging infectious diseases using a One Health approach, including using living labs (6.3).
4. De-risking livestock and fish production through novel business models, innovative financing and insurance (6.2, 6.4).
5. Market system approaches applied to One Health and Climate and the Environment (6.4).
6. AI-driven analytics to deliver tailored information on climate, management and market information (6.1 and 6.6).
7. Employment and business opportunities in AAF systems to increase the number of women, youth and marginalized communities in upstream jobs (6.5).

## **3. Prioritization**

### **AAF systems in Low- and Middle-Income Countries**

Livestock production contributes to the livelihoods of over 1.3 billion people globally and accounts for an average of 40% of global agricultural GDP. Aquatic foods are crucial in many regions, with fisheries and aquaculture supporting the livelihoods of around 600 million people and contributing to the nutrition security of over 3 billion.

### **Challenges Facing AAF systems**

- i) low productivity and profitability for smallholder farmers,
- ii) poor governance and market systems,
- iii) climate vulnerabilities and ecosystem degradation,
- iv) lack of quality data and digitalization, and
- v) chronic under-investment in sustainable innovative solutions.

### **SAAF prioritization overview**

SAAF's approach to co-developing solutions is to begin by building on the progress achieved by previous CGIAR Research Initiatives and bilaterals.

Proposed solutions include:

- i) responsible and inclusive strategic investments in research;
- ii) innovations and governance reforms;
- iii) adoption of climate-smart practices, and
- iv) data and digital transformation in food systems.

Increased investments are needed to foster inclusive, healthy and nutrient-dense food supply chains that are climate and environmentally friendly and ensure efficient and sustainable AAF systems, especially in countries where women, youth, the poor and marginal groups are heavily reliant on them (Kenya, Ethiopia, Mali, Nigeria, Tanzania, Uganda, Vietnam, Bangladesh and India).

## Country cases

In **Bangladesh**, 24% of the population lives below the national poverty line,<sup>12</sup> with many dependent on small-scale livestock production and aquaculture. Adopting innovative, low-cost technologies could substantially boost productivity and incomes. In India, where around 20% of the population lives below the poverty line, over 50% of the workforce is engaged in agriculture and 70% of rural households depend primarily on agriculture, including animals and aquaculture, for their livelihood. The sector is highly fragmented, with 82% of farmers being small and marginal.<sup>13</sup> Improving access to markets, technology and finance is critical to enhancing productivity and profitability and environmental sustainability.

Innovations for enhancing productivity to improve profitability, mitigate emissions and enrich nutrient profiles include i) advancing breeding programs, ii) refining feed formulations, and iii) deploying health management tools such as targeted vaccines. We aim to promote widespread and equitable adoption by ensuring these innovations are scientifically robust and tailored to specific contexts and social groups.

In **Kenya**, the agriculture sector contributes 22% to the GDP. There are 8.6 million small-scale farmers and 4.5 million farming households, with livestock accounting for 15% of agricultural output while fish and aquaculture contribute 2%. Recurrent droughts and floods severely impact food productivity. These households are an untapped resource for building sustainable and resilient nutrient-dense food systems.<sup>14</sup>

In **Ethiopia**, around 60% of households are engaged in agricultural activities with an average farm size of 1.1 hectares.<sup>15</sup> Food production is vulnerable to climate shocks. Improved and climate-smart livestock production and expanding aquaculture can ensure smallholder livelihoods and food and nutrition security.

In **Mali and Tanzania**, the situation is similar, with both countries facing unpredictable rainfall and desertification threatening the productivity of crops and livestock. Introducing resilient animal breeds and aquaculture with improved water management practices are foundational steps toward improving food security.

SAAF is committed to advancing climate resilience and environmental sustainability in food systems by supporting the adoption of practices and technologies that minimize environmental impacts, such as efficient water management and circular bioeconomy strategies. We focus on transforming market systems to improve access and transparency, particularly for small-scale producers, women, youth and marginalized communities. By addressing these needs, we support smallholder producers in overcoming the challenges posed by climate change and contribute to their long-term food security and environmental stewardship.

In SAAF countries, the animal and aquatic sectors face structural barriers (e.g., inadequate infrastructure, limited market access and volatile prices). In Sub-Saharan Africa, smallholder farmers, including men, women and youth, struggle to access local and international markets due to poor infrastructure and insufficient market information.

In the livestock sector, challenges include inadequate veterinary services, poor transportation networks and limited access to inputs that significantly affect productivity and market access. In aquaculture, barriers include limited access to quality inputs (e.g., fish feed and seeds), insufficient training on best practices and difficulties in accessing markets (Bangladesh, Cambodia, Egypt, Ghana, Malaysia, Nigeria, Timor Leste and Zambia). Developing efficient market systems and enhancing market information systems can enhance smallholder farmers' livelihoods.

In Kenya, Ethiopia and Uganda, zoonotic diseases pose significant risks. One Health focuses on integrated approaches that safeguard human, animal and environmental health.<sup>16</sup> This is especially important in countries where close daily interactions between humans, livestock, wildlife and natural resource systems create opportunities for the emergence or re-emergence of zoonotic diseases with pandemic potential.

In Bangladesh and India, SAAF emphasizes the need for productivity enhancements alongside One Health Initiatives, particularly concerning antimicrobial resistance (AMR). The intensification of small-scale production systems in these countries, coupled with high antimicrobial use (AMU), necessitates a balanced approach to increasing productivity while safeguarding public health challenges.

Gender inequality remains an issue in our proposed countries, affecting access to resources, decision-making power and economic opportunities in animal and aquatic systems. In Uganda, women make up 70–80% of the agricultural labor force, but most do not own or control any land.<sup>17</sup> This disparity limits inclusivity and potential productivity and profitability gains and environmental sustainability. In Bangladesh, Egypt and India, women play a crucial role in aquaculture and fish value addition but often lack access to credit, training and technology.<sup>18</sup>

Bangladesh, Colombia, Ethiopia, Guatemala, India, Kenya, Mali, Nepal, Tanzania, Tunisia, Uganda and Vietnam are key target countries for addressing poverty, climate change, gender inequities and emissions through the SAAF program (based on Tropical Livestock Units, Multidimensional Poverty Index levels, stunting prevalence, the Gender Inequality Index, the potential for scaling innovations and stakeholder demand).

### **Stakeholder engagement**

Comprehensive stakeholder engagement is central to our priority-setting process, ensuring that solutions are relevant, feasible and aligned with the needs and perspectives of stakeholders. This integrative approach enables us to meet urgent needs, foster equitable growth and contribute to the long-term sustainability of food systems (Table 3.1).

Table 3.1. Prioritization

Prioritization factor	Prioritization component
Scope	<ul style="list-style-type: none"> <li><b>Focus countries:</b> Kenya, Ethiopia, Mali, Tanzania, Uganda, Vietnam, Bangladesh, India, Nepal, Colombia, Guatemala, Senegal, Tunisia, Cambodia, Ghana, Nigeria, Timor Leste, Zambia, Malaysia, Egypt (countries at the start of the list have the highest concentration of activities, enabling government policies, pooled and bilateral funding and Center presence)</li> <li>Within each country, the focus on specific locations or production systems depends on the focus commodities and Area of Work (AoW). A subset of countries (potentially including Kenya, Ethiopia, Mali, Bangladesh and India) will incorporate all AoWs and multiple commodities.</li> </ul>
High-level outputs	<p>High-level outputs used in the prioritization exercise:</p> <ul style="list-style-type: none"> <li>Productivity-enhancing innovations (breeding, feeding, health) that are profitable, equitable and reduce GHG emission intensity [Productivity+]</li> <li>Fortification approaches for more nutritious animal and aquatic foods [Productivity+]</li> <li>Climate-adapted innovations and monitoring tools for animal and aquatic systems, enhancing resource efficiency and restoration, reducing emissions and increasing carbon sequestration [Climate and the Environment]</li> </ul>

Prioritization factor	Prioritization component
	<ul style="list-style-type: none"> <li>• Mobilized climate finance through innovative business models and financial mechanisms for innovations with proven environmental, climatic and financial benefits [Climate and the Environment]</li> <li>• AAF production systems derisked through integrated prevention and control of zoonotic diseases, AMR and foodborne diseases, while safeguarding environmental health [One Health]</li> <li>• Institutional and behavioral models for enhanced uptake (inclusive delivery systems) of animal and aquatic food system innovations [Markets, Policies and Scaling]</li> <li>• Policy analysis and engagement processes for effective animal and aquatic food systems [Market Systems, Policy Solutions and Scaling]</li> <li>• Effective interventions for empowering women, youth and marginalized groups and for equitable norms in animal and aquatic systems [Gender, Youth and Social Inclusion]</li> <li>• Development and implementation of knowledge and data management systems that adopt FAIR principles, ensuring accessibility, interoperability and usability for all market actors, including women, men, youth and marginalized groups [Digital and Data]</li> <li>• Strengthened capacity and knowledge among market actors to adopt digital innovations for evidence and data-informed decision-making [Digital and Data]</li> <li>• Establishing effective platforms, evidence, processes and a supportive enabling environment (finance, policies, norms) that facilitate the governance of AAF systems using digital innovations [Digital and Data]</li> </ul>
Stakeholder demand	<ul style="list-style-type: none"> <li>• Extensive stakeholder consultations conducted before and during the 2022–2024 CGIAR Research Initiatives and CGIAR Listening Sessions conducted in late 2023 and early 2024 in 25 countries have contributed to the prioritization exercise (10 are SAAF-proposed countries). During the Listening Sessions, countries provided their priorities across the five CGIAR Impact Areas, including the challenges and solutions detailed in this proposal. Continued stakeholder engagement will contribute to ongoing priority setting.</li> </ul>

## 4. Comparative advantage

### Aggregated high-level outputs (HLOs)

For the comparative advantage (CA) analysis and prioritization, we combined the HLOs of our six Areas of Work (AoWs) into 11 aggregated HLOs (Annex 4.1) with a view to similar requirements for their delivery and to prioritize them for potential impact in selected geographies.

Four of the 11 aggregated HLOs were combined across AoWs: i) institutional and behavioral models for enhanced innovation uptake (HLO6) under Market Systems, Policy Solutions and Scaling, which combines all elements related to inclusive delivery models from Productivity+, Climate and the Environment and One Health; and ii) the three aggregated HLOs (HLO9–11) under Data and Digital Solutions, including data information and decision-support systems and related shared capacity for all AoWs.

### Human and social capital

Across the AoWs, the analysis revealed that human capital is a cornerstone of CGIAR's comparative advantage for delivering aggregated HLOs, which are being continued from the Initiatives. For these HLOs, CGIAR SAAF consortium has the required expertise in interdisciplinary teams comprised of biophysical and social scientists and data analysts with extensive knowledge and experience in the low- and middle-income countries context. CGIAR is also a knowledge hub for innovation in the proposed SAAF work areas.

Knowledge for designing and testing innovations has been enabled by strong ties between CGIAR experts and agricultural research institutes (ARIs) and international universities, whose CA lies in providing the latest research methodologies and discoveries. Identifying innovation partners and relying on their CA in human and biophysical capital will fill the gaps in CGIAR expertise for delivering new HLOs like food fortification approaches for animal and aquatic foods (AAFs) (HLO2), climate finance (HLO4) and the three HLOs on the design and deployment of knowledge and data management systems, digital capacity building and innovation development. This is also the case for the increased focus on measuring and monitoring tools for GHG emissions and operationalizing local One Health units.<sup>19</sup> In these fields, the SAAF team will need to build more capacity and expertise.

Overall, disciplinary coverage and expertise are strong within CGIAR, but it does not have sufficient human capacity to co-design, adapt and implement innovations at a larger scale in the countries where we plan to work. Thus, CGIAR relies on its social capital, consisting of extensive partnerships and networks with NARS, local universities, community-based organizations (CBOs) and NGOs and using their extensive human capital. CBOs and NGOs have deep-rooted connections in local communities and can mobilize grassroots support and are often more adept at ensuring interventions are demand-based, culturally appropriate and widely accepted. CGIAR's long-term relationships with national research-for-development organizations, underpinned by a physical presence in many countries, facilitate knowledge exchange, collaboration and uptake, thereby amplifying CGIAR's impact.

National governments are another important source of complementary CA in human and social capital, given their ability to enable implementation and scaling. While CGIAR has traditionally focused on strong ties with ministries of agriculture, livestock and fisheries, One Health will strengthen connections with public health institutes and organizations, and Climate and the Environment with ministries of environment, water and climate. Further human and social capital could be complemented through strengthened collaboration with INGOs and regional agricultural

organizations to enhance CGIAR's understanding of the broader context and political landscapes at the regional level and benefit from their partner networks for delivery.

### **Biophysical capital**

The SAAF CGIAR Centers have excellent laboratory facilities, mainly in their head office countries covering four regions. In addition, ILRI's, ABC's and ICARDA's genebanks support advanced scientific and technical research in animal genomics, forage breeding, feed and health, husbandry, aquaculture, fisheries, environmental health and food safety. Through bilateral funding, ILRI, ABC and ICARDA are expanding their facilities to measure methane emissions to test productivity-enhancing genetic, feed and health innovations for their potential to reduce emissions. WorldFish maintains unique research infrastructures used to produce and disseminate genetically improved farmed tilapia and giant tilapia in Malaysia and Egypt and rohu, catla and silver carp in Bangladesh.

Despite this valuable infrastructure, geographical coverage is still limited. Partners, such as government agencies, private sector companies and ARIs often have physical infrastructure, including health facilities, production sites and logistical networks, which can complement CGIAR's biophysical capital for testing and scaling innovations.

To this end, CGIAR has invested in building biophysical and human capacity in several NARS Centers and local universities, aiming to establish Centers of excellence to complement its biophysical capital. A presence across regions, combined with access to CGIAR-owned and partner facilities, gives the SAAF consortium a moderately strong position to deliver impactful research and solutions globally. When it comes to implementing solutions in the field and at a larger scale, the CA in biophysical capital lies more with the proposed partners, while CGIAR's strength is leveraging its own and its partners' ARI research infrastructure to develop research methodologies and innovations.

### **Incentives**

The five CGIAR Centers participating in SAAF have distinct yet complementary institutional priorities that align with the SAAF objective of addressing the complex challenges associated with animal and aquatic food (AAF) production systems. Incentives for CGIAR Centers are 'very strong' to deliver the proposed HLOs as these align well with their missions, visions and strategies and allow for the continuation of ongoing research while making room for new ideas.

It is expected that delivering HLOs will create opportunities for living labs to test and prove innovations, generate international public goods (IPGs) and impact on the ground, while further strengthening shared capacity and ties with partners. Incentives for traditional CGIAR partners can be considered strong evidence through well-established long-term collaborations.

For NARS partners, collaborating with CGIAR on HLO delivery increases their capacity and connections with the international scientific community, contributes to the publication rate and visibility of involved national scientists (usually important for promotions) and offers opportunities for higher education (within-country and abroad).

For universities and ARIs, joint projects generate and provide access to data and opportunities for field studies and experience for students, also resulting in joint IPGs. Co-design and more adaptive demand-driven research projects also inform their research strategies and priority setting.

As with NARS researchers, government departments benefit from the increased technical capacity and direct access to innovations and technical backstopping and expanded international scientific connections, which are important for loan proposals. An even stronger incentive would be employment opportunities through new business models and evidence of the impact of joint activities on national impact indicators.

Creating incentives for CBO, NGOs and INGOs to partner with CGIAR is more challenging as they are interested in access to well-documented innovations, practical technical assistance and proven new business models, which requires going beyond scientific proof. This also applies to profit-oriented private partners potentially interested in selected innovations related to input supply, increased production, and processing with clearly described and proven profitable business models to guide their investment in SMEs. Tech companies may be interested in co-investing in AI/ICT solutions once demand has been created. For new service delivery models for AAF producers, co-investing from private enterprises may require incentives from the public sector.

The detailed analysis for each of our aggregated HLOs in Annex 4.1 shows that the proposed consortium builds on its comparative advantage. Nevertheless, incentives for delivering the proposed HLO jointly with CGIAR team need to be carefully considered to ensure that all partners are equally motivated to contribute resources and expertise toward achieving the HLOs. The CA analysis revealed some differences between continued HLO and HLOs responding to new challenges. The CA of specific partners needs to be further analyzed for disaggregated HLO and outputs.

## 5. Program-level theory of change

SAAF contributes to all CGIAR Impact Areas, with an emphasis on i) nutrition, health and food security; ii) poverty reduction, livelihoods and jobs; and iii) climate adaptation and mitigation.

Impact is achieved by delivering on eight Program Outcomes (PO). Four are centered on innovation adoption by producers, market actors and communities, facilitated by co-design and capacity sharing. These are:

1. Animal and aquatic food producers, including women, youth and marginalized groups adopt combinations of innovations for improved productivity and profitability, emissions reduction, nutrient-dense food, healthier animals and aquatic species and climate and environmental sustainability (PO1).
2. Market actors, including women, youth and marginalized groups adopt market system innovations for equitable, efficient, low-emission and resilient animal and aquatic foods systems (PO5).
3. Communities within animal and aquatic food systems adopt innovations for increased social, economic and environmental resilience (PO3).
4. Communities within animal and aquatic food systems adopt innovations that improve community health and well-being (PO4).

The remaining outcomes Center around behavior change for gender-equitable norms, increased investment, more supportive policies and integration of animal and aquatic sourced foods into the diets of producing households. Specifically:

1. Animal and aquatic food producers, market actors and communities within animal and aquatic food systems exhibit behavior supporting gender-equitable norms (PO6).
2. Public and private sector actors invest in equitable, efficient, low-emission and resilient animal and aquatic food systems (PO7).
3. Policy and decision-makers implement new or improved policies, regulations or strategies for equitable, efficient, low-emission and resilient animal and aquatic food systems (PO8).

4. Animal and aquatic food producers and their households integrate adequate safe, nutrient-dense animal and aquatic foods in diverse diets (PO2).

In response to the challenges and megatrends discussed in Section 2, SAAF designed six interlinked Areas of Work (AoWs) to achieve SAAF's vision of transforming animal and aquatic food systems sustainably.

**Productivity+** focuses on increasing the production of nutrient-dense animal and aquatic foods, with the "+" signifying that higher productivity will be paired with increased profitability — a critical incentive for producer adoption — alongside a reduction in emissions, which is essential in addressing the climate crisis.

**One Health** emphasizes the importance of ensuring that food production remains safe and healthy for people, animals, and ecosystems, while **Climate and the Environment** addresses the broader environmental and climatic factors associated with animal and aquatic food production.

Building strong, inclusive market systems and enabling environments is essential for driving innovation adoption among diverse stakeholders. This is key to the sustainability and scalability of solutions and is facilitated by **Market Systems, Policy Solutions, and Scaling**. This AoW also plays a role in influencing policy and investment decisions in support of sustainable animal and aquatic food systems, while also developing and implementing scaling strategies.

**Gender, Youth, and Social Inclusion** ensures that solutions for animal and aquatic food production are inclusive, empowering, equitable and contribute to sustainability.

**Digital and Data** supports the other AoWs and stakeholders in leveraging advancements in digital and data science to enhance impact.

All AoWs are interconnected to enhance synergy. To demonstrate, SAAF will strategically select specific sites where all AoWs will be embedded from the outset. Potential countries for these sites include Vietnam (focusing on mangrove-aquaculture, beef cattle, pigs, poultry), Bangladesh (tilapia, carps, goat, poultry), Nigeria (tilapia, cattle, small ruminants, poultry) and Kenya (tilapia, small ruminants, dairy cattle and poultry).

The overall SAAF theory of change (TOC) is a series of nested (interconnected) AoW TOCs (see Figure 5.2). Multiple AoWs contribute to each Program Outcome, for example, PO1 is achieved through the joint efforts of all AoWs, while PO2 is achieved through the efforts of four.

Within each AoW TOC, impact pathways are formulated as i) outputs, which include the process of identifying and engaging with stakeholders and partners and co-design of innovations and innovation packages and capacity-sharing approaches; ii) intermediate outcomes as changes in capacities and attitudes within stakeholders and partners; and iii) outcomes as changes in the behavior of stakeholders and partners resulting from enhanced capacity (knowledge, skills, attitudes, aspirations), improved access to resources, goods and services, a more supportive and enabling environment, and shifts in social norms among others. All AoWs share an impact pathway influencing policy and investment which, once implemented, will positively influence the enabling environment for SAAF work (for simplicity, this and other feedback loops are not shown in the TOC visuals). The SAAF TOC harmonizes with CGIAR-level TOCs through their joint focus on innovation, capacity and policy.<sup>20</sup>

Key assumptions have been attached to impact pathways. Examples include: i) capacity-sharing activities result in increased levels of knowledge and skills within groups; ii) political, economic, and governance structures and systems support investment in AAF systems innovations; and iii) decision-makers are willing to use SAAF evidence, data and tools to inform policy and investment

decisions. All assumptions will be monitored and revised to reflect changing conditions or additional activities incorporated to ensure an assumption holds.

All innovation packages are contextualized for a specific animal and aquatic food production system, including mixed systems (various combinations of livestock, aquaculture and crop), agro-pastoral and pastoral, peri-urban, aquaculture (marine, freshwater and brackish) and fisheries (coastal and inland).

SAAF will work closely with partners in the design and implementation of its activities through co-design. The goal is to ensure partners have ownership and agency as we jointly conceptualize and implement the program. Co-design is an iterative process that enables innovation users to have direct input into selecting, designing, re-designing, prioritizing and scaling modalities. Similarly, at a programmatic level, co-design means governmental and institutional partners are central in establishing priorities, designing programs and establishing development pathways.

Capacity sharing will be achieved through approaches including South–South cooperation to facilitate knowledge and skills exchange among developing countries, technical assistance to provide specialized expertise where needed and peer-to-peer learning to foster mutual support and experience sharing. Knowledge networks will enable the collaboration of multiple stakeholders to disseminate best practices, while public-private partnerships will enhance capacity in key sectors. Capacity-building workshops and training programs will offer structured learning opportunities, complemented by mentorship programs and e-learning platforms to support ongoing development. Community-based approaches will leverage local knowledge and participation to ensure that capacity building is relevant and sustainable.

Gender and equity are central to SAAF. The Gender, Youth and Social Inclusion (GYSI) AoW will lead this area of research and coordinate the integration of gender and equity analysis across the other AoWs. The GYSI strategic research focuses on supporting the empowerment of women, youth and marginalized groups in animal and aquatic food systems for improved livelihoods. Integrative gender research ensures that the innovations developed in the other AoWs respond to gender, youth and marginalized group needs and that benefits from innovation use are equitable. The strategic and integrated work continuously exchanges learning and innovations.

Scaling is built into the AoW TOCs through systems diagnosis and co-design with partners, including the generation of evidence on pathways and policy options that catalyze investment and strengthen the enabling environment. The Market Systems, Policy Solutions and Scaling AoW supports the identification of viable scaling pathways for specific contexts, considering innovation bundles across the different SAAF AoWs. It also supports the engagement of scaling partners to embed proven pathways into their operations and work with Scaling for Impact to synthesize learning on scaling approaches.

Five program-level research questions cut across the AoWs:

1. What are the synergies and tradeoffs on productivity, profitability, emission reductions, climate and environmental resilience, One Health and equity associated with innovation packages for producing adequate, safe, nutritious animal and aquatic sourced foods?
2. How can animal and aquatic food systems support empowerment and create business opportunities and jobs for women, youth and marginalized groups?
3. What are the most effective scaling pathways to achieve SAAF outcomes combining effective partnerships, proven innovations, capacity sharing and supportive policies?
4. What are the best approaches to co-designing innovations and capacity-sharing approaches in specific contexts?

5. How do we most effectively influence, engage with and communicate to investors and policymakers the solutions, tradeoffs and synergies of animal and aquatic sourced foods at the global, regional and national levels?

**Figure 5.1. Program-Level Theory of Change**

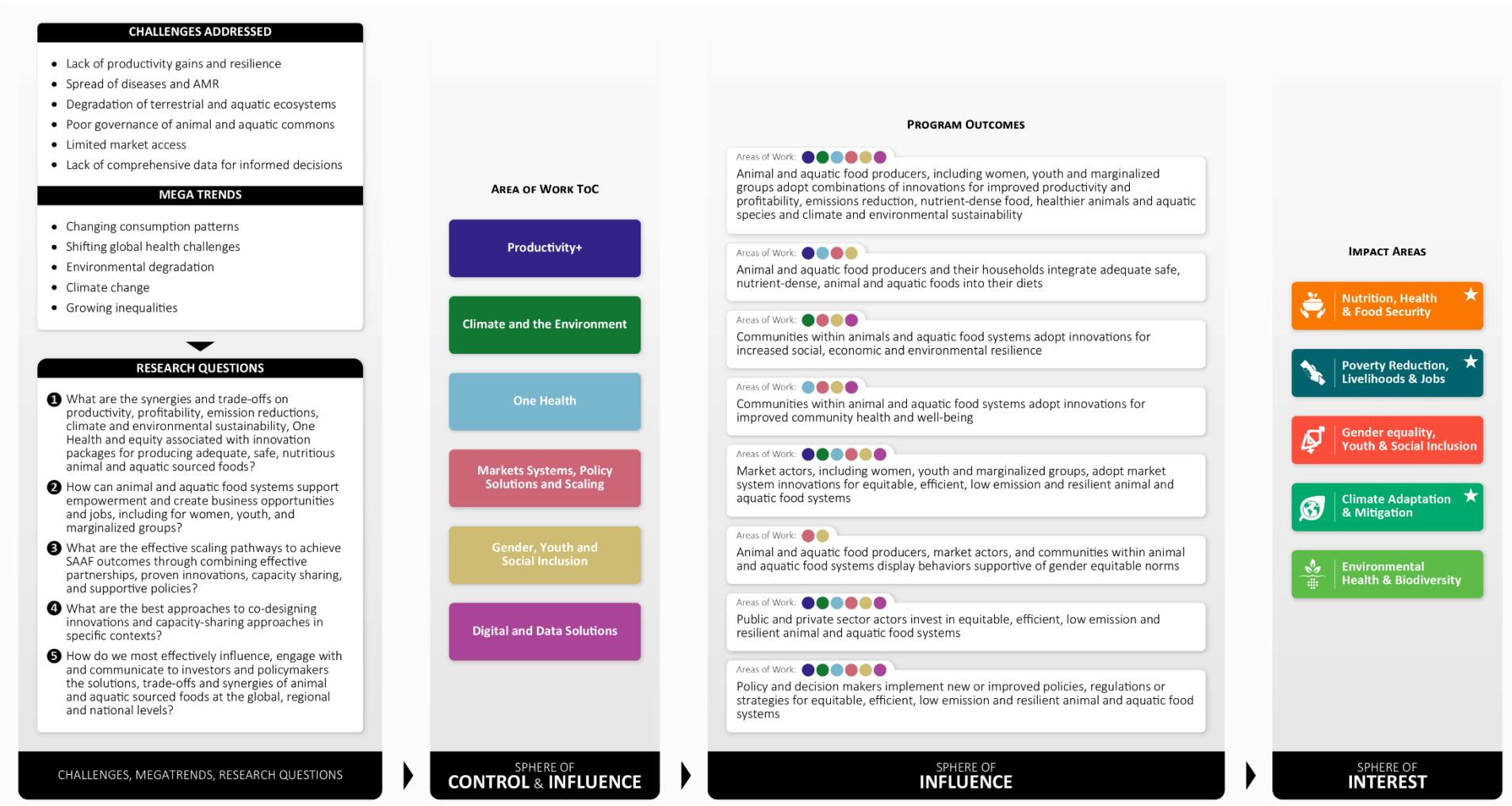


Table 5.1. Partners, assumptions, indicators and targets

Program Outcome (PO)	Statement	Partners Demand:	Assumptions (illustrative, see Section 6 for placement on causal links)	Indicator and target
P01	Animal and aquatic food producers, including women, youth and marginalized groups adopting combinations of innovations for improved productivity and profitability, emissions reduction, nutrient-dense food, healthier animals and aquatic species and climate and environmental resilience	<p>Consumers and consumer groups</p> <p><b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector including market actors; animal and aquatic food system communities; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; donors</p> <p><b>Internal innovation and scaling:</b> Breeding for Tomorrow; Better Nutrition; Climate Action; Multifunctional Landscapes; Policy Innovations; Digital Transformation; Gender Equity and Inclusion; Scaling for Impact; Shared Capacity</p>	<p>Animal and aquatic food producers have sufficient incentives to adopt innovations</p> <p>Input and service providers have sufficient incentives to invest in delivering innovations efficiently, equitably and affordably</p>	<p>Number of people in animal and aquatic food-producing households that adopt one or more SAAF innovations (gender, youth and marginalized groups disaggregated). <b>Target = 1.7 million people</b></p>
P02	Animal and aquatic food producers and their households, integrate adequate safe, nutrient-dense, animal and aquatic foods in diverse diets	As above	Animal and aquatic food producers see the benefit and are willing and able to change dietary practices to better integrate animal and aquatic foods	Number of people in animal and aquatic food-producing households integrating adequate safe, nutrient-dense, animal and aquatic foods in diverse diets. <b>Target = 300,000 people</b>

				Number of partners supporting producer households to integrate adequate safe, nutrient-dense, animal and aquatic foods in diverse diets. <b>Target = 8 institutions</b>
P03	Communities within animal and aquatic food systems adopting innovations for increased social, economic and environmental resilience	As above	Animal and aquatic producers, market actors and communities have sufficient incentives to adopt innovations	<p>Number of people within animal and aquatic food-producing communities that adopt SAAF innovations for improved resilience (disaggregated for women, youth and marginalized groups). <b>Target = 420,000 people</b></p> <p>Number of partners supporting the adoption of SAAF innovations for improved resilience. <b>Target = 10 institutions</b></p>
P04	Communities within animals and aquatic food systems adopting innovations for improved community health and well-being	As above	Animal and aquatic producers, market actors and communities have sufficient incentives to adopt innovations	<p>Number of people within animal and aquatic food-producing communities that adopt SAAF innovations for improved overall health and well-being (disaggregated for women, youth and marginalized groups). <b>Target = 420,000 people</b></p> <p>Number of partners supporting the adoption of SAAF innovations for improved health and well-being. <b>Target = 10 institutions</b></p>
P05	Market actors, including women, youth and marginalized groups adopting market systems innovations for equitable, efficient, low-emission and resilient AAF systems	As above	Market actors, including women, men, youth and marginalized groups, have the capacity, knowledge and willingness to apply inclusive market system innovations	Number of market actors (excluding producers) adopting one or more SAAF innovations (gender, youth and marginalized groups disaggregated). <b>Target = 2,640 people</b>
P06	Animal and aquatic food producers, market actors and communities within animal and aquatic food systems exhibit behavior supporting gender-equitable norms	As above	Stakeholders are willing to adopt and embrace gender-equitable behaviors	Number of people within animal and aquatic food systems (producing households, market actors and communities) that exhibit behavior more supportive of gender-equitable norms (women, youth)

				<p>and marginalized groups disaggregated).  <b>Target = 370,000 people</b></p> <p>Number of partners supporting changes to more gender-equitable norms. <b>Target = 10 institutions</b></p>
P07	Public and private sector actors invest in equitable, efficient, low-emission and resilient animal and aquatic food systems	As above	Political, economic and governance structures and systems support investment in AAF systems innovations	USD investment by public and private sector actors in equitable, efficient, low-emission and resilient animal and aquatic food systems. <b>Target = US\$ 22 million</b>
P08	Policy and decision-makers implement new or improved policies, regulations or strategies for equitable, efficient, low-emission and resilient animal and aquatic food systems	As above	Decision-makers willing to use SAAF evidence, data and tools in policy design and investment decisions	Number of policies, regulations or strategies influenced by SAAF for equitable, efficient, low-emission and resilient animal and aquatic food systems. <b>Target = 62 policies</b>

## 6. Areas of Work

### 6.1 Productivity+

Productivity+ supports animal and aquatic food producers, including women, youth and marginalized groups as they adopt productivity-enhancing innovations that are profitable, reduce emissions and increase food nutrient value (PO1). It also contributes to market actor innovation adoption (PO5), investment (PO7) and policy change (PO8).

Three interlinked pathways contribute to these outcomes i) input and service providers, ii) producers, and iii) local, national and regional institutions (Figure 6.1).

The first pathway recognizes that sustainable productivity improvements depend on input and service providers who can deliver innovations efficiently, equitably and affordably. Therefore, delivery systems are based on business models and input and service providers' capacities for entrepreneurship, inclusion and innovation.

The second pathway focuses on producers and supporting them as they adopt contextualized combinations of innovations that suit their needs and preferences. Input and service providers and institutions, such as NARS, play central roles in capacity sharing.

The third pathway focuses on capacities within local, national and regional institutions so their staff can more effectively support producers and input and service providers and influence a favorable and inclusive policy environment.

Productivity+ collaborates with all other AoWs: i) with Markets Systems, Policy Solutions and Scaling on business models, innovation adoption incentives, policy influence and scaling; ii) with One Health on animal and aquatic species health management practices; iii) with Gender, Youth and Social Inclusion on gender responsiveness and inclusion; iv) with Climate and the Environment on ensuring innovations are climate and environmentally friendly; and v) with Digital and Data Solutions on digital innovations and data management.

#### Research questions

1. How can innovations in breeding programs, reproductive technologies, digital platforms and genomics deliver sustained gains in productivity and lower emissions and support the conservation of animal and aquatic species?
2. How can innovations in animal and aquatic species nutrition, including traditional and novel feeds, forages and feed-food crops and their delivery systems improve feed efficiency, nutrition and productivity with lower emissions?
3. How can innovations in animal and aquatic species' health and welfare and their delivery systems decrease morbidity and mortality and thus increase productivity with lower emissions?
4. How can feeding innovations improve the nutritional quality and nutraceutical properties of animal and aquatic foods?
5. What tools and approaches support the identification and adoption of combinations of innovations for improved animal and aquatic species productivity and profitability, emissions reduction and nutrient-dense food?
6. What business opportunities can be created for women, youth and marginalized groups in innovation delivery and what business models support the delivery of innovations equitably?
7. How can the Productivity+ approach and innovation packages be scaled under different contexts?

To address our research questions we will i) diagnose production systems and value chains to understand needs and preferences; ii) facilitate the co-design of innovation bundles for different contexts using a transdisciplinary approach to capitalize on the synergies between genetics, genomics, nutrition, feeding, health and food fortification (upstream work, such as on genomics or vaccine development may be included here); iii) conduct participatory studies to gather evidence and make recommendations; and iv) develop and test pathways for scaling under specific contexts. As Productivity+ is building on a large volume of past and current work, the entry point for research within some production systems may be at iii) or iv).

### **Comparative advantage**

The sources of CGIAR's comparative advantage lie in its extensive collection of forage species and expertise in forage improvement, livestock and fish genetics, feed and health sciences, animal and aquatic production systems, capacity sharing and its field presence in the Global South.

### **High-level outputs (HLOs)**

Productivity+ has six HLOs using a co-design process for innovation and capacity sharing.

**1 Sustainable breeding and conservation programs for animal and aquatic species and inclusive delivery models.** Working with producers, breeding organizations, artificial insemination service providers and hatcheries and NARS, we will co-design or strengthen: i) contextualized genetic improvement programs, including for dairy cattle<sup>21</sup> and buffalo, beef cattle, pigs,<sup>22</sup> small ruminants,<sup>23</sup> chickens,<sup>24</sup> tilapia,<sup>25</sup> carp and catfish species and aquatic plants; ii) reproductive technologies that support delivery or conservation;<sup>26, 27, 28, 29</sup> and iii) models for efficient, equitable and affordable delivery of improved genetics<sup>30, 31</sup> or that conserve biodiversity. The genetic improvement programs will differ depending on the context (within-breeding versus crossbreeding; community-based versus nucleus-based), incorporate breeding objectives appropriate for a climate crisis (emissions reduction, heat tolerance) and capitalize on advances in genomics, phenomics, digital solutions and artificial intelligence.

New work here includes a greater focus on animal and aquatic species biodiversity conservation and an increased focus on breeding for a climatically changed future.

**2. Genomic resources for animals, aquatic species and forages.** Working with national partners, we will i) strengthen genomic resources for animals, aquatic species and forages;<sup>32,33</sup> ii) identify genomic variants for ecologically and economically useful traits, feeding into genetic improvement strategies; iii) develop new ways of mining genomic data (e.g., with artificial intelligence). Where possible, the genomic data will be shared in publicly accessible genomic databases, such as Ensembl.

**3. Cost-efficient animal and aquatic species feed and forage innovations and inclusive delivery models.** Working with producers, feed and seed suppliers and NARS and taking into consideration traditional and novel feeds, forages and feed-food crops, we will co-design or strengthen i) novel ways of reducing emissions and improving feed efficiencies, such as anti-methanogenic compounds in forages<sup>34</sup> and nutrient requirement assessments of farmed species;<sup>35</sup> ii) high quality, climate-resilient forages by exploiting our forage and feed-food crop genebank resources and improvement programs;<sup>36</sup> iii) digital tools for cost-efficient feed formulations and enhanced decision-making;<sup>37, 38</sup> iv) labor-saving feed processing technologies;<sup>39</sup> v) circular bioeconomy approaches to ingredients and feeds;<sup>40</sup> and vi) models for efficient, equitable and affordable delivery of feeds and seeds.<sup>41, 42</sup>

New work here comprises novel ways to jointly reduce emissions and increase feed efficiency.

**4. Cost-efficient animal and aquatic species health and welfare innovations and inclusive delivery models.** Working with producers, animal and aquatic healthcare workers and NARS, we will co-design or strengthen: i) vaccines and diagnostic tools for animal and aquatic species diseases with high economic burdens, including African Swine Fever,<sup>43</sup> Peste des Petits Ruminants,<sup>44</sup> Tilapia Lake Virus,<sup>45, 46</sup> and carp parasites;<sup>47</sup> ii) improved herd/fish health management practices, including biosecurity;<sup>48, 49</sup> iii) models for efficient, equitable and affordable delivery and iv) risk mapping for climate-sensitive diseases and a risk-based approach to disease control.<sup>50, 51</sup> Reduced animal and aquatic food infections and better health management will also contribute to achieving the outcomes in One Health. This risk-based disease control work is new.

**5. Fortification approaches for more nutritious animal and aquatic foods.** This entails deploying feed formulations and feeding practices to increase the nutritional value of animal and aquatic foods for nutrient-deficient populations.<sup>52, 53</sup> With producers, feed suppliers, NARS and others, we will i) assess the nutrient deficiencies within groups and design fortification approaches to mitigate them;<sup>54</sup> ii) identify local ingredients and feeds with nutraceutical potential and develop functional (fortified and acceptable) animal and aquatic foods; and iii) test and validate selected functional foods in context, including analysis of nutritional quality and specialized metabolites.

While a relatively new research component, this builds on promising earlier work.<sup>55</sup>

**6. Inclusive approaches, tools and capacity building to support animal and aquatic food producers to adopt combinations of innovations for improved productivity and profitability, emissions reduction and nutrient-dense foods.** This recognizes that increased productivity usually requires combined genetics, feeding and health interventions and that profitability is a primary incentive for producer adoption. There are tradeoffs between productivity, profitability, emissions reduction and food nutrient value. With partners, we will co-develop innovations and capacity-building approaches to address these issues, for example: i) digital apps for monitoring on-farm performance for better decision-making;<sup>56</sup> ii) models for trade-off analysis; iii) social and behavior change communications that combine messaging on genetics, feeding and health practices;<sup>57</sup> and iv) approaches supporting endogenous, producer-led innovations and scaling through farmer-to-farmer extension.<sup>58</sup>

Building on past activities, new work will more systematically compare approaches under different contexts.

Work on gender, youth and social inclusion will ensure that Productivity+ innovations and delivery systems are gender-responsive and that access to innovations and benefit sharing is equitable. Women, men, youth and marginalized groups have different needs and preferences regarding innovations, such as intersectional trait preferences,<sup>59, 60</sup> and will need tailored support to access and benefit from innovations.<sup>61</sup> They may face barriers to engaging as service providers in innovation delivery, which will require solutions.<sup>62</sup> Should empowerment and gender norm changes be required to enhance equity, this will be conducted in collaboration with the GYSI AoW.

## **Partnerships**

Productivity+ will partner with i) producers and farmer organizations; ii) the private sector, including veterinarians and other healthcare workers, artificial insemination Centers and technicians, feed and seed suppliers and hatcheries; iii) the public sector, including NARS; and iv) local, national and regional institutions, including government; and selected advanced research institutes. Productivity+ will also engage in and strengthen networks, such as the Forage African Network and facilitate South–South knowledge exchange, such as via the Asia-Africa Bluetech Superhighway.<sup>63</sup>

### **Collaboration with other Programs/Accelerators**

Productivity+ will collaborate with Better Diets to identify consumer demand and nutrient deficiencies within specific populations, and acceptance of fortified foods; Breeding for Tomorrow to undertake market assessments, create an enabling environment for genomics work, cost-save on genotyping and strengthen seed policy; and the Shared Capacity Accelerator on best practices in capacity sharing.

Figure 6.1.1. Productivity+

## PRODUCTIVITY+

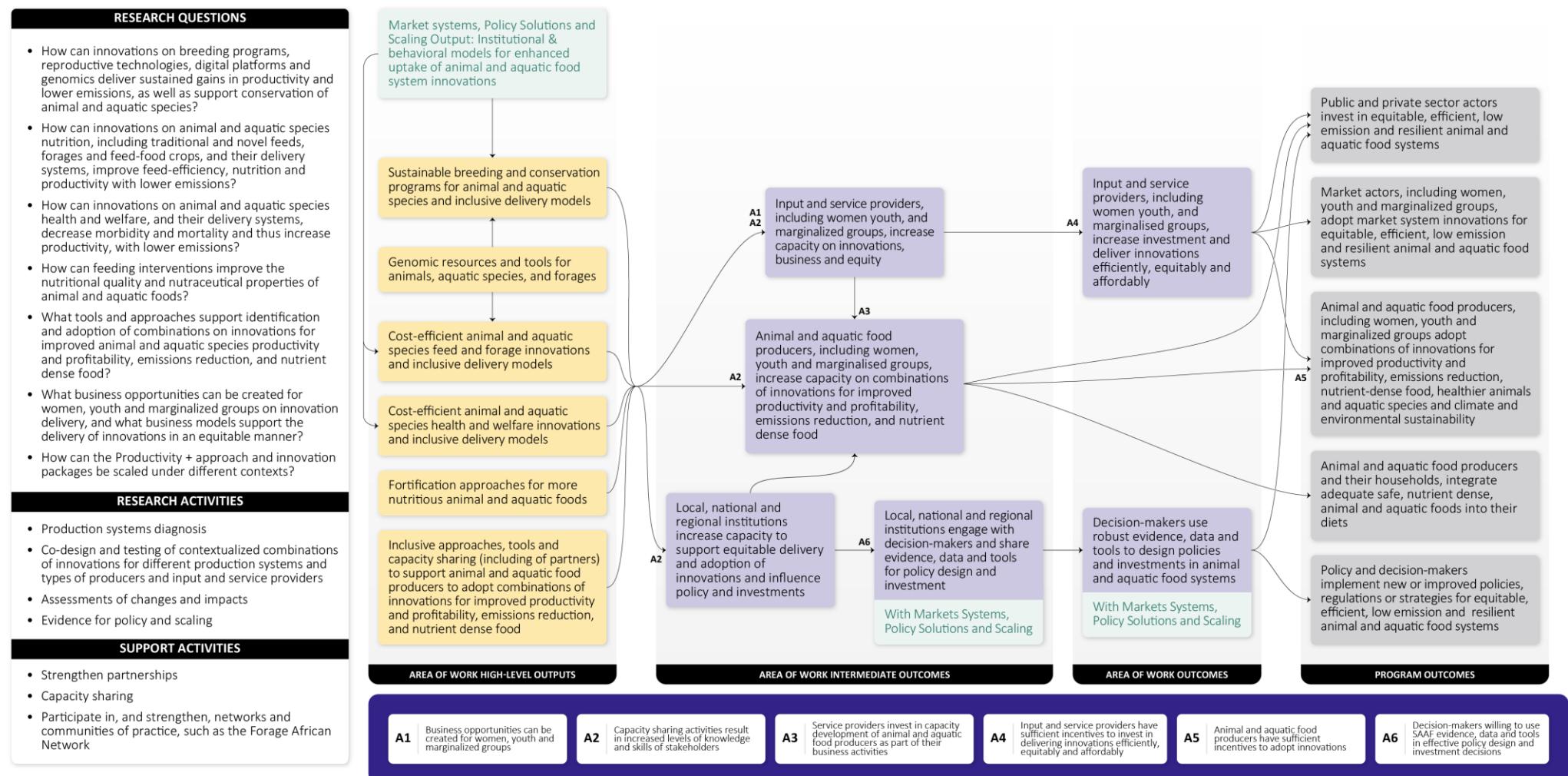


Table 6.1.1. Partners, assumptions and indicator targets

<b>TOC Element #</b> OC=outcome I-OC= intermediate OC OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OC 1.1	Input and service providers, including women youth and marginalized groups, increase investment and deliver innovations efficiently, equitably and affordably	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors	A1 Business opportunities can be created for women, youth and marginalized groups  A2 Capacity-sharing activities result in increased levels of knowledge and skills of target groups  A3 Service providers invest in capacity development of animal and aquatic food producers as part of their business	Number of input and service providers delivering innovations efficiently, equitably and affordably (disaggregated for women, youth and marginalized groups). <b>Target = 530 people</b>  USD investment by input and service providers in delivery systems (disaggregated for women, youth and marginalized groups). <b>Target = US\$1.1 million</b>
OC 1.2	Decision-makers use robust evidence, data and tools to design policies and investments in animal and aquatic food systems	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors	A4 Input and service providers have sufficient incentives to invest in delivering innovations efficiently, equitably and affordably  A5 Animal and aquatic food producers have	Number of policies, regulations or strategies or investments, designed by decision-makers using SAAF evidence, data and tools. <b>Target = 11 policies</b>
I-OC 1.1	Input and service providers, including women youth and marginalized groups, increase capacity on innovations and technologies, business and equity	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors		Not required

<b>TOC Element #</b> OC=outcome I-OC= intermediate OC OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
I-OC 1.2	Animal and aquatic food producers, including women, youth and marginalized groups, increase capacity on combinations of innovations for improved productivity and profitability, emissions reduction and nutrient-dense food	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors	sufficient incentives to adopt innovations A6 Decision-makers willing to use SAAF evidence, data and tools in effective policy design and investment decisions	Not required
I-OC 1.3	Local, national and regional institutions increase capacity to support equitable delivery and adoption of innovations and influence policy and investments	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors		Not required
I-OC 1.4	Local, national and regional institutions engage with decision-makers and share evidence, data and tools for policy design and investment	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors		Not required

<b>TOC Element #</b> OC=outcome I-OC= intermediate OC OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OP 1.1	Sustainable breeding and conservation programs for animal and aquatic species and inclusive delivery models	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors.  Internal innovation and scaling: Breeding for Tomorrow		Not required
OP 1.2	Genomic resources and tools for animals, aquatic species, and forages	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors.  Internal innovation and scaling: Breeding for Tomorrow		Not required
OP 1.3	Cost-efficient animal and aquatic species feed and forage innovations and inclusive delivery models	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors.  Internal innovation and scaling: Breeding for Tomorrow		Not required

<b>TOC Element #</b> OC=outcome I-OC= intermediate OC OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OP 1.4	Cost-efficient animal and aquatic species health and welfare innovations and inclusive delivery models	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors		Not required
OP 1.5	Fortification approaches for more nutritious animal and aquatic foods	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors.  Internal innovation and scaling: Better Diets and Nutrition		Not required
OP 1.6	Inclusive approaches, tools and capacity building (including of partners) to support animal and aquatic food producers to adopt combinations of innovations for improved productivity and profitability, emissions reduction and nutrient-dense food	Demand, innovation and scaling partners: producer and producer groups; community-based and grassroots organizations; private sector, including input and service providers; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; donors		Not required

## 6.2 Climate and the Environment

Climate and the Environment supports the efforts of communities within animal and aquatic food systems to adopt innovations for increased social, economic and environmental resilience (PO3). It contributes to improved productivity and profitability (PO1), equitable market systems (PO5) and increased investments in low-emission and resilient animal and aquatic food systems (PO7).

The main pathways are via market actors (e.g., animal and aquatic food (AAF) producers and the private sector and regional institutions). Market actors and AAF producers increase capacities for innovation for resilient and low-emission production systems. We work with the Markets Systems AoW to enhance capacity and incentives for the private sector to invest in equitable delivery and increased adoption of climate-adapted innovations while strengthening local, national and regional institutions to influence policy and investment opportunities.

### Research questions

1. How do AAF systems influence climate and environmental sustainability and what reciprocal impacts do climate and environmental changes have on the productivity, resilience, water, land and biodiversity impacts of these food systems?
2. What new climate-adapted innovations can be developed and implemented to optimize the use and restoration of water, soil and land resources, enhance livelihoods and reduce climate impacts, while simultaneously fostering community resilience and engagement to ensure equitable access to these resources?
3. What innovative business models, financial mechanisms and evidence of impact are most effective in mobilizing climate finance to support the transition to SAAF systems?
4. How can AAF system resilience and emissions be cost-effectively monitored and optimized for scalability?

### Comparative advantage

CGIAR is uniquely positioned to drive low-emission innovation and resilience in AAF systems through our global research Centers, forage, animal and aquatic species genebanks, bilateral projects (e.g., [Low-Methane Forages](#)) and long-term partnerships. CGIAR's expertise extends to gender transformative approaches, data analytics and field trials in priority regions across Latin America, Africa, Asia and the Pacific.

CGIAR offers science-based evidence for those working in conservation, industry, finance and markets to scale resilient low-emission AAF systems by integrating bioscience, social innovation, ecosystem management, business models, policy and finance. CGIAR's expertise in integrating animal and plant-based production supports circular economy principles, optimizing resource use and minimizing waste.

### Methods and approaches

- Life cycle assessments and environmental impact models to evaluate land, water and climate impacts.
- Field experiments and modeling (process-based, empirical) to estimate the resilience and productivity of pasture, animal and aquatic species and livelihoods to climate hazards.
- Analysis of economic opportunities and risks, costs of inaction and returns on investments using standard and stochastic approaches.
- Meta-analyses to assess the effectiveness of interventions.
- Remote sensing, machine learning and surveys to monitor uptake by end-users and assess impacts.

- Participatory methods for co-design, including community conversations and Pioneer-Positive Deviance.

## **High-level outputs**

- 1. Evidence of the benefits and impacts of AAF systems on climate and the environment and vice versa.** Animal and aquatic food systems shape climate and environmental outcomes. Sustainable livestock management and technologies increase soil carbon sequestration (e.g., rotational grazing and deep-root forages). Integrated aquaculture systems boost food production and promote biodiversity and water quality by reducing the need for chemical inputs (e.g., rice-fish systems and integrated multi-trophic aquaculture systems). Climate change impacts these systems by altering water temperatures and availability, which affects fish and livestock growth rates and health. Quantifying these interactions is the basis for developing strategies that maximize benefits while minimizing environmental harm.  
  
A relatively new area of inquiry is to evaluate the economic costs and benefits of climate action and inaction, and work on developing sustainable animal and fish feed, resilient animal breeds and fish strains, and better management practices to reduce emissions.
- 2. Innovations for efficient use and restoration of water, soil and land resources, enhanced livelihoods and reduced climate impacts while fostering community resilience and engagement for equitable access to resources.** Innovations such as silvopastoral systems integrate trees with pasture and livestock, enhance carbon sequestration in biomass,<sup>64</sup> improve soil health<sup>65</sup> and moisture and reduce methane emissions.<sup>66,67</sup> In aquaculture, innovations like recirculating water systems and farming seaweeds and bivalves minimize water use and pollution, while mangrove restoration supports carbon storage and protects coastal ecosystems. Social-technical innovations which couple technical innovations with social and policy innovations will promote locally-led adaptation and strengthen institutional capacities to plan and implement low-emission climate-resilient development pathways.
- 3. Business models, financial mechanisms and evidence of economic, climatic and environmental benefits to mobilize climate finance.**<sup>68</sup> Evidence, technical assistance and co-developed solutions are needed to scale and de-risk investments. Implementing blended finance models has proven effective in de-risking AAF system investments and attracting more capital.<sup>69</sup> Inclusive business development models have promoted access to finance by small aqua-businesses and access to training and extension support by smallholder farmers. Working with micro-financial institutions has helped unlock green financing for Kenyan and Guatemalan livestock producers.<sup>70</sup>
- 4. Cost-efficient and AAF-specific resilience and emission monitoring tools.** Tracking policies, investments and project impacts catalyze new funding and support narratives of progress, but the lack of robust methods for emission sources or progress on adaptation inhibits investments. Hence, this AoW focuses on developing monitoring and reporting frameworks and indicator datasets for national reporting,<sup>71</sup> improving methods for measuring pasture productivity with remote sensing<sup>72</sup> and creating new tools smallholders can use to access carbon markets and other funding opportunities.

With women, youth and marginalized communities, we will co-design ways to increase their participation and leadership positions in managing communal and household resources and environments. We will identify the benefits and obstacles of providing them with resilient and low-

emission technologies, like energy-efficient equipment for fish and animal products handling, preservation and processing (e.g., exploring Indigenous fish processing and preservation practices).<sup>73</sup>

## **Partnerships**

Partnerships include collaborations with governments, agricultural and hydrometeorological research institutions, local producers and value chain cooperatives and multilateral and multinational organizations (e.g., World Bank, Marfrig, Minerva, Nestle IADB, ADB and AfDB). Engaging with multilateral organizations offers access to funding, global expertise, policy advocacy and scaling innovations. Partnerships with government agencies ensure investments align with national objectives and generate policy and regulatory support.

Collaborations with NGOs focusing on gender and social inclusion help ensure women, youth and marginalized groups are represented and have opportunities for empowerment. We will engage with the private sector for technological and financial support and with universities for multi-disciplinary research. These partnerships facilitate comprehensive climate impact assessments, co-development of resilient and low-emission practices and the co-creation of sustainability narratives for scaling SAAF system innovations.

## **Collaboration with other Programs/Accelerators**

- Climate and the Environment collaborates with CGIAR Programs on Climate Action, Multifunctional Landscapes to scale data, approaches, locations and partnerships.
- With Climate Action, this AoW leads on-the-ground, producer-centered development of context-specific AAF system innovations. Climate Action offers evaluation frameworks, climate impact data and advocacy opportunities.
- With Multifunctional Landscapes, we will collaborate with producers on testing and implementing agro-ecological and ecosystem-based management approaches. The Multifunctional Landscapes Program offers landscape planning, food system policies, strategies and engagement.
- The Scaling for Impact Program takes tested, bundled climate-adapted AAF system solutions to scale in different geographies and contexts.

Figure 6.2.1. Climate and the Environment Theory of Change

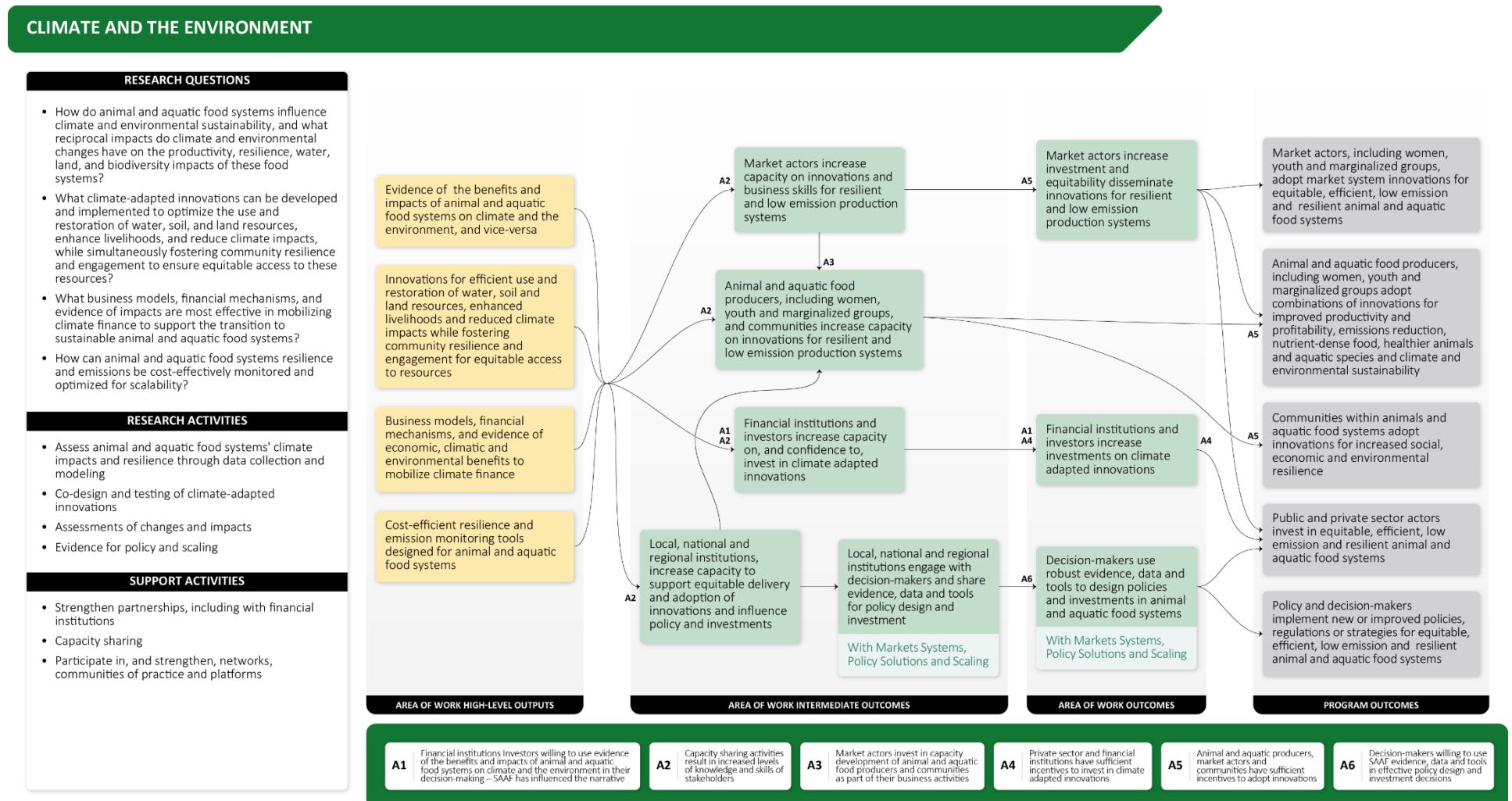


Table 6.2.1. Partners, assumptions and indicator targets

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OC 2.1	Market actors increase investment and equitability to disseminate innovations for resilient and low-emission production systems	<p><b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks</p> <p><b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</p>	<p>A1 Financial institutions and investors willing to use evidence of the benefits and impacts of animal and aquatic food systems on Climate and the Environment in their decision-making – SAAF has influenced the narrative</p> <p>A2 Capacity-sharing activities result in increased levels of knowledge and skills of target groups</p> <p>A3 Market actors invest in capacity development of animal and aquatic food producers and communities as part of their business activities</p> <p>A4 Financial institutions and investors have sufficient incentives to invest in climate-adapted innovations</p> <p>A5 Animal and aquatic producers, market actors and communities have sufficient incentives to adopt innovations</p> <p>A6 Decision-makers willing to use SAAF evidence, data and tools in effective policy design and investment decisions</p>	<p>Number of market actors equitably delivering innovations (disaggregated for women, youth and marginalized groups). <b>Target = 260 people</b></p> <p>USD investment by market actors in disseminating innovations for animal and aquatic food systems (disaggregated for women, youth and marginalized groups). <b>Target = US\$1.1 million</b></p>

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption</b> (see TOC visual for placement on causal links)	<b>Indicator and target</b>
OC 2.2	Financial institutions and investors increase capacity on, and confidence to, invest in climate-adapted innovations	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks  <b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)		USD investment by financial institutions and investors in climate-adapted innovations (disaggregated for women, youth and marginalized groups). <a href="#">Target = US\$ 5.5 million</a>
OC 2.3	Decision-makers use robust evidence, data and tools to design policies and investments in animal and aquatic food systems	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks  <b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)		Number of policies, regulations, strategies or investments, designed by decision-makers using SAAF evidence, data or tools. <a href="#">Target = 19 policies</a>

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption</b> (see TOC visual for placement on causal links)	<b>Indicator and target</b>
I-OC 2.1	Market actors increase capacity on innovations and business skills for resilient and low-emission production systems	<p><b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks</p> <p><b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</p>		Not required
I-OC 2.2	Animal and aquatic food producers, including women, youth and marginalized groups, communities and community groups increase capacity on innovations for resilient and low-emission production systems	<p><b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks</p> <p><b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</p>		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption</b> (see TOC visual for placement on causal links)	<b>Indicator and target</b>
I-OC 2.3	Private sector and financial institutions have increased capacity and confidence to invest in climate-adapted innovations	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks  <b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)		Not required
I-OC 2.4	Local, national and regional institutions, increase capacity to support equitable delivery and adoption of innovations and influence policy and investments	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks  <b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption</b> (see TOC visual for placement on causal links)	<b>Indicator and target</b>
I-OC 2.5	Local, national and regional institutions engage with decision-makers and share evidence, data and tools for policy design and investment	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks  <b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)		Not required
OP 2.1	Evidence of the benefits and impacts of animal and aquatic food systems on Climate and the Environment and vice versa	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks  <b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)		Not required
OP 2.2	Climate-adapted innovations for efficient use and restoration of water, soil and land resources and reduced climate impacts including	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption</b> (see TOC visual for placement on causal links)	<b>Indicator and target</b>
	lowered emissions and increased carbon sequestration	<p>agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks</p> <p><b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</p>		
OP 2.3	Business models, financial mechanisms and evidence of economic, climatic and environmental benefits to mobilize climate finance	<p><b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks</p> <p><b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</p>		Not required
OP 2.4	Cost-efficient resilience and emission monitoring tools designed for animal and aquatic food systems	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, communities and community-based and grassroots organizations; private sector; national agricultural research system; universities;		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption</b> (see TOC visual for placement on causal links)	<b>Indicator and target</b>
		<p>local, national and regional institutions including government; nongovernment organizations; decision-makers; donors; multilateral banks</p> <p><b>Demand and Innovation:</b> Intergovernmental Panel on Climate Change (IPCC); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</p>		

### **6.3 One Health**

One Health develops and supports innovations in animal and aquatic food systems (AAF systems) to improve community health and well-being (PO4). It integrates adequate safe, nutrient-dense foods into producers' diets (PO2) and improves policies and institutions around One Health (PO8).

There are four pathways: i) increasing the capacities of market actors, including women, youth and marginalized groups; ii) enabling communities and animal and aquatic food (AAF) producers to adopt innovations addressing One Health challenges including zoonoses, food and water safety and AMR; iii) enhancing the capacity of development actors to use One Health research evidence for decision-making and investment; and iv) strengthening local, national and regional institutions to support equitable delivery and adoption of innovations and influence policy and investment (Figure 6.3).

We explore interactions between climate, gender, environmental and animal and human health, focusing on transmission pathways to develop sustainable strategies for disease control and improve food safety in livestock and aquatic production systems.

#### **Research questions**

1. How do AAF production systems contribute to One Health risks, including emerging infectious and zoonotic diseases (EIZD), food safety and AMR, and how do socioeconomic, cultural and environmental factors, such as climate change, land use, water use and demographics influence these risks?
2. What are the primary drivers of EIZD in animal food production systems, including wild meat, and how can these transmission patterns be predicted and mitigated?
3. What are the drivers of antimicrobial use (AMU) in livestock and aquaculture, how can they be effectively quantified and reduced across various farm contexts, and what are the associated economic and gender-specific implications of production system intensification?
4. What are the health and economic impacts of foodborne diseases in traditional and informal markets and wild meat value chains, and how can cost-effective food safety interventions be scaled and integrated into national and regional food systems? What are the drivers of success and failure of food safety interventions?
5. What are the risks associated with AMR and pathogen contamination in watersheds and cropping soils to animal and aquatic food production, and what are the most effective environmental interventions to mitigate these risks while addressing broader issues like water quality, soil health degradation and climate change?
6. What are the economic and health benefits of One Health Initiatives, how can these be measured, and what best practices can be identified for governments and organizations to operationalize and invest in One Health to effectively deliver improved health outcomes for humans, animals and the environment?

#### **Comparative advantage**

We are building on strong capabilities and successful experiences from decades of interdisciplinary research on One Health challenges like AMR, food safety and zoonoses in animal, aquatic and environmental systems. Through enduring national and global partnerships, including the UN Quadripartite (WHO, FAO, WOAH and UNEP).<sup>74</sup> CGIAR can promote integrated One Health service delivery that cost-effectively enhances health outcomes for humans, animals and the environment.

## **Methods and approaches**

- i) Surveys, epidemiological, genomics and living labs;
- ii) Environmental modeling and risk assessment to measure the prevalence and transmission of emerging infectious and zoonotic diseases and foodborne diseases;
- iii) Measure AMU and water pollution and associated pathways;
- iv) Evaluate the quality and availability of antimicrobials and vaccines; and
- v) Examine socioeconomic, cultural and political-economic factors driving One Health challenges.

We co-develop, pilot and scale interventions to reduce and prevent risks of emerging infectious and zoonotic and foodborne diseases in traditional markers and reduce AMU and mitigate AMR, including conducting cost-benefit analyses of interventions and identifying climate adaptation strategies that reduce environmental toxicity.

We assess One Health by comparing health outcomes, the cost–benefits of joint service delivery models with traditional single-sector service delivery methods and capturing the social and environmental outcomes of One Health Initiatives and supporting local, national and regional One Health platforms.

## **High-level outputs**

**1. Targeted innovations and incentives to reduce emerging infectious and zoonotic diseases (EIZD) in animal and aquatic food production systems.** We will identify key factors that drive the emergence and transmission of EIZD and develop strategies to mitigate risks.<sup>75</sup> This includes assessing system capacities to combat disease transmission amid climate, environmental and socioeconomic changes. We will also analyze how environmental factors influence risk pathways and employ simulation models to estimate impacts on human health and nutrition.

A relatively new area of inquiry will be to develop and evaluate disease control interventions, including integrated disease surveillance systems and measures to reduce risks associated with wildlife interactions and wild meat consumption to enhance ecosystem health<sup>76</sup>.

**2. Target innovations and incentives to improve food safety in informal markets and better nutrition.** Building on over a decade of research, we examine the health and economic impacts of foodborne disease, the role of water in food safety, and launch interventions to improve food safety focusing on critical control points (e.g., informal and traditional markets).<sup>77</sup> We will continue working with health and food safety regulatory authorities to characterize the cost-effectiveness of i) food safety capacity building, ii) infrastructure provision and iii) business oversight.<sup>78, 79</sup>

New work includes scaling microbial decontamination technologies in informal market settings and supporting national and regional food safety strategy implementation. Outputs include evidence-informed interventions, institutional arrangements and technologies to improve food safety in informal markets and better nutrition.

**3. Targeted innovations and incentives to reduce AMU and mitigate AMR risks on farms and in the environment.** This relatively new area of activity integrates learning in both animal and aquatic foods systems to develop standardized methods to assess AMU and the quality of antimicrobials and vaccines. We will investigate AMU drivers and implement risk-based assessments, monitoring and modeling in watersheds, and pilot interventions, including gender-sensitive and de-risking strategies. This will include evaluating current biosecurity measures, regulatory frameworks,<sup>80</sup> and feed and vaccination strategies to reduce AMU, disease and AMR.

We will also conduct economic analyses to support policy development, create incentives for behavior change and explore climate adaptation strategies to reduce environmental impacts.

**4. Optimized One Health service delivery model that integrates studies to compare health outcomes, costs and benefits of joint service delivery.** Building on strong regional and national networks we will continue supporting capacity sharing through organizational development, implementation and sectoral integration.<sup>81, 82</sup> We will engage two groups of implementers, i) government (all levels), and ii) development partners. The latter will focus on NGOs and humanitarian organizations implementing One Health Initiatives locally.<sup>83</sup> This will generate evidence on best practices and add value to One Health and support sustainable implementation and integration across sectors.

The AoW will work closely with Gender, Youth and Social Inclusion (6.5) to integrate their data and insights, specifically Gender in One Health and gender and AMR research frameworks.<sup>84</sup>

### **Partnerships**

Strengthen existing partnerships with the African Union, including Africa CDC and AU-IBAR, the Vietnam One Health Partnership, Kenya Zoonotic Disease Unit and the One Health Quadripartite (WHO, FAO, UNEP, WOAH). Engage with communities of practice (PREZODE, GALVmed and the African One Health University Network), while exploring new collaborations with private sector partners (Thermo Fisher and Zoetis).

### **Collaborations with other Programs/Accelerators**

Collaborations with the Better Diets and Nutrition Program on food safety to provide safe, nutritious and accessible animal-sourced food for better health and nutrition in Global South countries and the Scaling for Impact Program on profiling and packaging innovations.

Figure 6.3.1. One Health Theory of Change

## ONE HEALTH

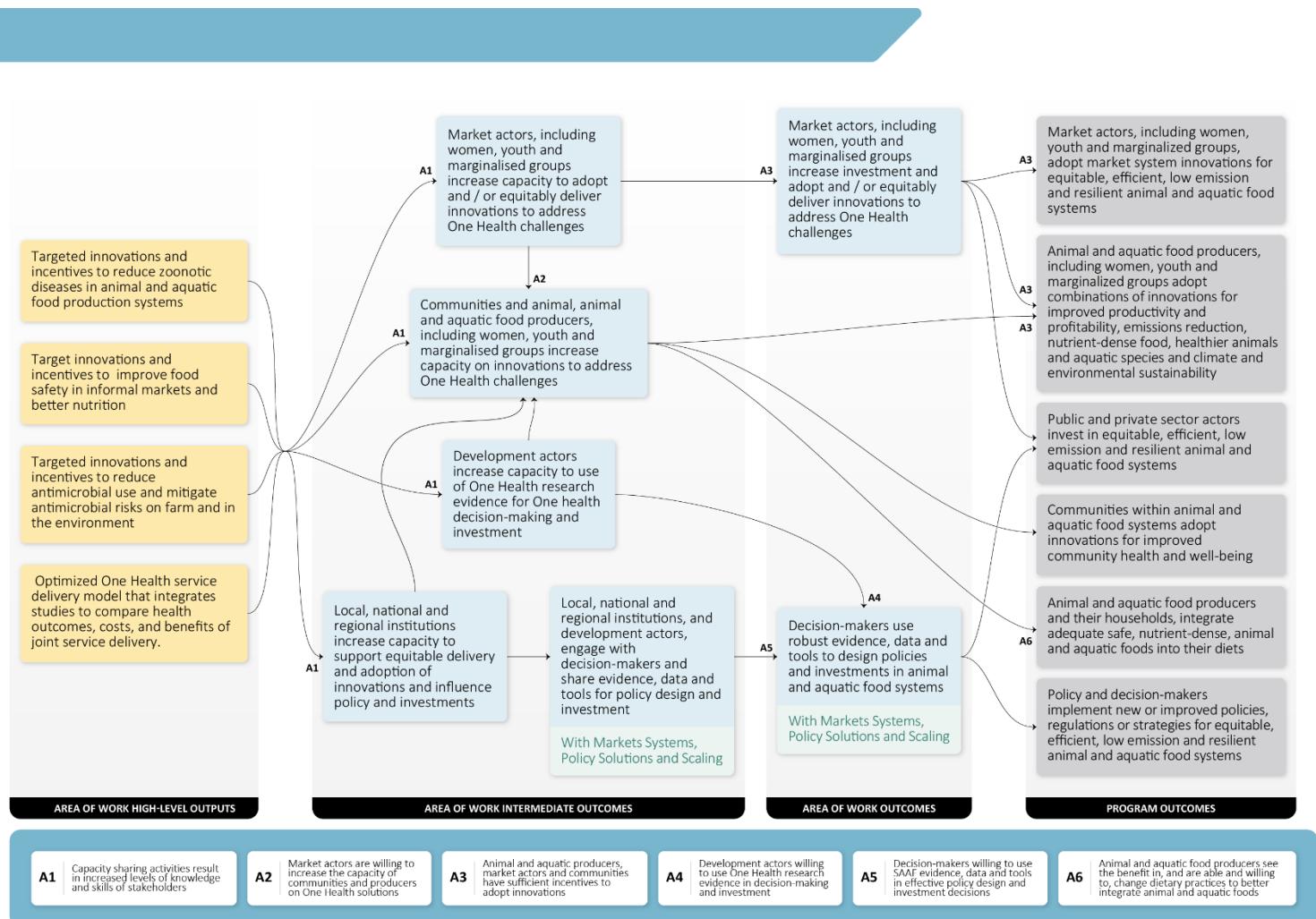


Table 6.3.1. Partnerships, assumptions and targets

TOC Element # OC=outcome I-OC = intermediate outcome; OP = output	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OC 3.1	Market actors, including women, youth and marginalized groups, increase investment and adopt and equitably deliver innovations to address One Health challenges	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organization, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors	A1 Capacity-sharing activities result in increased levels of knowledge and skills of stakeholders  A2 Market actors are willing to increase the capacity of communities and producers on One Health solutions  A3 Animal and aquatic producers, market actors and communities have sufficient incentives to adopt innovations	Number of market actors adopting or delivering innovations (disaggregated for women, youth and marginalized groups). <b>Target = 260 people</b> USD investment by market actors in adopting or delivering innovations (disaggregated for women, youth and marginalized groups). <b>Target = US\$ 1.1 million</b>
OC 3.2	Decision-makers use robust evidence, data and tools to design policies and investments in animal and aquatic food systems	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organization, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors	A4 Development actors willing to use One Health research evidence in decision-making and investment  A5 Decision-makers willing to use SAAF evidence, data and tools in policy design and investment decisions	Number of policies, regulations or strategies or investments, designed by decision-makers using SAAF evidence, data or tools. <b>Target = 19 policies</b>

TOC Element # OC=outcome I-OC = intermediate outcome; OP = output	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
I-OC 3.1	Market actors, including women, youth and marginalized groups have improved capacity for practices to address One Health challenges linked to animal and aquatic food systems	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organization, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors	A6 Animal and aquatic food producers see the benefit in and are able and willing to, change dietary practices to better integrate animal and aquatic foods	Not required
I-OC 3.2	Communities and animal, animal and aquatic food producers, including women, youth and marginalized groups have improved capacity on practices to address One Health challenges linked to animal and aquatic food systems	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		Not required
I-OC 3.3	Development actors increase capacity to use One Health evidence, data and tools to support equitable delivery and adoption of innovations, and for decision-making and investment	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors;		Not required

TOC Element # OC=outcome I-OC = intermediate outcome; OP = output	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
		quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		
I-OC 3.4	Local, national and regional institutions increase capacity on One Health practices to support communities and influence policy and investments	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Program); donors		Not required
I-OC 3.5	Local, national and regional institutions and development actors, engage with decision-makers and share evidence, data and tools for policy design and investment	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		Not required

TOC Element # OC=outcome I-OC = intermediate outcome; OP = output	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OP 3.1	Targeted innovations and incentives to reduce zoonotic diseases in animal and aquatic food production systems	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		Not required
OP 3.2	Target innovations and incentives to improve food safety in informal markets and better nutrition	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		Not required
OP 3.3	Targeted innovations and incentives to reduce antimicrobial use and mitigate antimicrobial risks on-farm and in the environment	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors;		Not required

TOC Element # OC=outcome I-OC = intermediate outcome; OP = output	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
		quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		
OP 3.4	Optimized One Health service delivery model that integrates studies to compare health outcomes, costs and benefits of joint service delivery.	<b>Demand, innovation and scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; decision-makers; development actors; quadripartite (World Health Organisation, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health, United Nations Environment Programme); donors		Not required

## **6.4 Market Systems, Policy Solutions and Scaling**

Aquatic and animal food (AAF) markets exhibit systemic challenges and policy barriers<sup>85, 86, 87</sup> that hinder the efficiency and inclusiveness of AAF systems. This AoW strengthens market actors including women, youth and marginalized groups, to participate in equitable, efficient, low-emission and resilient AAF systems (PO5). It also contributes to increased adoption of productivity-enhancing innovations and the supply of nutrient-dense and healthy AAF diets (PO1) and evidence for policy design (PO8). We also generate evidence for increased investments from the private sector and alternative financing for climate and the environment (PO7).

Outcomes are realized through i) co-development of robust information systems for effective decision-making; ii) decision-support tools for efficient AAF systems; iii) co-design and testing institutional and behavioral models that enhance efficiency, inclusiveness and resilience of AAF systems; iv) evidence-based and participatory policymaking processes; and v) participatory design of pathways for scaling contextualized innovations and technology packages (Figure 6.4.1).

We work with Productivity+ on efficient delivery, increased adoption and scaling, and optimized management for profitable producers. With Climate and the Environment, we work to increase the adoption of innovations for resilient and low-emission production systems and incentives for the private sector financing of climate-adapted innovations. With Data and Digital Solutions, we work to ensure data availability, interoperability, quality and accessibility, thereby enhancing decision-making. We work across the whole program to design policies that promote the use of AAF system innovations at scale.

### **Comparative advantage**

Our comparative advantage lies in the advanced and diverse expertise in institutional and behavioral analysis, impact assessment and policy modeling and interest in demonstrating impact. Our partnerships with universities and think tanks position us at the forefront of methods in rigorous impact assessment. Our established collaboration with NARS, development NGOs and the private sector interested in our innovations provides a network of grassroots collaborators, social capital and business incentives for testing adoption and dissemination of proven innovations for wider impact and policy advocacy.

### **Research questions**

1. What data innovations and tools effectively guide national plans and investments, support market innovations and facilitate sustainable and equitable systems transformations?
2. Which market system innovations enhance inclusion (social and gender), efficiency and positive transformation of AAF systems and how does the transition happen?
3. What are the socioeconomic and environmental benefits and tradeoffs of market system innovations and policies in a changing climate?

### **Methods and approaches**

Using a transdisciplinary approach,<sup>88</sup> we apply a mix of ex-ante experiments, foresight analysis and system dynamics models to diagnose systemic challenges within market systems and policy landscapes and generate market intelligence that informs co-design and testing of innovations. We apply randomized trials and field experiments to evaluate adoption and impacts of co-designed innovations and generate evidence that inform policy design, investment and scaling. The methods present an integrated research-for-development pathway that considers diverse contexts and allows for continuity while providing links to other AoW and Science Program/Accelerators.

## **High-level outputs**

**1. Robust information systems and data innovations.** Working with local and national government departments, NARS, universities and agricultural research institutions (ARIs) and with input from food producers and the private sector, we apply systems and policy analysis to identify gender and age-based gaps in the capacity of market actors and address them through data optimization systems.<sup>89</sup> Production and market profiles across regions are used to characterize the productivity, efficiency, sustainability, equity and resilience of production and market systems.<sup>90, 91</sup> Web-based platforms tailored to stakeholder needs and with predictive analytics are developed to provide actionable recommendations for non-technical users. The use, scaling and effectiveness of these innovations are evaluated to continuously improve their performance and sustainability.

**2. Decision-support tools for sustainable and efficient AAF systems.** Digital decision-support tools are co-designed with local and national government departments, NARS, universities and ARIs with input from food producers and the private sector to deliver benefits particularly to women, youth and marginalized groups in diverse AAF systems.<sup>92</sup> We bundle and package these gender-responsive tools and facilitate enabling conditions for actors to effectively use them while we generate evidence to inform scaling. These tools offer extension agents, producers, policymakers and investors actionable insights for productivity and profitability enhancement, waste reduction and resilience<sup>93</sup> to water and climate risks.

**3. Institutional and behavioral models for innovation uptake.** In this output, we co-design bundled interventions with market actors to modify incentives, behaviors and capacities of private sector actors toward embedding practices that reduce risks, bridge knowledge and skills gaps and enhance gender and social equity among AAF producers and consumers. This demonstrates how inclusive models improve business performance while benefiting poor women, youth and marginalized producers and consumers.<sup>94, 95, 96</sup>

Building on Productivity+ and Climate and the Environment, we design and test emerging innovations in ecosystem financing,<sup>97</sup> insurance and delivery models involving entrepreneurship ecosystems that minimize information asymmetry and reduce risks.<sup>98</sup> We focus on rules, regulations, standards and norms that shape barriers and opportunities for adoption and exchanges between producers and consumers.

Co-design of innovations is complemented with adoption, impact, scaling and qualitative studies that generate evidence on the impact of i) institutional, behavioral and business models for delivery; ii) AAF system technologies; and iii) a combination of these two interventions on inclusion and efficiency.

Harmonized evaluation approaches and data integration with the Policy Innovations Program will support insightful analysis involving big data and artificial intelligence.

**4. Policy analysis and engagement processes for effective AAF systems.** We leverage partnerships and apply foresight analysis with gender, nutrition, food safety and political economy considerations to understand policy barriers to inclusivity and efficiency of AAF sectors. Insights guide policy reviews and co-designed investment plans and strategies for AAF systems, including through gender-inclusive aquatic and livestock masterplans.<sup>99</sup> We promote inclusive AAF policies and investment plans through multistakeholder platforms and awareness campaigns that leverage AAF systems for gender and social equity outcomes.<sup>100</sup> These context-dependent

structures formalize interactions and mobilize stakeholders for dialogue, decision-making and formulating AAF policies. Finally, we assess the sustainability and effectiveness of AAF policies, investment plans and the governance processes to mainstream innovations and grow investments.

**5. Evidence and pathways for scaling.** While co-designing and co-testing innovations, we collaborate with Scaling for Impact and other scaling partners and apply the innovation packaging and scaling readiness (IPSR) approach to package context-specific AAF innovation that enables scaling. Using the IPSR process, we prioritize interventions and innovations that transform AAF systems while generating metrics that influence policies, development programs and public and private investment to deliver impact at scale. We also identify and address scaling barriers including capacities, incentives, behaviors and policies and co-develop strategies for innovations that are demand-driven, proven and enable impact at scale. The IPSR process also supports SAAF to monitor and adaptively manage our innovation portfolio alongside our theory of change.

## **Partnerships**

We work with knowledge institutions in the Global South (e.g., NARS), research institutes in the Global North working on tropical livestock and aquaculture issues (e.g., CIRAD), market actors and their organizations, NGOs, policymakers and development partners in AAF systems. Partnerships span the five research activities of diagnosis, innovation co-design, change measurement, policy design and scaling.

## **Collaboration with other Programs/Accelerators**

This AoW evaluates and informs innovation development in Productivity+, Climate and the Environment, Data and Digital Innovations and One Health including some initiated under the Initiatives and contributes to the Scaling for Impact Program by developing behavior change and investment pathways for scaling innovations. We will also work with the Policy Science Program to develop and apply methods and approaches to modeling and impact assessment.

Figure 6.4.1. Market Systems, Policy Solutions and Scaling Theory of Change.

## MARKETS SYSTEMS, POLICY SOLUTIONS AND SCALING

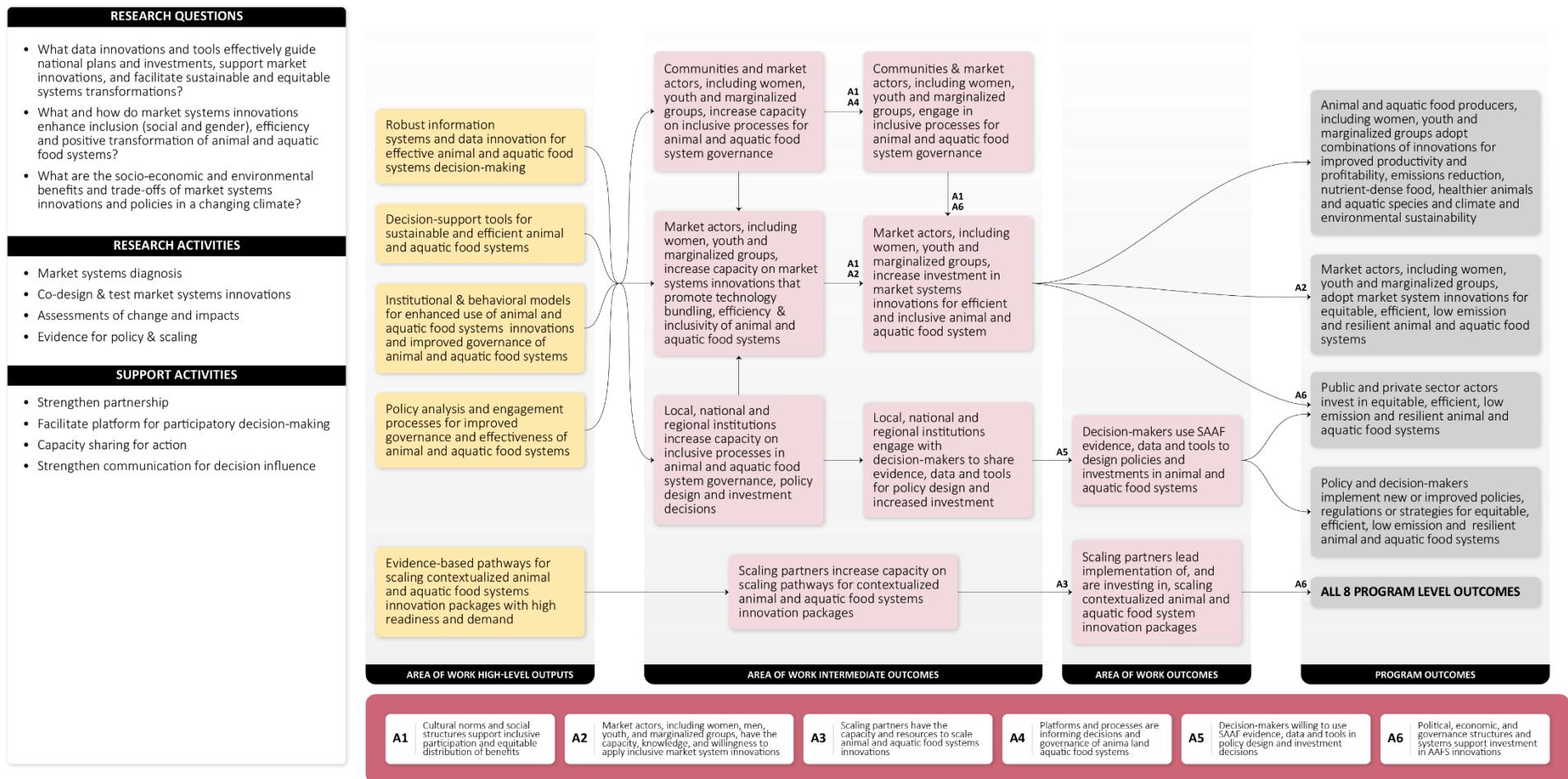


Table 6.4.1. Partners, assumptions, indicators and targets

TOC Element # OC=outcome; I-OC= intermediate OC; OP=output	Statement	Partners (including internal) and roles	Assumption (see TOC visual for placement on causal links)	Indicator and target
OC 4.1	Communities & market actors, including women, youth and marginalized groups, engage in inclusive processes for animal and aquatic food system governance	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A1 Cultural norms and social structures support inclusive participation and equitable distribution of benefits  A2 Market actors, including women, men, youth and marginalized groups, have the capacity, knowledge and willingness to apply inclusive market system innovations  A3 Scaling partners have the willingness to scale animal and aquatic food systems innovations	Number of people engaged in inclusive processes for animal and aquatic food systems governance (disaggregated for women, youth and marginalized groups). <b>Target = 1,200 people</b>  Number of platforms supporting inclusive processes for animal and aquatic food system governance. <b>Target = 12 platforms</b>
OC 4.2	Market actors, including women, youth and marginalized groups, increase investment in market systems innovations for efficient and inclusive animal and aquatic food systems	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A4 Platforms and processes are effective in informing decisions and governance of animal and aquatic food systems  A5 Decision-makers willing to use SAAF evidence, data	Number of market actors investing in market systems innovations (disaggregated for women, youth and marginalized groups). <b>Target = 1,590 people</b>  USD investment by market actors in market systems innovations (disaggregated for women, youth and marginalized groups). <b>Target = US\$ 2.2 million</b>

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OC 4.3	Decision-makers use SAAF evidence, data and tools to design policies and investments in animal and aquatic food systems	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	and tools in policy design and investment decisions  A6 Political, economic and governance structures and systems support investment in animal and aquatic food systems innovations	Number of policies, regulations or strategies or investments, designed by decision-makers using SAAF evidence, data or tools. <b>Target = 19 policies</b>
OC 4.4	Scaling partners lead implementation of and are investing in, scaling contextualized animal and aquatic food systems innovation packages	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		USD investment by scaling partners in scaling animal and aquatic food systems innovation packages. <b>Target = US\$ 4.4 million</b>
I-OC 4.1	Communities and market actors, including women, youth and marginalized groups, increase capacity on inclusive processes for animal and aquatic food systems governance	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 4.2	Market actors, including women, youth and marginalized groups, increase capacity on market systems innovations that promote technology bundling,	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
	efficiency & inclusivity of animal and aquatic food systems	and regional institutions including government; nongovernment organizations; decision-makers; donors.		
I-OC 4.3	Local, national and regional institutions increase capacity on inclusive processes in animal and aquatic food systems governance, policy design and investment decisions	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 4.4	Local, national and regional institutions engage with decision-makers to share evidence, data and tools for policy design and increased investment	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 4.5	Scaling partners increase capacity on scaling pathways for contextualized animal and aquatic food systems innovation packages	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OP 4.1	Robust information systems and data innovation for effective animal and aquatic food systems decision-making	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 4.2	Decision-support tools for efficient animal and aquatic food system	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 4.3	Institutional & behavioral models for enhanced uptake of animal and aquatic food systems innovations and improved governance of animal and aquatic food systems	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 4.4	Policy analysis and engagement processes for improved governance and effectiveness of animal and aquatic food systems	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including		Not required

TOC Element # OC=outcome; I-OC= intermediate OC; OP=output	Statement	Partners (including internal) and roles	Assumption (see TOC visual for placement on causal links)	Indicator and target
		government; nongovernment organizations; decision-makers; donors.		
OP 4.5	Evidence and viable pathways for scaling of animal and aquatic food systems innovations	<b>Demand, Innovation and Scaling partners:</b> producer and producer groups, private sector; communities and community-based and grassroots organizations; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required

## **6.5 Gender, Youth and Social Inclusion**

Gender, Youth and Social Inclusion (GYSI) supports the efforts of animal and aquatic food producers and communities to adopt more equitable norms for the empowerment of women and youth (PO6). It contributes to all program-level outcomes by ensuring that gender, equity and social considerations are considered in all activities.

We achieve outcomes by i) working with research and development actors to gather and analyze disaggregated data on gender and youth norms and dynamics using tools and approaches to assess gendered and youth changes in empowerment, norms and resilient livelihoods; and ii) co-designing and implementing interventions that support women and youth empowerment and more equitable norms in AAF systems using tested packages of socio-institutional and technical interventions that support equity.

GYSI will work with Productivity+, Climate and the Environment and One Health to ensure that innovations consider gender, equity and youth in their designs and with Market Systems to ensure that models and studies include the impacts of gender, equity and social inclusion.

### **Research questions**

1. What is the status of women, youth and marginalized groups in terms of their roles, engagement, opportunities and constraints in specific (to a given intervention) contexts of animal and aquatic food systems?
2. What contextualized interventions support the empowerment of women, youth and marginalized groups and create a conducive normative environment?
3. What packages of socio-technical innovations work best for women, youth and marginalized groups?
4. What are the best ways to engage youth in gaining knowledge, skills, and access to innovations and private sector opportunities that help them participate in, and benefit from, animal and aquatic food systems?

### **Comparative advantage**

SAAF capitalizes on a diverse team of gender scientists and their partners from participating Centers who have deep knowledge of SAAF's strategic and integrated research and a proven track record. Experts across four institutes have collaborated effectively on multi-country, multi-Center and multi-commodity engagement studies since 2012. We have long-standing partnerships with local and international institutes that can foster rapid growth in needed areas.

### **Methods and approaches**

This research comprises three stages: i) studying empowerment and norms to develop appropriate interventions; ii) implementing co-designed interventions that support empowerment and address restrictive norms; and iii) examining changes in norms to assess under what conditions these contextualized interventions scale to other settings. We expect that a society with less restrictive gender norms benefits everyone.<sup>101</sup>

We examine gender and youth disempowerment and the structural constraints that shape it and co-develop, implement and test interventions to identify those that most effectively support empowerment and conducive social institutions. We focus on policy and the best approaches to integrate gender and youth equity into policymaking. With partners, we will scale the most promising innovations and assess how our context-specific innovations scale to other contexts and the changes they can bring to gender norms.

To assess social, technical and innovation bundles (STIBs), we examine the evidence from strategic work and other AoWs to determine which combinations and implementation modalities move us toward effective and equitable AAF systems. This entails assessing the impact of STIBs on empowerment and norms in combination with other SAAF indicators and conducting a meta-analysis. The approach is two-pronged: integrating gender considerations across all SAAF work areas and conducting strategic GYSI analysis of empowerment, norms and innovation packages.

GYSI leads strategic research and coordinates the GYSI activities conducted in other AoWs. Methodologically, we conduct qualitative and quantitative research and use an intersectional lens to examine the interplay of individual characteristics in shaping people's lived experiences.<sup>102, 103</sup> We build on work done across Initiatives and bilateral projects and will explore emerging topics identified in recent scoping reviews; frameworks highlighting new areas of gender integration in AAF systems;<sup>104, 105</sup> and evidence and evaluations that contribute to more impactful interventions.<sup>106</sup>

#### **High-Level outputs**

**1. Disaggregated data and evidence on gender and youth norms and dynamics.** We will conduct diagnostic research that maps all women, men, youth and marginalized individuals (AWMYM) in selected AAF value chains relevant to SAAF work, as a basis for developing locally relevant gender and youth-responsive interventions. This research identifies who occupies which value chains and nodes, their type of engagement, the constraints and opportunities they face and marketing across livestock,<sup>107, 108</sup> small ruminants;<sup>109, 110</sup> fish and aquatic foods value chains,<sup>111</sup> and assessing women's involvement in near-shore and on-shore fishing and gleaning and shell fisheries in the coastal communities and consumption of animal and aquatic sources foods.<sup>112</sup>

**2. Tools and approaches to assess gender and youth changes in empowerment, norms and resilient livelihoods.** We will improve on existing tools such as the Women's Empowerment in Livestock Index<sup>113</sup> and the Women's Empowerment in Fisheries and Aquaculture Index,<sup>114</sup> and the gender norms assessment tool developed by SAPLING. New tools tailored to new study areas will be co-developed.<sup>115, 116, 117</sup> We will use Gender Transformative Approach (GTA) training tools (e.g., Savings and Internal Lending Communities,<sup>118</sup> GALS<sup>119</sup> and others).<sup>120</sup>

**3. Effective interventions that support women and youth empowerment and more equitable norms in animal and aquatic systems.** This includes research on empowerment and norm dynamics and assessments on effective interventions. We continue previous research on:

- i. the meanings of empowerment;
- ii. the interaction between empowerment and other livelihood indicators; measure qualitative and quantitative changes in empowerment in relation to other intersectional factors;
- iii. gender accommodative versus transformative approaches in AAF system FHCDs; and
- iv. studies on gender, climate change and AAF.<sup>121, 122</sup>

We conduct new research on:

- i. the inter-relational and psychological dimensions of empowerment;
- ii. women's empowerment in fragile contexts, informal markets, and social protection mechanisms;
- iii. Employment, work-burden and the unpaid economy;
- iv. the digital revolution for empowerment and norms;
- v. the relationship between inequality, norms and empowerment;<sup>123, 124, 125</sup>

vi. effective transformative approaches, tipping points and scaling interventions.

#### **4. Effective packages of socio-institutional and technical interventions that support equity.**

This is coordinated in collaboration with other AoWs by integrating GYSI considerations. We build on previous work by applying and improving existing frameworks and evidence on [animal health](#), [genetics](#), [One Health](#), [nutrition](#), markets, policy and livestock master plans, [aquaculture value chain frameworks](#) and scaling.<sup>128</sup>

We build on work in the Digital Initiative on the role of digital tools in empowerment. The findings will be combined with those from Output 3 and integrated into STIB packages. We will assess how these packages perform in terms of empowerment and norms through meta-analysis.<sup>126, 127,</sup>

#### **Partnerships**

We build on existing collaborations with CGIAR Senior leadership, CGIAR Gender Accelerators, donors, multilateral organizations for global and regional lobbying, NARS, civil society, other research institutions and policymakers to build capacity, scale-out STIBs and create demand.

#### **Collaborations**

Our research focus is aligned with the Gender Equality and Inclusion Accelerator (empowerment and norms). While the Accelerator works at the agrifood system level, we focus on empowerment and norms within AAF systems. Our findings will provide evidence for analyses undertaken by the Accelerator program at the agrifood system level.

Figure 6.5.1. Gender, Youth and Social Inclusion Theory of Change

## GENDER, YOUTH AND SOCIAL INCLUSION

RESEARCH QUESTIONS
<ul style="list-style-type: none"> <li>What is the status of women, youth and marginalized groups in terms their roles, engagement, opportunities and constraints in animal and aquatic food systems?</li> <li>What contextualized interventions support the empowerment of women, youth and marginalized groups and to create a conducive normative environment?</li> <li>What packages of socio-technical innovations work best for women, youth and marginalized groups?</li> <li>What are the best ways to engage youth in gaining knowledge, skills, and access to innovations and private sector opportunities that help them participate in, and benefit from, animal and aquatic food systems?</li> </ul>
RESEARCH ACTIVITIES
<ul style="list-style-type: none"> <li>Diagnostic analysis on structural (formal and informal) barriers for women and youth in livestock and fish systems, also in fragile contexts (e.g. conflict, climate hot spots, etc.)</li> <li>Co-design and test empowerment interventions addressing structural constraints faced by women and youth in livestock and fish systems</li> <li>Co-design and test transformative interventions that address restrictive gender and youth norms</li> <li>Implement social interventions in tandem with technical interventions to progress towards equality</li> <li>Compare across commodities and countries various livelihood diversification activities (including social protection) that can lead to more equality</li> <li>Engage with policy makers to identify what is the gendered impact of existing policies and what policies can support progress towards gender and youth equality</li> </ul>
SUPPORT ACTIVITIES
<ul style="list-style-type: none"> <li>Strengthen partnerships</li> <li>Capacity sharing</li> <li>Participate in, and strengthen, networks, communities of practice and platforms</li> </ul>

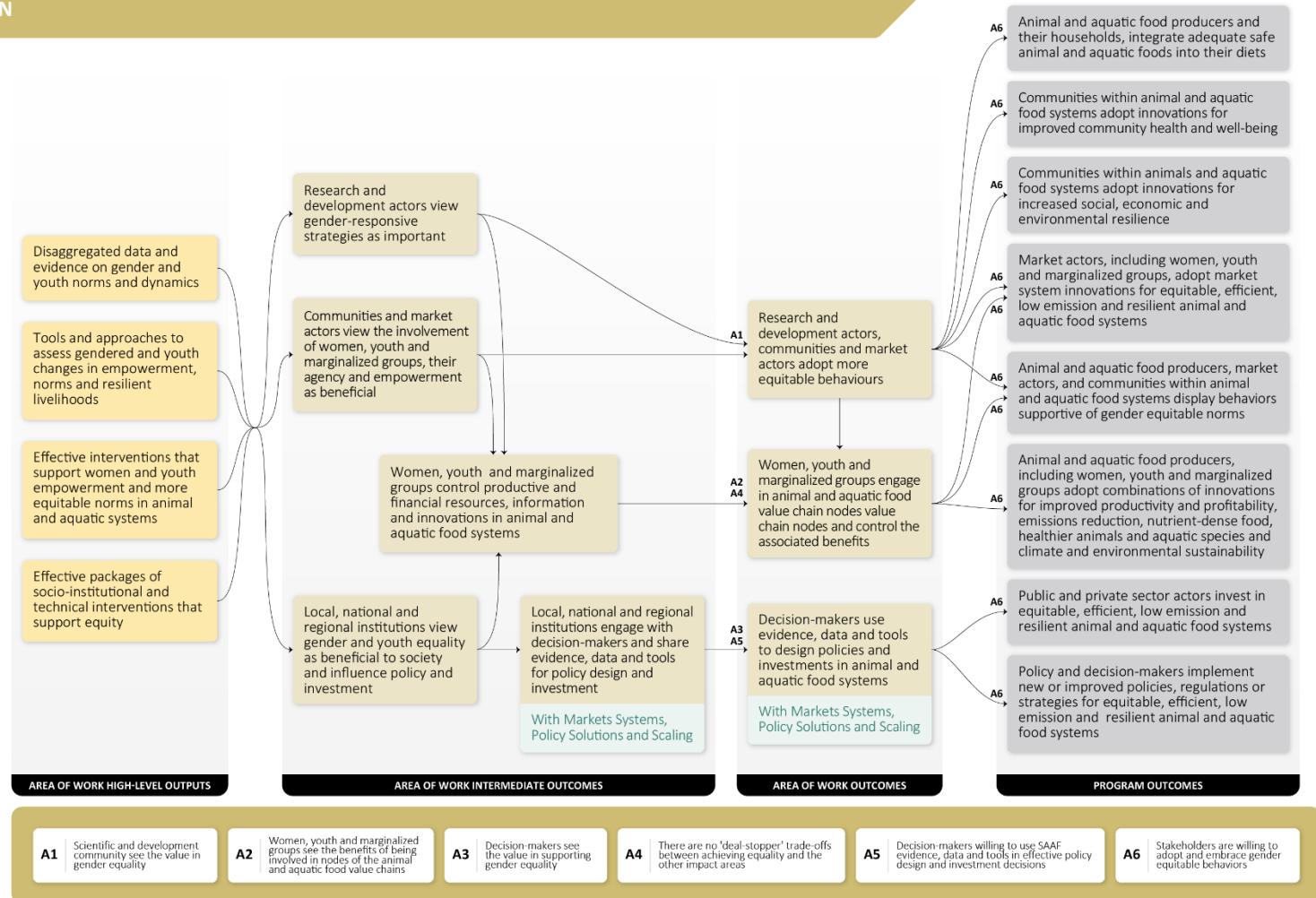


Table 6.5.1. Partners, assumptions, indicators and targets

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
OC 5.1	Research and development actors, communities and market actors, adopt more equitable behaviors	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A1 Scientific and development community sees the value in gender equality  A2 Women, youth and marginalized groups see the benefits of being involved in nodes of the animal and aquatic food value chains  A3 Decision-makers see the value in supporting gender equality	Number of community members and market actors who adopt more equitable behavior (disaggregated for the intersection of actor type and gender). <b>Target = 370,000 people</b>  Number of research and development actors who adopt more equitable behavior. <b>Target = 10 institutions</b>
OC 5.2	Women, youth and marginalized groups engage in animal and aquatic food value chain nodes and control the associated benefits	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A4 There are no 'deal-stopper' tradeoffs between achieving equality and the other Impact Areas  A5 Decision-makers willing to use SAAF evidence, data and tools in effective policy design and investment decisions	Number of women, youth and marginalized groups (disaggregated) facilitated to engage in value chain nodes and who control the associated benefits <b>Target = 1,000 people</b>
OC 5.3	Decision-makers use robust evidence, data and tools to design policies and investments in animal and aquatic food systems	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A6 Stakeholders are willing to adopt and embrace gender-equitable behaviors	Number of policies, regulations, strategies or investments, designed by decision-makers using SAAF evidence, data or tools. <b>Target = 4 policies</b>

I-OC 5.1	Research and development actors view gender-responsive strategies as important	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OC 5.2	Communities and market actors view the involvement of women, youth and marginalized groups, their agency and empowerment as beneficial	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 5.3	Women, youth and marginalized groups control productive and financial resources, information and innovations in AAF	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 5.4	Local, national and regional institutions engage with decision-makers and share evidence, data and tools for policy design and investment	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required

OP 5.1	Disaggregated data and evidence on gender and youth norms and dynamics	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 5.2	Tools and approaches to assess gendered and youth changes in empowerment, norms and resilient livelihoods	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 5.3	Effective interventions for the empowerment of women and youth and more equitable norms in animal and aquatic systems.	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 5.4	Effective packages of socio-institutional and technical interventions that support equity	<b>Demand, innovation and scaling partners:</b> women, youth and marginalized groups; producer and producer groups; communities and community-based and grassroots organizations; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required

## **6.6 Data and Digital Solutions**

Data and Digital Solutions supports all program-level outcomes in developing scalable innovations for improved productivity (PO1). Digital innovations facilitating community decisions strengthen resilience (PO 3) and health outcomes (PO4). Digital innovations/AI-based analytics enable data-driven decisions (O6.2), drive investments (PO7) and inform better policies and regulations (PO8). O6.3 I (impacts, tradeoffs and strategies to support ethical and inclusive development and use of digital innovations and analytics) provides analyses to determine how these technologies affect women, youth and marginalized groups (PO6).

We will achieve these by i) establishing standardized data protocols and creating federated, harmonized databases for high quality, FAIR data (I-OC6.1); ii) supporting co-design and deployment of inclusive, scalable innovations and building stakeholders' capacity to develop AAF-specific solutions (I-OC6.2); and iii) providing policymakers with digital tools to make more informed decisions and manage production, market, health and environmental risks.

This AoW consolidates the data and digital innovation activities across all AoWs and conducts research to harness new digital innovations for transforming SAAF systems. Collaboration with other AoWs will be through use-cases, sharing data standards and co-developing digital infrastructure which enhances AAF data availability, interoperability, quality and accessibility, thereby enhancing decision-making for stakeholders.

### **Research questions**

1. What standards can enable data interoperability and digital innovations across AAF systems?
2. How can digital technologies improve sustainable productivity in AAF systems for women, youth and marginalized groups while ensuring equity and equitable access?
3. What ethical considerations and best practices can ensure data privacy, inclusion and security in the application of AI and analytics in these food systems?
4. How effective are digital technologies in providing accurate and actionable data for climate and environmental monitoring and decision-making in AAF systems?

### **Comparative advantage (CA)**

This AoW leverages research and activities across CGIAR to harness the promise of digital and AI to develop scalable solutions for producers, market actors, policymakers and researchers. AAF systems data and digital innovation methods and processes overlap with those in crop systems but the social, institutional and biophysical context within AAF systems pose unique data and digital innovation needs (disease surveillance in livestock, water quality monitoring in aquaculture or tracking fish stock levels). CGIAR has a unique CA in addressing these needs which it draws from convening power, global reach, a multi-disciplinary approach, human and institutional capabilities in handling data and knowledge products across different scientific disciplines, strong partnerships and a deep understanding of market actors' needs and interoperability issues. CGIAR's past investments in FAIRification processes, data standardization and bilateral projects in digital and data innovations coupled with a strong MEL culture position CGIAR to lead digital innovations for SAAF. CGIAR hosts multiple global databases and platforms for AAF digital innovations (e.g., FishBase), which attracts millions of users each year and serves as a critical resource for researchers, policymakers and practitioners.

## **Research methods and approaches**

We will prioritize participatory approaches to identify end-user needs and systematic constraints including connectivity, hardware and digital literacy and co-develop innovations as well as strategies for mitigating these. Our innovation methods will ensure that digital innovations are inclusive, incorporate near-real-time data, based on human-centered design and comply with best practices for governance and ethical considerations. We will identify sustainability and scalability strategies, including business models and capacity building.

### **High-level outputs**

- 1. Standardized FAIR data collection and management protocols, interoperability standards and data integration mechanisms for AAF systems.** This comprises standardized protocols and workflows aligned with FAIR principles, interoperability standards and data integration mechanisms.<sup>129</sup> This includes pilot testing and customizing protocols, engagement mechanisms with stakeholders and improvement cycles for solutions to ensure consistency and effectiveness.
- 2. Exploratory digital innovations and artificial intelligence-based analytics to enable data-driven decisions in AAF systems.** This includes piloting digital tools on the back of data-sharing infrastructure and principles (Output 1) to address high-impact use-cases identified in collaboration with other AoWs. We will integrate existing systems, followed by planned cycles of testing, validation and improvements. Business models and sustainability plans will be co-developed and implemented according to institutional strengths and mandates. Continuous engagement with partners, monitoring, evaluation and learning will ensure that the tools remain effective, sustainable and aligned with evolving stakeholder needs.
- 3. Strategies to support ethical and inclusive development and use of digital innovations and analytics in AAF systems.** We will engage with stakeholders, gather diverse perspectives and conduct detailed analyses to determine how digital innovations affect specific groups, identifying positive outcomes and potential risks. Based on these, we will co-develop guidelines and strategies to promote ethical and inclusive practices within SAAF digital innovations and support continuous evaluation to ensure tools remain effective.
- 4. Co-development of innovative and scalable platforms including digital public infrastructure (DPI) for AAF systems.** The focus here is on the participatory scaling of innovative and proven digital innovations and platforms, including DPI for AAF systems. Using multistakeholder consultations, we can identify the needs, requirements and challenges to scaling. A collaborative design process will ensure effective stakeholder engagement in co-creating inclusive and user-friendly platforms that are readily scalable without significant re-engineering efforts. Feedback is used to refine platforms before deployment. Lessons learned will be documented to guide improvements.
- 5. Evidence for decision-makers to make investment and policy decisions on inclusive digital innovations.** Reviews of existing policies and practices will be carried out to identify gaps, opportunities and best practices. New policies and recommendations are co-developed with stakeholders to promote innovation and address specific needs while working with local governments and other partners to advocate for policies enhancing inclusive access and use of digital tools. We also focus on building collaborative networks to facilitate knowledge sharing and collective action. Methods will be developed/identified to monitor and track policy and network effectiveness using strategies created to bridge gaps in stakeholder access to information and resources (e.g., sustainability indexes like AqualIndex).

## **Gender integration**

We prioritize gender integration by identifying ‘gender digital inequity chokepoints’, developing gender-inclusive digital innovations and addressing the gender digital divide. Efforts encompass gendered implementation processes, capacity building for best practices, raising awareness about inclusive design and ensuring equitable access to digital tools and technologies. The aim is to support women’s empowerment and incentivize their active participation in digital initiatives.

## **Partnerships**

We will partner with public and private sector entities, international organizations, academia, NGOs, technology companies and development agencies. These collaborations are crucial for co-generating accurate data, co-developing digital solutions, sharing best practices and ensuring timely use of information, scalability, sustainability and leveraging expertise and resources to maximize impact.

**Collaborations**The Digital Transformation Accelerator plays a pivotal role in connecting these efforts by ensuring a coordinated and integrated approach to digital innovation across the AAF ecosystem. The Scaling for Impact Program can assist with strategies for scaling and ensuring that impactful digital innovations are promoted and effectively deployed.

Figure 6.6.1. Data and Digital Solutions Theory of Change

## DIGITAL AND DATA SOLUTIONS

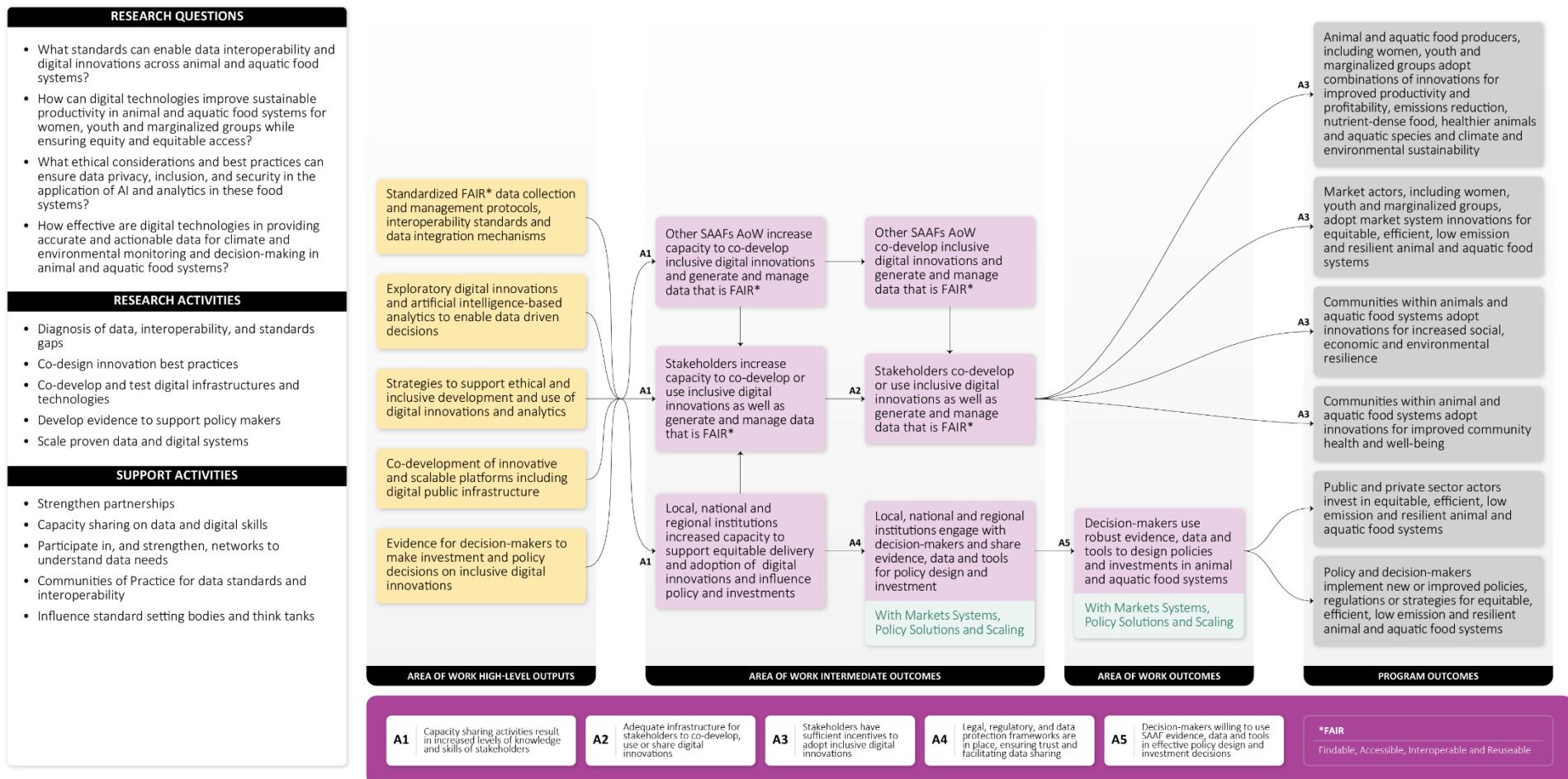


Table 6.61. Partners, assumptions, indicators and targets

TOC Element # OC=outcome; I-OC= intermediate OC; OP=output	Statement	Partners (including internal) and roles	Assumption (see TOC visual for placement on causal links)	Indicator and target
OC 6.1	Other SAAF AoWs co-develop inclusive digital innovations and generate and manage data that is FAIR	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A1 Strong political and institutional willingness among stakeholders to adopt, implement and collaborate on improved digital strategies and platforms.  A2 Adequate infrastructure, technical capacity and financial	Number of inclusive digital innovations co-developed with other SAAF AoW <b>Target = 15 innovations</b>  % of data sets that SAAF has contributed to that are FAIR <b>Target = 100%</b>
OC 6.2	Stakeholders co-develop or use inclusive digital innovations as well as generate and manage data that is FAIR	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	investments to support the development, integration, training, capacity building and maintenance of digital systems  A3 Conducive environment for innovation, with economic and market conditions that support the scaling, sustainability and adoption of digital tools and data-driven decision-making.	Number of inclusive digital innovations co-developed by stakeholders <b>Target = 3 innovations</b>  Number of partners promoting SAAF digital innovations <b>Target = 36 institutions</b>  % of data sets that stakeholders have contributed to that are FAIR <b>Target = 80%</b>
OC 6.3	Decision-makers use robust evidence, data and tools to design policies and investments in animal and aquatic food systems	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.	A4 Legal, regulatory and data protection frameworks are in place, ensuring trust and facilitating data sharing, collaboration and adoption  A5 Decision-makers willing to use SAAF evidence, data and tools in effective policy design and investment decisions	Number of policies, including regulations and strategies or investments designed <b>Target = 4 policies</b>
I-OC 6.1	Other SAAF Systems AoW increase capacity to co-develop inclusive digital	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system;		

TOC Element # OC=outcome; I-OC= intermediate OC; OP=output	Statement	Partners (including internal) and roles	Assumption (see TOC visual for placement on causal links)	Indicator and target
	innovations and generate and manage data that is FAIR	universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		
I-OC 6.2	Stakeholders increase capacity to co-develop or use inclusive digital innovations as well as generate and manage data that is FAIR	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 6.3	Local, national and regional institutions increased their capacity to support equitable delivery and adoption of digital innovations and influence policy and investment	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
I-OC 6.4	Local, national and regional institutions engage with decision-makers and share evidence, data and tools for policy design and investment	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 6.1	Standardized FAIR data collection and management protocols, interoperability standards and data integration mechanisms	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government;		Not required

TOC Element # OC=outcome; I-OC= intermediate OC; OP=output	Statement	Partners (including internal) and roles	Assumption (see TOC visual for placement on causal links)	Indicator and target
		nongovernment organizations; decision-makers; donors.		
OP 6.2	Exploratory digital innovations and artificial intelligence-based analytics to enable data-driven decisions	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 6.3	Strategies to support ethical and inclusive development and use of digital innovations and analytics	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		Not required
OP 6.4	Co-development of innovative and scalable platforms including digital public infrastructure (DPI)	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government; nongovernment organizations; decision-makers; donors.		
OP 6.5	Evidence for decision-makers to make investment and policy decisions on inclusive digital innovations	<b>Demand, innovation and scaling partners:</b> producer and producer groups; private sector; national agricultural research system; universities; local, national and regional institutions including government;		Not required

<b>TOC Element #</b> OC=outcome; I-OC= intermediate OC; OP=output	<b>Statement</b>	<b>Partners (including internal) and roles</b>	<b>Assumption (see TOC visual for placement on causal links)</b>	<b>Indicator and target</b>
		nongovernment organizations; decision-makers; donors.		

## 7. Country integration

### 7.1. Example of integration in a country or set of countries

This program builds on the 2022–24 initiatives developed with the Ethiopian government, NGO and private sector partners. The 2023 CGIAR Listening Sessions provided insights into local needs and aspirations for livestock development and identified collaboration areas where we could make the most impact. The World Bank's support for two new major initiatives<sup>130</sup> led to discussions with their project development team on how to complement these projects to scale our innovations. A Research Portfolio Consultation on SAAF in early August reviewed the program's priority areas against national strategies and initiatives. The team reviewed Ethiopia's [Ten Years Perspective Development Plan \(2021–2030\)](#) and long-term low-emission and climate-resilient development strategy (2020–2050) to identify priority areas.

The program is embedded in major Ethiopian initiatives: i) the Ethiopia Food Systems Resilience Project, ii) the Lowland Livelihood Resilience Program, iii) the Livestock and Fisheries Sector Development Program, iv) Yelemat Terufat, and v) the national One Health Steering Program. CGIAR team was consulted in developing these initiatives or showcasing proven innovations that have become central to these projects. SAAF aims to actuate these initiatives to achieve broader impacts. Recently, the government launched the National Dairy and Poultry Strategies supported by CGIAR team, ensuring alignment with government priorities. CGIAR is a member of the Research and Innovation Platform and has identified integration points where joint efforts are included as deliverables in the government system, a strategy also applied to bilateral projects. The program will contribute to six outcomes by 2030 (e.g., policymakers use program-generated evidence to formulate supportive policies on animal and aquatic food systems; animal and aquatic food producers adopt combinations of innovations for improved productivity, profitability, GHG outcomes and food nutrition. These are fully endorsed by partners.

In Ethiopia, efforts to integrate these elements have been ongoing since the CRPs (2017), with notable successes in small ruminant value chains. More work is needed to achieve effective integration across dairy, poultry and fish value chains. Initiatives like One Health and Resilient Cities have collaborated with ministries to create One Health food safety working groups, enhancing cooperation between researchers and policymakers.

Despite these efforts, integration faces challenges: i) a lack of shared goals and complementary approaches, and ii) perceived transaction costs of integration (e.g., coordination needed to synchronize activities). Some initiatives were implemented but lacked coordination with stakeholders at the national level.

Integration can be strengthened with more frequent face-to-face interactions for learning and engaging local stakeholders. Successful integration was a function of specific skill sets, dedicated personnel with clearly defined roles and adequate funding. The Pioneer-Positive Deviance team's engagement in the Livestock and Climate Initiative involved co-producing locally-led innovations and scaling through extension services. The lessons learned are now being integrated into current efforts.

CGIAR has effective partnership networks in Ethiopia collaborating with the Ethiopian Institute of Agricultural Research, regional research institutes, government universities, the Ministry of Agriculture (including the Department of Fisheries) and private sector entities that support CGIAR Centers to better determine the needs and roles of partners. CGIAR's role involves conceptualizing program ideas, aligning programs with national government priorities and

facilitating implementation. CGIAR is also invested in capacity building and training technical staff and implementers to ensure effective project execution. A critical component of CGIAR's strategy is to engage with local partners to promote locally-led innovation and ensure innovators see the results as their own deliverables and incorporate them into their planning.

All SAAF components will be active in Ethiopia and will:

1. Enhance productivity and sustainable practices to improve livestock and fish output while minimizing environmental impact and creating a foundation for economic growth and integrating locally-led solutions.
2. Strengthening market systems and effective governance to ensure that increased productivity leads to economic benefits and fair-trade practices.
3. Integrating the One Health Approach to ensure improved health outcomes by addressing environmental and animal health factors.
4. Gender, Youth and Social Inclusion ensures equitable distribution of benefits, empowering marginalized groups and promoting social cohesion.

The major approaches are i) building country teams that jointly plan aligned implementation timelines and apply joint M&E; ii) periodic meetings for reflection on what went well and what needs to be corrected; iii) stakeholders and partners co-creating site-level theories of change to maximize integration; and iv) ICT tools (e.g., digital platforms) to compile information that multiple partners and users can access and use to create market links where buyers and sellers of livestock and fish, and livestock and fish products can connect. Breaking down content to deliver actionable messages challenges researchers to bring different research together.

SAAF will coordinate with programs on Climate Action, Multifunctional Landscapes, Policy Innovations, Better Diets and Nutrition, Breeding for Tomorrow and Sustainable Farming. SAAF will work with Scaling for Impact and all Accelerators by i) creating a platform for program partners to identify synergies and jointly planning implementation; ii) recruiting shared positions to manage and coordinate activities at the field level; iii) modeling results and scenarios generated in one program to inform and support deliverables in other programs; iv) aligning CGIAR research through dedicated staff across science programs (e.g., country convenor, specialized ambassadors) with broader government initiatives to unify efforts toward common goals and scale CGIAR innovations.

## 7.2. Overview of selected work in top countries

Region	Country	District/System	Area of Work	Program and Accelerator collaboration	Partners
EA	Kenya	Mixed crop-livestock system; pastoral systems; aquaculture and fisheries	Productivity+, Market Systems, Policy Solutions and Scaling, Climate and the Environment, Gender, Youth and Social Inclusion	SAAF, Multifunctional Landscapes, Policy Innovations, Scaling for Impact, Digital Transformation	MoALD, KALRO, Vet pharmaceutical, KEPHIS, Sub-national governments, business incubators, Kenyan Marine and Fisheries Research Institute, ICIPE, departments of fisheries, Kenyan fisheries service
EA	Ethiopia	Mixed crop-livestock and pastoral systems; aquaculture and fisheries	Productivity+, One Health, Market Systems and Policies, resilience, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes, Scaling for Impact	MoA (including Department of Fisheries); EIAR; Regional research institutes- ARARI, OARI, TARI, SEARI, CEARI, SWARI; Government Universities, private sector
WA	Mali	Pastoral and mixed crop-livestock systems	Productivity+ One Health, Market Systems and Policies, resilience, Gender, Youth and Social Inclusion	SAAF	Institut d'Economie Rurale, Laboratoire Central Veterinaire, Direction Nationale des Services (DNSV) Vétérinaires - Ministère de l'Agriculture, Université de Bamako
EA	Tanzania	Mixed crop-livestock systems; pastoral systems; aquaculture and fisheries	Productivity+, Market Systems, Policy Solutions and Scaling, Climate and the Environment, Gender, Youth and Social Inclusion	SAAF, Multifunctional Landscapes, Policy Innovations, Scaling for Impact, Digital Transformation	TALIRI, SUA, MLF, TAMISEMI, Tanzania Fisheries Research Institute, agribusiness incubators, private sector (e.g., Silverlands AKMGlitters)
EA	Uganda	Mixed crop-livestock systems	Productivity+ Market Systems, Policy Solutions and Scaling, Gender, Youth and Social Inclusion	SAAF	NARO, MAAIF, MoH, NAGRC & DB, Makerere University
SEA	Vietnam	Mixed crop-fish-livestock systems	One Health, Productivity+, Climate and the Environment, OEC	SAAF, Better Diets and Nutrition	National Institute of Veterinary Research (NIVR) National Institute of Animal Science (NIAS) Hanoi University of Public Health Vietnam, OH University Network (VOHUN) Private seed sector

Region	Country	District/System	Area of Work	Program and Accelerator collaboration	Partners
			Gender, Youth and Social Inclusion		Agriculture Universities e.g. Hanoi (VNUA), Thai Nguyen (TUAF) Ministries MARD, MOH, MONRE Vietnam One Health Partnership
SA	Bangladesh	Mixed crop-fish-livestock systems, aquaculture (marine, freshwater and brackish) and fisheries (coastal and inland)	One Health, Productivity+, Climate and the Environment, Market Systems, Policy Solutions and Scaling, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes	Bangladesh Livestock Research Institute & Sher-e-Bangla Agricultural University & Institute of Public Health, departments of fisheries; Bangladesh Fisheries Research Institute; Bangladeshi universities
SA	India	Mixed crop-livestock system Aquaculture and fisheries	One Health, Productivity+, Climate and the Environment, Market Systems, Policy Solutions and Scaling, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes	Indian Council of Agricultural Research institutes, particularly Indian Veterinary Research Institute, NDRI, NIVEDI and ICMR, departments of fisheries
SA	Nepal	Mixed crop-livestock systems Aquaculture and fisheries	Productivity+	SAAF	Ministry of Agriculture and Livestock Development, Dept. of Livestock Services, Nepal Agriculture Research Council, Agriculture Forestry University
LAC	Colombia	Mixed crop-livestock-tree systems; pasture-based systems	Productivity+, Climate and the Environment, Markets Systems, Policy Solutions and Scaling Gender, Youth and Social Inclusion	SAAF, Multifunctional Landscapes	Agrosavia, Private Seed Sector
LAC	Guatemala	Mixed crop-livestock-tree systems	Productivity+, Climate and the Environment, Market Systems, Policy Solutions and Scaling, Gender, Youth and Social Inclusion	SAAF	Ministry of Agriculture and Nutrition, University of San Carlos, Asociación de Ganaderos de Izabal, Private Seed Sector
WA	Senegal	Pastoral and mixed crop-livestock systems	Productivity+, Climate and the Environment,	SAAF, Multifunctional Landscapes	Laboratoire d'Elevage et de Recherches Vétérinaires (LNERV)- Institut Sénégalais de Recherches Agricoles, Ecole Inter-Etats des Sciences et Médecine Vétérinaires, Direction

Region	Country	District/System	Area of Work	Program and Accelerator collaboration	Partners
			Market Systems, Policy Solutions and Scaling, Gender, Youth and Social Inclusion		des Services Vétérinaires - Ministre de l'Agriculture, de la Souveraineté Alimentaire et de l'Élevage
NA	Tunisia	Pastoral and mixed agro-pastoral systems	Productivity+, Climate and the Environment	SAAF, Multifunctional Landscapes	IRESA; Institut des Regions Arides
SEA	Cambodia	Mixed crop-fish-livestock systems Aquaculture and fisheries	One Health, Productivity+ Climate and the Environment Market Systems, Policy Solutions and Scaling	SAAF, Multifunctional Landscapes	NAHPRI National Institute of Animal Health and Production Royal University of Agriculture CelAGrid (NGO) Inland Fisheries Research and Development Institute (IFReDI) Private seed sector
WA	Ghana	Mixed crop-tree-livestock systems; aquaculture	Productivity+, Climate and the Environment, Markets systems, policy solutions and scaling, Gender, Youth and Social Inclusion	SAAF	Council of Scientific and Industrial Research – Animal Research Institute, Forestry Research Institute of Water Research Institute, University of Development Studies, Fisheries Commission, Bridgeways (NGOs)
NA	Egypt	Aquaculture	Productivity+, Climate and the Environment, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes	Central Laboratory for Aquaculture Research, Private sector including feed companies (Skretting) and farmers
WA	Nigeria	Aquaculture and fisheries	Productivity+, Climate and the Environment, One Health, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes	Departments of fisheries, IITA, local universities
SEA	Malaysia	Aquaculture and fisheries	Productivity+, Climate and the Environment, One Health, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes	Departments of fisheries, local universities
SCA	Zambia	Aquaculture and fisheries	Productivity+, Climate and the Environment, One Health, Market and Policies, Gender, Youth and Social Inclusion	SAAF, Climate Action, Multifunctional Landscapes	Department of Fisheries, local universities, Natural Resources Development College

## 8. Boundaries and linkages with other components of the Portfolio

### 8.1. Boundaries with other components of the Portfolio

SAAF focuses on the supply of healthy nutrient-dense foods, from sustainable animal and aquatic production systems. It differs from Sustainable Farming, Multifunctional Landscapes, Climate Action and Policy Innovations by having a more specific focus on animal and aquatic food systems, versus whole-farm, multifunctional landscape or system-wide contexts. Both SAAF and Breeding for Tomorrow have genetic improvement activities. SAAF will focus on the genetic improvement of animal and aquatic species, forage and feed-food crop improvement through selection and scaling of improved forages and feed-food crops, while breeding of forages like Urochloa and Megathyrsus and feed-food crop barley will be through Breeding for Tomorrow. Better Diets and Nutrition focuses on the consumption of animal and aquatic foods, while SAAF addresses their supply through fostering inclusive, healthy and nutrient-dense food supply chains that are climate and environmentally friendly.

### 8.2. Linkages across the Portfolio

**Breeding for Tomorrow and SAAF** will work together to i) develop joint positions on access and benefit sharing of genetics resources as well as responsible use of genetic innovations; ii) influence policy; iii) further seed policy development, including for forages and feed-food crops; iv) undertake market assessments for breeding programs, including for animals, aquatic species and forages, through contextualization of existing crop oriented tools; and v) jointly negotiate with genotyping service providers for cost savings.

**Better Diets and Nutrition and SAAF** will collaborate to improve the safety, appeal and sustainability of animal and aquatic foods in diets. This partnership builds on SAAF's One Health work in food safety and Better Diets and Nutrition's focus on healthier diets through the food environment and demand-driven innovations. Joint efforts will i) explore sustainable production practices, ii) assess the environmental impact of nutrient-dense diets, iii) examine tradeoffs between nutrient adequacy from AAF systems and their cost; iv) facilitate the incorporation of safe animal and aquatic foods into the diets of producing households, many of whom otherwise sell this food; and v) present a balanced narrative on AAF systems in healthy, sustainable diets.

**Climate Action and SAAF** will collaborate to create policies, increase investments and develop innovations that help food system actors adapt to climate change, become more resilient and reduce emissions. SAAF uses tailored information on climate impacts and hotspots from Climate Action to inform the development of sector-specific solutions. In turn, SAAF provides up-to-date assessments and monitoring tools for the environmental impacts of diverse SAAF systems and innovations for Climate Action to include in databases, syntheses and advocacy campaigns.

**Multifunctional Landscapes and SAAF** will collaborate on integrating and evaluating SAAF innovations in multifunctional landscapes considering socioeconomic, environmental and biodiversity outcomes. These include those for One Health, increased animal and aquatic productivity and reduced emissions, soil and water conservation and business and market models. Recommendations will feed back to SAAF for improvement and contextualization of innovation bundles. The two Programs will also co-develop monitoring tools and improve the enabling environment of animal and aquatic food systems through joint national and global influence.

**Sustainable Farming and SAAF** will collaborate on evaluating innovation bundles developed for animal and aquatic food producers under SAAF when integrated into different whole-farm contexts, which is the focus of Sustainable Farming. The generated evidence will also inform whole-farm prioritization and decision-support tools being designed under Sustainable Farming, which SAAF can later capitalize on.

**Policy Innovations and SAAF** will collaborate to ensure an accurate representation of aquatic and animal foods in global food systems modeling and policy analysis. This will involve enhancing the aquatic and animal components within the country and global economic models managed by Policy Innovations. Furthermore, the market-led transformation work under Policy Innovations, which focuses on co-designing and evaluating bundled technology, institutional and policy innovations, aligns with SAAF's efforts in co-designing institutional and behavioral models for technology delivery. Both Programs will benefit from sharing methodologies and approaches to innovative packaging design and evaluation.

**Digital Transformation and SAAF** will work to ensure that digital innovations across different AoWs are co-designed using human-centered design principles, are inclusive and bring global best practices to the software development process. To operationalize this, Digital Transformation and SAAF will identify a set of use-cases. While Digital Transformation aggregates and makes available capacities necessary to design and deploy scalable and inclusive digital innovations, SAAF brings the necessary contextual understanding of the use case including limitations, local partnerships and domain expertise necessary.

**Gender Equality and Inclusion and SAAF**, through the SAAF AoW on Gender, Youth and Social Inclusion, have aligned issues on empowerment, norms and youth. SAAF innovations and evidence specific to animal and aquatic food systems will contribute to the agrifood system analysis of Gender Equality and Inclusion. Reciprocally, SAAF will benefit from the work of Gender Equality and Inclusion by adopting tools and approaches and the use of evidence.

**Scaling for Impact and SAAF** will collaborate to co-design and implement scaling strategies to integrate animal and aquatic-based food solutions into broader agrifood systems. Multistakeholder scaling hubs and the Innovation Packaging and Scaling Readiness (IPSR) approach will help prioritize innovation packages and ensure contextualized scaling strategies. This partnership will also generate evidence that informs policy, catalyzes investments and drives market system transformations while addressing scaling barriers like capacities, incentives and the enabling environment. By combining expertise in sustainable food production with scaling methodologies, the collaboration contributes to CGIAR's 2030 outcomes and achieves large-scale impact.

**Capacity Sharing and SAAF** will foster South–South triangular collaboration in sharing knowledge, best practices, technologies and innovation transfer in animal and aquatic foods. It aims to advance institutional and system capacities for development in One Health systems and the use of advanced genetic tools for breed improvement. Co-design and co-developed leadership and soft techniques and skills training for NARS, CGIAR and partners to efficiently manage and sustain research innovations and technologies. It will co-design joint and research on policy engagement and advocacy with NARS and agricultural sector partners.

The mechanisms underlying these linkages are sharing expertise, joint staff, co-investment in joint activities and co-location within common sites.

## 9. Monitoring, evaluation, learning and impact assessment (MELIA)

The 2025–30 cycle will feature a coordinated approach for MELIA across funding sources in the Portfolio, with greater uniformity in processes, capacities, data management practices and the use of results to measure progress. A minimum level of reporting into CGIAR Performance and Results Management Framework will be established for bilaterally funded projects.

Detailed Program MELIA plans will be developed during the Inception Phase, once system level MELIA principles and indicators are further advanced.

### 9.1. Monitoring, evaluation and learning (MEL)

The program theory of change provides a framework for MEL activities by outlining the steps and assumptions to achieve outcomes and guiding the identification of indicators, monitoring strategies, evaluation criteria and learning processes.

In addition to the program and AoW theories of change, stakeholders and partners co-create site-level theories of change for key program locations. These nest upwards to the Area of Work and program-level TOCs (Figure 5.1 and 5.2). The site-level TOCs i) ensure common vision and alignment of outcomes; ii) facilitate cohesion across the AoWs, including elements funded by bilaterals; iii) facilitate identification of context-specific assumptions; and iv) ensure necessary partners and actors are included. The site-level TOC approach was tested under the Sustainable Animal Productivity Initiative and found to be extremely successful.

Yearly joint reflections on the TOCs at program, AoW and site level allow us to monitor progress and practice adaptive management. Learning across program sites will be facilitated by lessons gathered from reflections on site-level TOCs.

The program will establish a core MEL team as well as MEL focal points for each Area of Work, key program sites and major bilaterals. This will ensure that MEL activities are embedded in program activities rather than treated as additional tasks. MEL activities will be resourced through a core MEL budget and budgets at Area of Work and bilateral levels.

### 9.2. Impact assessment (IA)

Our impact assessment strategy for SAAF is designed to produce robust empirical evidence on the Program's contribution to CGIAR's Impact Areas with a focus on evaluating long-term and large-scale impacts. This strategy will establish clear objectives, research questions and testable hypotheses aligned with the program's TOC. This will guide the identification of key outcomes to be assessed in terms of economic, social and environmental benefits.

The strategy incorporates methodologies for leveraging monitoring data while using both counterfactual and theory-based methodologies to validate the TOC. This includes experimental, quasi-experimental and observational data to underpin causal inferences. IAs will rigorously evaluate the effectiveness of implementation, such as ensuring that SAAF technologies benefit intended populations, governance reforms increase equity and improved practices do not exacerbate inequities, including those related to gender and exclusion. Impact assessments will be aligned with significant program achievements, conducting meta-analyses across specific countries or regions and disaggregating impacts by gender, age and other key demographics. These assessments will estimate the tangible economic, social and environmental benefits derived from the program's outputs and interventions, taking into account contextual factors that influence effectiveness.

The IA strategy will cover geographies, timeframes, scales and populations of interest, facilitating cross-program learning, data sharing and meta-analysis. Internal resources are essential for effective data collection and evaluation use, while external collaboration will help to ensure independence and methodological rigor. A structured and dedicated impact assessment team will be established across the Areas of Work, ensuring coordination with the Standing Panel on Impact Assessment to maintain consistency and leverage shared insights.

## 10. Capacity sharing

Capacity sharing is embedded in the way SAFF works and its theory of change with many of the AoW outcomes focused on capacity development. Partners are involved at all stages of the implementation and work together with CGIAR researchers in co-design processes. This ensures that roles are complementary, and solutions are appropriate, sustainable and scalable.

There are four pathways for capacity sharing: i) co-design of interventions and working hand-in-hand with national partners; ii) South–South collaboration and triangular cooperation; iii) capacity development programs for young career researchers; and iv) capacity sharing with policymakers, investors and other decision-makers. We will work with NARS, government agencies, small and medium enterprises, entrepreneurs, food vendors, community groups, digital groups and agriculture technology and data agencies.

Capacity sharing builds on past and ongoing efforts and interactions initiated in CGIAR Initiatives and bilateral programs. A major component of AoW 6.1 (Productivity+) is working with national Centers of excellence in genetic breeding, livestock and aquatic production to strengthen the use of advanced genomic tools in breeding-related work. AoW 6.1 also works on disease diagnostics, biosecurity and awareness raising on access and benefit sharing of genetic resources.<sup>131</sup> South–South exchange and triangular cooperation is a main component of these efforts. This includes work between Asia and Africa in the African Dairy Genetic Gains project<sup>132</sup> and the [Asia-Africa blue tech superhighway](#). SAFF will work with advanced research institutes in the Global North for advanced genetics research that cannot be done elsewhere.

AoW 6.2 (Climate and the Environment) works with i) community groups and farmers on locally-led adaptations with Adaptation Pioneers,<sup>133</sup> strengthening capacity for smallholder farmers on diversification of forage-based livestock systems to improve climate resilience and reduce emissions and sensitizes aquaculture producers to climate change and climate impacts; and ii) with national policymakers and government agencies to increase sharing on how to adapt national livestock and fisheries policies to support climate change efforts and develop tools for GHG inventories, estimating uncertainty with partners in the Global North and national partners.

AoW 6.3 (One Health) focuses on: i) building up institutional capacity to strengthen integrated One Health networks within countries for more coordinated responses to outbreaks and disease control; and ii) through training and awareness raising with small informal market vendors, national laboratory technicians<sup>134</sup> and around food safety<sup>135</sup> and developing materials, manuals and training events for farmers, fishers and communities around AMR.<sup>136, 137</sup>

AoW 6.4 (Market Systems, Policy Solutions and Scaling) will focus on two areas of capacity development: i) building on incubation and entrepreneurship mentoring training workshops that help scale solutions and link small and medium enterprises and financers to SAFF solutions; and ii) work with farmers, fishers and community groups on business training and decision-support tools for farmers.<sup>138</sup>

AoW 6.5 (Gender, Youth and Social Inclusion) works with international NGOs (e.g., Care, SNV, Oxfam) to scale gender-appropriate solutions.<sup>139, 140</sup> GYSI has developed tools ([Women's Empowerment in Livestock Index](#) and the [FISH gender integration tools](#)) that support capacity building for local partners. GYSI will also work with local women groups, fishers and farmers on gender norms training using tools such as community conversations.<sup>141</sup>

AoW 6.6 (Data and Digital Solutions) will co-generate data and knowledge management platforms for national partners,<sup>142,143</sup> particularly national research and meteorological institutes. It will also work with development partners, NGOs and startups to train them on using digital data collection tools. This will include training on data management, FAIR data practices and data ontologies for animal and aquatic food systems.

SAAF will take advantage of CGIAR Center capacity development which supports Masters and PhD fellows to develop their scientific skills. The [CapDev Grand Challenge](#) from ILRI is a year-long program for academics and fellows that involves developing skills for researchers to carry out systems-based research-for-development. The fellowship program at ILRI also gives academic and national scientists access to ILRI's research facilities where they are mentored by senior scientists while contributing to advanced research work and provides conducive benefits that do not discriminate against women or those with families.

## 11. Gender and social inclusion

**Challenges and prioritization:** Inequalities in animal and aquatic food systems are deeply rooted and expected to grow over the next decades as the impacts of climate change negatively impact the most marginal sectors of society. Gender inequalities are the most widespread worldwide and intersect with other forms of discrimination (e.g. age, ethnicity, religion, socioeconomic status) that exacerbate the disadvantages of marginalized groups. Yet, these groups depend most heavily on AAF systems for livelihoods as input suppliers, producers, traders, processors, value chain actors and consumers.

Two-thirds of the developing world's rural livestock keepers are women; women comprise half of all people involved in post-harvest processing, transporting, trading and selling fish, and 45% of all those in subsistence fisheries. This is too many people to be ignored. Youth are significantly under-represented in the production and business sectors of AAF systems. If women, youth and marginalized groups are disempowered and lack access to social-technical innovations, finance and knowledge they will be unable to effectively participate in or benefit from these systems; these systems in turn, will cease to thrive.

Achieving gender equality and empowering women and youth are essential for progress toward thriving AAF systems, and also, towards SDG5. While AAF systems have been shown to offer unique potential to support the empowerment of women, youth and marginalized groups, disadvantage based on gender, age and other individual characteristics continue to limit the benefits they can gain from these systems.

In SAAF we aim to develop technological and socio-institutional innovations that support women, youth and marginalized groups to progress toward gender equality and for AAF systems to thrive. This work is led by the Gender, Youth and Social Inclusion (GYSI) Area of Work.

**Knowledge base: A focus on empowerment to counteract disadvantage.** CGIAR has done much to show how AAF can support empowerment. We build on this research and expand to new

areas of empowerment that need further research: i) the psychological and relational dimensions of empowerment (example [here](#)); ii) the role of AAF systems in building women's empowerment in fragile contexts; iii) the role of collective action for empowerment; iv) employment and empowerment particularly in informal aquatic foods and milk markets; v) work-burden and the unpaid economy ; vi) the role of the digital revolution in empowerment; vii) how social protection mechanisms/packages enable empowerment and resilience; and viii) understanding the power of access and use of social-technical bundles and related resources.

We focus on conducive social and gender norms which are the basis of empowerment. Previous research by AAF systems partners has shown the cultural norms that most strongly affect equality in these systems, how such norms are maintained and their influence on empowerment. We build on this work and continue to explore i) the best approaches for studying norms and how they evolve; ii) how various determinants of inequality collectively shape norms; iii) the impact of these norms on empowerment; iv) the most effective approaches to addressing restrictive norms to foster a more supportive environment; v) the mechanisms by which individual changes in attitudes lead to behavioral shifts; and vi) how we scale to larger communities and achieve a tipping point that results in broad changes in social norms. This knowledge helps us leverage AAF system interventions to effect changes in equity and livelihoods and make AAF systems more functional. Such changes will result from innovation bundles: a combination of technical innovations that respond to the needs of All, and socio-institutional innovations that address disempowerment. To this aim, the GYSE Area of Work leads strategic work on empowerment and norms, and coordinates integration of equality considerations across the other Areas of Work; it identifies bundles of innovations that are most effective in moving toward equitable AAF systems.

### **Research questions**

Overall, the gender, youth and social inclusion work in SAAF aims to understand how AAF systems support gender, youth and social equality and how gender, youth and social equality, in turn, support AAFs to thrive. Detailed research questions are included in Section 6.5.

**Results and TOC.** GYSI will mitigate the disadvantages faced by women, youth and marginalized groups by removing constraints on access to resources (e.g. employment opportunities and training). GYSI responds to their preferences (e.g. for animal and aquatic breeds and forage crops) and leverages available opportunities such as new technologies and markets. The expected outputs are gender and youth-responsive innovations that are more likely to be adopted by producers and attract the attention of private and public investors. This will result in communities adopting more resilient practices and policymakers developing more equitable policies.

Access to innovations and opportunities, together with our intentional, strategic empowerment work, is expected to support the empowering efforts of women, youth and marginalized groups in terms of i) new jobs in AAF systems; ii) leadership roles; iii) engagement in profitable value chain nodes; and iv) reduced women's work-burden. We leverage transformative approaches so that households, communities and system actors, including decision-makers and funders, adopt behaviors that enable empowerment processes that benefit women, youth and marginalized groups. Taken together, we expect the livelihoods of the most marginalized in AAF systems to improve. This contributes to SAAF's progress toward social and inclusion Impact Area targets.

## **12. Climate change**

Climate change is threatening animal and aquatic food systems (AAF systems) in low- and middle-income countries of Asia, Africa and Latin America. Rising temperatures, ocean

acidification and changing precipitation patterns are altering AAF systems habitats and livestock, fisheries and aquaculture productivity. Climate-induced stressors such as heatwaves reduce livestock productivity by affecting animal health and increasing mortality rates.<sup>144</sup> Extreme weather events (floods and droughts), disrupt feed and forage supply chains and increase the incidence of pests and diseases.<sup>145</sup> In fisheries, rising water temperatures and changes in dissolved oxygen are shifting fish distribution and contributing to collapse, thereby affecting the livelihoods of millions dependent on these resources.<sup>146</sup> There are also economic risks. As AAF systems face increasing impacts, the cost of maintaining production increases, especially for small-scale farmers and fishers, women, youth and marginalized groups, leading to reduced food security and increased poverty in regions already facing significant challenges.

AAF systems have a significant impact on the climate via greenhouse gas emissions and land use change (e.g., deforestation). Livestock production is a major source of methane primarily through enteric fermentation in ruminants. Manure management and the use of synthetic fertilizers in feed production contribute to methane and nitrous oxide emissions. Aquaculture, while generally considered to have a lower carbon footprint<sup>147</sup> contributes to climate change through energy-intensive practices, feed production and the release of methane and nitrous oxide from ponds. Both land and water use for AAF production can lead to deforestation, habitat destruction and biodiversity loss. However, some systems (farming bivalves and seaweeds) produce highly nutritious foods with minimal inputs, offering some of the most sustainable opportunities for enhancing food and nutrition security.

**Strategies and mitigation efforts.** A multi-pronged approach to AAF systems aims to enhance adaptive capacity and resilience while reducing emissions and expanding the production of low-input systems. This involves:

1. **Research and monitoring.** SAAF will intensify research on climate impacts specific to AAF systems in targeted geographies by examining the effects of changing and extreme weather on animal/fish health, feed and forages availability and aquatic ecosystems using advanced modeling techniques to predict weather and climate scenarios and their potential impacts. The data will inform proactive adaptation strategies. We will also generate data on GHG emissions from AAF systems.
2. **Development of climate-resilient practices.** SAAF will develop and scale up climate-resilient practices and innovations (from gene to landscape level) tailored to the needs of regions, production systems and livelihoods. For livestock, this includes heat-tolerant breeds, drought/flood tolerant and low-emission forages, improved animal shelters and housing and enhanced feed and forage efficiency. In aquatic systems, this includes adaptive fish breeds and farming practices, promoting low-carbon mariculture and aquatic plant species, integrated agriculture-aquaculture systems and sustainable feeds.
3. **Mitigation with adaptation co-benefits.** SAAF will develop mitigation innovations with adaptation co-benefits<sup>148</sup> by improving feed efficiency in livestock with improved forage and management practices to enhance productivity and carbon capture and reduce emissions. Similarly, sustainable aquaculture practices and fisheries management can sequester carbon and reduce the overall carbon footprint of food production. By co-developing AAF systems innovations and corresponding business models with strong mitigation and adaptation co-benefits, SAAF can inform impactful climate finance decisions.

**Capacity building and knowledge sharing.** SAAF will leverage partnerships with national innovation systems, private sector actors and local communities to build capacity for climate-

resilient AAF systems. This includes training programs on climate risk management, adopting climate-smart practices and integrating local knowledge and resources with scientific research. Capacity-sharing efforts are designed to empower women, youth and marginalized people to counter inequities in climate vulnerability. Our 2030 goal is to make available to 500 million users the knowledge and tools needed to adapt to climate change.

**Policy advocacy and implementation.** SAAF will advocate for policy changes at national and international levels. We will work with governments to develop and implement policies that promote sustainable and resilient AAF systems. This includes advocating for incentives that encourage climate-smart practices and the inclusion of animal and aquatic foods in broader climate adaptation and mitigation strategies, including Nationally Determined Contributions and National Action Plans.

## 13. Risk management

*Risks will be finalized and mitigation actions will be developed as part of the risk management plan during the Inception Phase.*

The Science Program has considered risks with the most harmful effects on projected 2030 outcomes. The table below summarizes the risk event, its causes and consequences. These are also based on the mapped initiative risks. Mitigation strategies will be elaborated during the program initiation phase with a more detailed risk assessment.

Risk title (summarized statement)	Risk statement including potential event, sources and consequences on objectives
Risk 1 Species collapse	A collapse of one or more animal or aquatic food species caused by an epidemic. This would result in reduced productivity and profitability of farmers and fishers, less nutrient-dense food, sicker animals and aquatic species and damage to climate and environmental resilience.
Risk 2 Global recession	A global recession would limit direct investment in some animal and aquatic food sources due to their long and expensive production timelines, niche markets or limited farmer/fisher purchasing power. This would result in limited input and service provider participation, reducing their ability to scale innovations.
Risk 3 Immature innovations	Past CGIAR and donor investment in animal and aquatic foods resulted in limited mature innovations able to increase the productivity and profitability of farmers and fishers, nutrient-dense foods, healthy animals and aquatic species and climate and environmental resilience within the Science Program budget. This would result in unscalable/incompletable supply-driven innovations by 2030.
Risk 4 Insufficient data	The unwillingness of a national government and producers to share accurate or potentially embarrassing data on animal and aquatic food diseases, production, profitability and genetic diversity. This would result in neighboring and regional decision-makers lacking the information needed to contain disease outbreaks, species inbreeding, incentivize market actors and reduce greenhouse gas emissions.
Risk 5	A change in societal values brought about by the election of a very conservative government in a SAAF priority country. This could result in a society unwilling to

Changes in government	modify existing social norms by 2030, thereby reducing the productivity and profitability of farmer and fisher households.
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## 14. Funding sources

The projects below have identified USD \$82 million in funds from 18 bilateral projects mapped to Sustainable Animal and Aquatic Foods. Other Programs and Accelerators mapped to the same projects include Multifunctional Landscapes (2 projects), Breeding for Tomorrow (4 projects), the three Accelerators (3 projects each), and Better Diets and Nutrition, Climate Action, and Scaling for Impact (1 project each). As noted in Section 8, SAAF will closely coordinate with those Programs and Accelerators. Half the mapped bilateral funding comes from the UK Foreign, Commonwealth and Development Office for Aquatic Foods

Mapping within SAAF Areas of Work shows that there is significant bilateral funding for Productivity+, Climate and the Environment, One Health and Markets Systems, Policies and Scaling. However, the Gender, Youth and Social Inclusion and the Data & Digital Areas of Work will need to leverage funds from bilateral projects to implement some of the planned activities.

Encouragingly, there are 10 donors for these projects, which suggests broad support for SAAF Program Outcomes. Half are government and half nongovernment.

Four of the five contributing Centers have bilateral projects mapped to SAAF. One bilateral funded by Bezos Earth Fund and BMGF on the Anti-methanogenic Feedstock for Livestock in Global South project contributes US\$19 million to ABC, ILRI and ICARDA.

Project/program title	Lead CGIAR Center	Funder	Duration	Expected 2025–30 funding USD ('000)	Relevant Program/Accelerator Areas of Work, if known
F-AG10607-Asia-Africa Bluetech Superhighway Project (Coast)	WorldFish	United Kingdom Foreign Commonwealth & Development Office (FCDO)	74 months	43,271	Productivity+
L-BMG026-CGIAR Livestock Partnership	ILRI	BMGF-Bill & Melinda Gates Foundation	9 months	12,481	Productivity+, One Health and Markets Systems, Policies and Scaling
F-PP-2022-1020-Climate-Resilient Aquaculture Systems for Africa	WorldFish	BMGF-Bill & Melinda Gates Foundation	48 months	11,179	Productivity+ and Climate and the Environment
L-EUR022-EU Support to sustainable Livestock system in Ethiopia	ILRI	European Commission	43 months	8,398	Productivity+, Climate and the Environment and One Health
L-UOE012 Centre for Tropical Livestock Genetics and Health	ILRI	BMGF and FCDO	32 months	7,974	Productivity+
BIUSA (BEF) – Screening, Developing and Deploying anti-methanogenic	ABC	Bezos Earth Fund		6,335	Climate and the Environment

Project/program title	Lead CGIAR Center	Funder	Duration	Expected 2025–30 funding USD ('000)	Relevant Program/Accelerator Areas of Work, if known
feedstock into livestock systems in the Global South					
BMGF - Anti-methanogenic Feedstock for Livestock in Global South	ABC	BMGF-Bill & Melinda Gates Foundation	45 months	6,127	Climate and the Environment
L-BMZ002-One Health Research, Education and Outreach Centre	ILRI	Germany-BMZ-German Federal Ministry for Economic Cooperation and Development	12 months	5,995	One Health
L-KOR025- Improving Human Health Through Sustainable Value Chains in Human-Animal-Environmental Interactions Using ICT in Vietnam infection	ILRI	Korea-MAFRA-Ministry of Agriculture, Food and Rural Affairs	12 months	4,837	One Health and Data & Digital
F-AG10578-Dev. & Scaling of Sustainable. Feeds for RAqFS in Sub-Saharan Africa	WorldFish	Norway-NORAD-Norwegian Agency for Development Cooperation	30 months	3,565	Productivity+
L-MML008-Fleming Fund Country Grant for Kenya Phase 2	ILRI	The Fleming Fund	14 months	3,418	One Health
L-CIA024-Anti-methanogenic Feedstock for Livestock Systems in Global South	ILRI	BMGF-Bill & Melinda Gates Foundation	45 months	3,135	Climate and the Environment
L-EUR021-Capacitating One Health in Eastern and Southern Africa	ILRI	EC-European Commission	12 months	3,030	One Health
L-MML007-Antimicrobial Resistance and One Health, including Animal Health, the Environment and Practitioner Engagement Eastern and Southern Africa	ILRI	Euroconsult Mott MacDonald	12 months	2,250	One Health
D-200375-ICARDA - Screening, developing and deploying anti-methanogenic compounds	ICARDA	CIAT-International Center for Tropical Agriculture	43 months	2,159	Productivity+ and Climate and the Environment
D-200385-BMGF - Anti-methanogenic feedstock for livestock	ICARDA	CIAT-International Center for Tropical Agriculture	45 months	2,095	Climate and the Environment
F-AG10582-Technologies for African Agri Transformation Phase	WorldFish	AfDB-African Development Bank	27 months	1,282	Productivity+ and Markets Systems, Policies and Scaling

Note: This table is not intended to be exhaustive. It should provide sufficient information to support the assumptions made with regard to the overall funding mix and high-level breakdown (e.g. the known projects and programs that make up 80% of bilateral funding, mapped to the Program).

A variety of assets support the work across the different AoWs. These include biophysical assets and facilities such as laboratories, genebanks, biorepositories, hatcheries, fish rearing facilities, aquaculture stations, farms, and animal care facilities, primarily used by Productivity+, Climate and Environment, and One Health. These assets will require funding for new equipment, maintenance, and other operational needs. Additionally, digital assets like databases, repositories, data management systems, digital platforms, and cloud/server infrastructure, used by all AoW, will need investment for updates, ongoing development, maintenance, and licensing fees. Both pooled and bilateral funding will contribute to these efforts.

**High-level breakdown of pooled funding by Area of Work (USD '000)**

*In the final version, a table will be inserted here, showing the breakdown of pooled funding by Area of Work for different budget scenarios.*

## Annex - Pooled funding

Tables 1-6 provide for each AoW proposed activities, and geographies, linked bilaterals and science Programs and Accelerators. Budgets are still being worked out.

For Productivity+ there are 12 activities of which four are new or mostly new activities. The activity with the largest budget within Productivity+ relates to genetic improvement programs for animal and aquatic species (4,390k USD), as this budget comprises 3,183k USD of funds specifically for African Dairy Genetics Gains and Tropical Poultry Genetics Solutions sub-activities (via targeted BMGF funding). The newer activities are on technologies and models for conservation of animal and aquatic food biodiversity, risk mapping for climate-sensitive diseases and a risk-based approach to disease control; functional (fortified and acceptable) animal and aquatic foods; and supporting animal and aquatic food producers to adopt contextualized combinations of innovations. These newer activities are targets for additional funding under the surge budget. Many Productivity+ activities have linked bilaterals and in these cases, the pooled funding will target species or sites outside of the bilateral funding.

For Climate and Environment, there are 10 activities of which two are relatively new. These focus on forage biodiversity and management options for mitigation and resilience in SAAF, including anti-methanogenic feeds, and adoption of climate-adaptive, nature-based aquaculture and silvopastoral systems (seaweed, bivalves, etc.). The latter is a target for surge funding along with additional assessments of carbon, land and water footprints and further development of monitoring, reporting and verification systems for GHG emissions and carbon capture. Continuing work is foundational in that it builds on previous activities in specific countries where there are demands. This includes index-based livestock insurance and engagement and business models for climate financing.

For One Health, there are six activities, with a new activity on Operationalizing One Health and scaling, and a mostly new activity on zoonoses prevention and control. Operationalizing One Health is a key target for surge funding that will develop business cases to promote One Health investment, implementation and scaling. New areas of zoonoses prevention and control will see more work on wildlife, which will contribute to an improved understanding of the role of wildlife in food systems and how to better manage the benefits and risks. Also new are the use of living labs to study health, ecological and climate risks in the context of climate-resilient food systems and analyzing the success and failure of food safety interventions in traditional markets, disease control and AMR in integrated systems of livestock and fish. Most activities have linked bilateral projects and build on long-standing partnerships in the country and regions where the activities take place.

For Markets Systems, Policies and Scaling, there are 11 activities. Some are new and continuing. New activities are i) SAAF information gap assessment and market system diagnosis; and ii) identification of market and policy needs for decision support tools and studies to understand the uptake of decision support tools and policy integration. This AoW also builds on partnerships with government agencies and the private sector that were established in the research Initiatives. Activities in this area will also directly link to the Policies Program and the Scaling Program. Surge funding would allow for expanding the work to additional countries, value chains and commodities.

For Gender, Equity, Youth and Social Inclusion, 11 activities build up the research from targeted diagnosis and baselines to testing interventions for empowerment of women and youth, and conducive norms; to policy engagement; to testing technological and socio-institutional bundles; and to scaling. Endline and meta-analysis will not be done in 2025. Most activities build on previous work and expand both research and testing of interventions based on lessons learned.

Youth and policy (which are more emphasized than previously), and scaling (which is a new area) and further testing of promising interventions are targets for surge funding. All activities will foster cohesion within SAAF by collaborating with other AoWs and linking to the work of the Gender Accelerator.

Digital and Data Solutions has 13 activities (three new). Many are linked to bilaterals but it is expected that this Area of Work will be entrepreneurial and leverage pooled funding to develop new proposals and funding opportunities as digital and AI-related activities have the potential to draw in more funding. Much of this work depends on pooled funding and fosters cohesion within SAFF by collaborating with other AoWs as well as links to the work being done in the Digital Accelerator. A key aspect of this will be designing an integrated information system for SAAF.

Table 7 shows the partners we will be working with in specific countries and potentially allocating funds to partners. This includes a diverse mix of partnerships from national research institutes and universities, government agencies, NGOs and cooperatives and some private sector entities.

### **Building on CGIAR Research initiatives**

SAAF builds on the work of several CGIAR Research Initiatives and bilateral projects and programs. Below is a summary of the research initiative activities that will be continued under SAAF, what might be discontinued, and new areas of inquiry.

#### **Initiative on Sustainable Animal Productivity for Livelihoods, Nutrition and Gender Inclusion (SAPLING)**

The Initiative Sustainable Animal Productivity for Livelihoods, Nutrition and Gender Inclusion (SAPLING) aims to contribute to transforming livestock sectors in target countries to make them more productive, resilient, equitable and sustainable. SAPLING works in seven countries located in East Africa (Ethiopia, Kenya, Tanzania, Uganda), West Africa (Mali), Southeast Asia (Vietnam) and South Asia (Nepal), on 15 livestock value chains.

SAAF will build on the SAPLING initiative by i) continuing and strengthening the approaches to stakeholder engagement and co-design from the onset; ii) the use of site-level theories of change to contextualize solutions and monitor change; iii) integrating existing and co-designing new feed, health and genetics solutions with input and service delivery to enhance productivity; iv) ensuring market competitiveness of livestock keepers and other market actors; v) facilitating inclusiveness and the empowerment of women, youth and marginalized groups, including through job creation; vi) undertaking policy and engagement work for increased investment by the public and private sectors and a more enabling environment; vii) contextualizing innovation packages and scaling approaches for different production systems; and viii) building the capacity of a range of partners. With Better Diets and Nutrition, SAAF will build on SAPLING approaches for using safe animal-sourced foods within producing households.

Areas not well addressed under SAPLING that will be strengthened through SAAF include: i) ensuring animal and aquatic food production enterprises are productive and profitable; ii) reducing emissions; iii) increasing the nutrient density of animal and aquatic foods as part of production practices (feeding); iv) conservation of animal and aquatic species biodiversity, including through in-vitro approaches; v) risk mapping for climate-sensitive diseases and a risk-based approach to disease controls; vi) a more holistic consideration of animal and aquatic food production, One Health, and the Climate and the Environment; and vii) thinking beyond the animal food value chains (the focus of SAPLING) to whole-farm contexts, landscape and system levels (including in collaboration with other Programs).

Within SAAF, work on SAPLING's existing livestock value chains will continue and expand, incorporating the new elements described above. For some value chains, new sites within countries may be selected, and new partnerships may be required for additional expertise. SAAF will have fewer assessments and more action research in comparison to SAPLING (as there is already a strong understanding of the focal value chains and systems).

### **Initiative on One Health**

One Health Initiative aims to show how a One Health approach – which recognizes the interconnections between people, animals, plants, and their shared environment – can help manage zoonotic diseases, improve food and water safety, and reduce antimicrobial resistance, leading to better human, animal, and environmental health. One Health works in 7 countries across Asia and Africa.

Under the One Health Area of Work, we will continue to develop integrated zoonotic disease surveillance tools and food safety interventions for traditional markets; quantify foodborne disease risk and the use of antimicrobials in animal source and aquatic food production; and investigate the role of water in disease transmission. Through this portfolio of work, we will continue to generate evidence of One Health risks in food systems and develop solutions to prioritize, mitigate and manage these risks.

New Areas of Work will include a greater focus on understanding and managing the risks of wildlife as reservoirs of emerging infectious zoonotic diseases. Food safety work will focus on the identification and scaling of microbial decontamination technologies in informal market settings and supporting national and regional food safety strategy implementation. AMR research will evaluate biosecurity and vaccination strategies to reduce disease prevalence and AMU and conduct cost-benefit analyses of AMR mitigation efforts. The water research will deepen the work on watershed modeling for health risk assessment and planning for risk mitigation as well and focus on policy change and solution adoption. A completely new area will be on One Health operationalization that will generate evidence on best practices and added value to One Health and support investments and sustainable implementation and integration across sectors.

### **Initiative on Livestock and Climate**

CGIAR Research Initiative on Livestock and Climate addresses the challenges that climate change poses to livestock production, supporting livestock-dependent communities without accelerating greenhouse gas emissions or degrading land, water, and biodiversity.

Work will continue using results from carbon, land, and water footprint assessments of diverse AAF systems under various climate scenarios, moving beyond tool development. We will enhance monitoring, reporting, and verification systems for greenhouse gas emissions by integrating digital innovations. A key focus will remain on testing forage biodiversity and management options to support both mitigation and resilience in AAF systems. Additionally, we will scale climate-linked credit scoring and index-based insurance to unlock microfinancing and provide mitigation services for AAF producers.

We will reinforce our work with new business models and financial mechanisms to mobilize climate finance, strengthen human-centric approaches for delivering weather and climate information, and evaluate the full economic costs and benefits of climate action. Sustainable animal and fish feed, resilient fish strains, and improved management practices will be developed to reduce emissions in aquaculture. Community-driven resource management for resilience and mitigation will expand across AAF systems, alongside promoting climate-adaptive, nature-based aquaculture and silvopastoral systems.

Some changes include discontinuing work in conflict zones, shifting climate security toward inclusivity and vulnerability, and continuing regenerative livestock activities, particularly in rangelands, under the Multifunctional Landscapes Science Program.

### **Initiative on Aquatic Foods**

CGIAR Initiative on Aquatic Foods aims to build the resilience of aquatic food systems and unlock their full potential by scaling research and innovations. It forms part of CGIAR's new Research Portfolio, delivering science and innovation to transform food, land, and water systems in a climate crisis.

SAAF will build on the progress of the Aquatic Foods Initiative (AqFI), which advanced research through its Work Packages and strengthened partnerships across countries like Bangladesh, Cambodia, India, Ghana, Kenya, Zambia and Timor Leste. AqFI made notable contributions by disseminating innovations such as improved fish strains (e.g., GIFT tilapia, G3 rohu), influencing national and global policies, supporting multistakeholder platforms for inclusive governance, and expanding decision-support and digital tools for aquatic food systems. SAAF will continue these efforts, with a focus on scaling innovations that enhance productivity, environmental sustainability, and nutrition. The program will also strengthen integration across input supply, production, and market systems while emphasizing stakeholder engagement and co-design to ensure solutions are relevant, inclusive and impactful.

In contrast to AqFI, SAAF will place greater emphasis on reducing emissions from aquatic foods, increasing nutrient density in production, and considering ecosystem-level resilience and biodiversity. Action-oriented research will take precedence, focusing on scaling innovations and integrating aquatic foods into national Agricultural Innovation Systems. Some diagnostic workstreams from the earlier phase will be phased out as SAAF leverages the evidence gathered to implement practical, scalable solutions, ensuring aquatic food systems contribute to climate resilience, inclusion, and sustainability.

**Table 1. Productivity+ Area of Work Proposed Activities linked to TOC outputs and geographies, and linked bilaterals and science Programs/Accelerators**

Activity	Title / description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
1	Co-design and testing of genetic improvement programs for animal and aquatic species, linked to efficient, equitable and affordable delivery systems, and capacity sharing	1.1	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Continuing	BMGF - CGIAR Livestock Partnership - African Dairy Genetics Gains  BMGF - CGIAR Livestock Partnership – Tropical Poultry Genetic Solutions  Technologies for African Agricultural Transformation	
2	Co-design and testing of conservation technologies and models for at-risk animal and aquatic species, and capacity sharing	1.1	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Mostly new	Center for Tropical Livestock Genetics and Health	
3	Co-strengthening genomic resources for animal, aquatic species and forages, and use of these resources to identify genomic variants for ecologically, economically and environmentally important traits, including for emissions reduction, and capacity sharing	1.2	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Continuing	Center for Tropical Livestock Genetics and Health  Asia-Africa BlueTech Superhighway Project	Breeding for Tomorrow

4	Co-design and testing of innovations for: feeding approaches that reduce emissions and improve feed efficiency; cost-efficient feed formulations' efficient, equitable and affordable feed delivery; labor saving feed processing; and circular economy approaches to ingredients and feeds, and capacity sharing	1.3	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Continuing	EU Support to sustainable Livestock systems in Ethiopia Technologies for African Agricultural Transformation Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa	
5	Co-design and testing of improved forage and feed-food crop through selection, as well as equitable and affordable delivery systems for forages and feed-food crops (both bred and selected), and capacity sharing	1.3	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Continuing	EU Support to sustainable Livestock system in Ethiopia The Development and Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa Climate-Resilient Aquaculture Systems for Africa Anti-methanogenic feedstock for livestock systems in Global South	
6	Co-design and testing of vaccines and diagnostics tools for economically important animal and aquatic species disease, linked to efficient, equitably and affordable delivery systems, and capacity sharing	1.4	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Continuing	BMGF - CGIAR Livestock Partnership - Transforming Animal-Health Solutions and Services for LMIC	
7	Co-design and testing of herd/fish health management practices, including biosecurity, and capacity sharing	1.4	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia,	Continuing	EU Support to sustainable Livestock system in Ethiopia Climate-Resilient Aquaculture Systems for Africa	

			Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal		Asia-Africa BlueTech Superhighway Project	
8	Co-design and testing of risk mapping for climate sensitive diseases and a risk-based approach to disease control	1.4	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	New		
9	Co-design and testing of functional (fortified and acceptable) animal and aquatic foods, based on knowledge of nutrient deficiencies within groups of people, and capacity sharing	1.5	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Mostly new		Better Diets and Nutrition
10	Co-design and testing of approaches to support animal and aquatic food producers to adopt combinations of innovations for improved productivity and profitability, emissions reduction and nutrient-dense foods, under different contexts, and capacity sharing	1.6	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Mostly new	Climate-Resilient Aquaculture Systems for Africa  Asia-Africa BlueTech Superhighway Project	Sustainable farming  Multifunctional Landscapes  Digital and Data  Capacity Sharing Scaling for Impact
11	With stakeholders, ensuring Productivity+ innovations and delivery systems are gender-responsive, and that access to	1.1 1. 1.3 1.4 1.5	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt;	Continuing		Gender, Equity and Inclusion

	innovations and benefit sharing is equitable	1.6	<b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal			
12	Influence of policy design and investment for a more enabling environment for adoption and scaling of Productivity+ innovations	1.1 1.2 1.3 1.4 1.5 1.6	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria; <b>Southern Africa</b> - Zambia; <b>North Africa</b> - Egypt; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam, Malaysia; <b>South Asia</b> - Bangladesh, India, Nepal	Continuing	Asia-Africa BlueTech Superhighway Project	

**Table 22. Climate & the Environment Area of Work proposed activities linked to TOC outputs and geographies, and linked bilaterals and science Programs/Accelerators**

Activity	Title/description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
1	Assessing Carbon, land, and water footprint of diverse AAF production systems, under different climate scenarios and with/without implementation of innovation packages/system transformations	2.1 2.3 2.4	Global	Continuing		Climate Action
2	Development of Monitoring, Reporting and Verification systems for GHG emissions and carbon captures	2.1 2.2 2.4	Global	Continuing		Climate Action
3	Test forage biodiversity and management options for mitigation and resilience in SAAF	2.1 2.2 2.4	<b>South Asia – India, Latin America – Colombia, Guatemala</b>	New	Screening, developing, and deploying preparation of anti-methanogenic feedstock into livestock systems in the Global South	Climate Action
4	Scaling climate-linked credit scoring and index-based insurance to unlock green financing and provide resilience and mitigation service bundles for all AAF producers	2.2 2.3	<b>East and Southern Africa – Kenya, Ethiopia, Tanzania</b> <b>Latin America – Colombia, Guatemala, WAF</b>	Continuing		Climate Action; Catalyzing Impact

Activity	Title/description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
5	Human-centric design and delivery of weather and climate information services for resilient and low-emission AAF systems	2.2	<b>East Africa</b> – Kenya, Ethiopia, Tanzania <b>Latin America</b> – Colombia, Guatemala, <b>West Africa</b> – Mali, Senegal, Ghana, Nigeria	Continuing		Climate Action; Catalyzing Impact
6	Identify and explore with partners new business models and financial mechanisms to mobilize climate finance in AAF Systems	2.3	<b>East Africa</b> – Kenya, Ethiopia, Tanzania <b>West Africa</b> – Mali, Senegal, Ghana, Nigeria, <b>Latin America</b> – Colombia, Guatemala	continuing		Climate Action
7	Assessment of economic costs and benefits of action and inaction for climate and the environment in AAF Systems	2.1 2.3	Global	continuing		
8	Developing and testing sustainable fish feed, better management practices, and resilient fish strains to reduce emissions and enhance climate-adaptive aquaculture	2.1 2.2 2.3	<b>East Africa</b> – Kenya, Tanzania <b>West Africa</b> – Mali, Senegal, Ghana <b>South Asia</b> - India <b>Southeast Asia</b> – Myanmar, Vietnam	Continuing		
9	Assessment and development of community-engaged methods of resource management for resilience and mitigation, in all AAF systems	2.2 2.3 2.4	<b>South Asia</b> - India <b>Southeast Asia</b> – Myanmar, Vietnam, Pacific – Timor Leste, <b>East Africa</b> – Kenya, Tanzania, Ethiopia	Continuing		Future Frontiers and Security; Multifunctional Landscapes

Activity	Title/description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
10	Testing and promoting the adoption of climate-adaptive, nature-based aquaculture and silvopastoral systems (seaweed, bivalves, etc.)	2.1 2.2 2.3	<b>South Asia</b> – India <b>Southeast Asia</b> – Myanmar, Vietnam, Pacific – Timor Leste, <b>East Africa</b> – Kenya, Tanzania, Ethiopia, <b>West Africa</b> – Mali, Senegal, Ghana	Mostly new		Climate Action

**Table 33. One Health Area of Work Proposed Activities linked to TOC outputs and geographies, and linked bilaterals and Science Programs/Accelerators**

Activity	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
1	<p>Reducing farm-level antimicrobial resistance risks in livestock and aquatic farming systems</p> <p>Accurately quantify AMU and assess the quality of antimicrobials and vaccines, focusing on substandard products. Investigate socioeconomic, cultural, and systemic drivers of AMU, and implement risk-based, cost-effective interventions. Evaluate biosecurity and vaccination strategies to reduce disease prevalence and AMU, and conduct cost-benefit analyses of AMR mitigation efforts.</p>	3.1	<b>East Africa</b> - Ethiopia, Kenya, Uganda; <b>Southeast Asia</b> - Vietnam; <b>South Asia</b> - Bangladesh	Continuing	<p>Fleming Fund Country Grant for Kenya, Phase 2</p> <p>Antimicrobial Resistance and One Health, including Animal Health, the Environment and Practitioner Engagement (AMROH) Eastern and Southern Africa (ESA)</p> <p>Climate-Resilient Aquaculture Systems for Africa</p>	Better Diets and Nutrition Scaling for Impact
2	<p>Evidence-based approaches for zoonoses prevention and control</p> <p>Conduct epidemiological studies and use simulation models to design, deploy, and evaluate disease control measures in various animal and aquatic food production systems, including wild meats.</p>	3.2	<b>East Africa</b> - Ethiopia, Kenya, Uganda; <b>West Africa</b> – Côte d'Ivoire; <b>Southeast Asia</b> - Vietnam	Continuing and new	<p>One Health Research, Education and Outreach Centre for Africa</p> <p>Capacitating One Health in Eastern and Southern Africa</p> <p>Improving human health through sustainable value chains in human-animal-environmental interactions using ICT in Vietnam</p> <p>Climate-Resilient Aquaculture Systems for Africa</p> <p>Asia-Africa BlueTech Superhighway Project</p>	Better Diets and Nutrition Scaling for Impact, Multifunctional Landscapes

Activity	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
3	<p>Safer food and nutrition</p> <p>Assess the impacts of foodborne diseases, including bushmeat, on risk, gender, animal welfare, and environment. Scale and institutionalize interventions in informal markets with government partners, strengthen national food safety groups, evaluate economic impacts of safety measures, test food safety technologies, and collaborate with international agencies to support pro-poor policies.</p>	3.3	<b>East Africa</b> - Ethiopia, Kenya; <b>West Africa</b> – Côte d'Ivoire; <b>Southeast Asia</b> – Vietnam; <b>South Asia</b> -India	Continuing	<p>Capacitating One Health in Eastern and Southern Africa</p> <p>One Health Research, Education and Outreach Centre for Africa</p>	<p>Better Diets and Nutrition</p> <p>Scaling for Impact</p> <p>Future Frontiers and Security</p>
4	<p>Operationalizing One Health and scaling</p> <p>Compare health outcomes and the cost-effectiveness of joint versus traditional service delivery models. Develop indicators to measure the social and environmental impacts of One Health Initiatives. Conduct studies to identify factors that contribute to successful One Health implementation.</p>	3.4	<b>East Africa</b> - Ethiopia, Kenya; <b>Southeast Asia</b> – Vietnam; <b>South Asia</b> -India	New	<p>Improving human health through sustainable value chains in human-animal-environmental interactions using ICT in Vietnam</p> <p>Asia-Africa BlueTech Superhighway Project</p>	Multifunctional Landscapes
5	<p>Integrating environment into One Health</p> <p>Monitor and model antimicrobial resistance (AMR) and pathogen pollution in watersheds, assess risks and survey specific settings. Perform cost-effectiveness analysis before</p>	3.5	<b>East Africa</b> - Ethiopia, Kenya; <b>West Africa</b> – Ghana; <b>Southeast Asia</b> - Vietnam; <b>South Asia</b> - India	Continuing	<p>Climate-Resilient Aquaculture Systems for Africa</p> <p>Asia-Africa BlueTech Superhighway Project</p>	<p>Multifunctional Landscapes</p> <p>Future Frontiers and Security</p>

Activity	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
	implementing mitigation strategies for AMR, manure, and aquaculture waste in water and soil.					
6	<p>Ensuring Gender equity in One Health</p> <p>To integrate the data and insights of the AoW “SAAF Gender, Youth and Social Inclusions”, in particular, their gender in One Health research framework</p>	3.6	<b>East Africa</b> - Ethiopia, Kenya; Uganda; <b>Southeast Asia</b> - Vietnam; <b>South Asia</b> - India	Continuing		

**Table 44. Markets Systems, Policies and Scaling Area of Work proposed activities linked to TOC outputs and geographies, and linked bilaterals and science Programs/Accelerators.**

Activity	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
1	SAAF information gap assessment and market system diagnosis	4.1	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New		Digital Transformation Scaling for Impact
2	Design and development of SAAF market data tools	4.1	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing		Digital Transformation
3	Studies to understand uptake of data innovations and policy integration	4.1 4.5	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing		Scaling for Impact Policy
4	Identification of market and policy needs for decision support tools	4.2	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New		
5	Co-design and test of decision support tools innovations	4.2	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing		
6	Studies to understand the uptake of decision support tools and policy integration	4.2 4.5	<b>Starting with countries with operational DSTs in 2025:</b> <b>East Africa</b> - Ethiopia, Kenya; <b>West Africa</b> - Ghana; <b>Southeast Asia</b> - Cambodia, Myanmar	New		Scaling for Impact Policy

Activity	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
7	Behavioral studies for uptake of SAAF innovations	4.3	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing		
8	Impact assessments for uptake of SAAF innovations	4.3 4.5.	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing	Asia-Africa BlueTech Superhighway Project	Scaling for Impact Policy
9	Studies to understand policy barriers to inclusive and efficient growth of AAF sectors	4.4.	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing		Policy
10	Co-design and test of engagement processes for effective AAF systems	4.4	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia	New and continuing	CGIAR Livestock Partnership - Policy Options for Livestock  Asia-Africa BlueTech Superhighway Project  CGIAR Livestock Partnership - Global Livestock Advocacy for Development	Policy
11	Assessment of the sustainability and effectiveness of AAF policies, investment plans and governance processes, policy integration and scaling	4.4 4.5	<b>East Africa</b> - Ethiopia, Kenya, Tanzania, Uganda; <b>West Africa</b> - Mali, Nigeria, Ghana; <b>Southern Africa</b> - Zambia; <b>Southeast Asia</b> - Cambodia, Myanmar, Vietnam; <b>South Asia</b> - Bangladesh, India, Nepal; <b>Latin America</b> - Colombia			Scaling for Impact Policy

**Table 5. Gender Youth and Social Inclusion Area of Work proposed activities linked to TOC outputs and geographies, and linked bilaterals and science Programs/Accelerators**

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
1	Designing new and refining existing tools to conduct research and assess the impact of interventions	5.2	Global	New and continuing	Asia-Africa BlueTech Superhighway Project Climate-Resilient Aquaculture Systems for Africa Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa Technologies for African Agricultural Transformation Phase II CGIAR Livestock Partnership - Gender	Gender Equality and Inclusion Accelerator
2	Diagnostic analysis on structural (formal and informal) barriers and aspirations for women and youth in livestock and fish systems, also in fragile contexts (e.g. conflict, climate hot spots); including baselines on empowerment and norms	5.1	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>Southern Africa-</b> Zambia; <b>South Asia-</b> Bangladesh; and <b>Southeast Asia-</b> Vietnam.	New	Asia-Africa BlueTech Superhighway Project Climate-Resilient Aquaculture Systems for Africa Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa Technologies for African Agricultural Transformation Phase II CGIAR Livestock Partnership – Gender	Gender Equality and Inclusion Accelerator
3	Co-designing and testing of empowerment interventions – based on various livelihood diversification activities for women and youth (including social protection) - addressing structural	5.4	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>North Africa-</b> Tunisia; <b>South Asia-</b> Bangladesh; and <b>Southeast Asia-</b> Vietnam.	New and continuing	Asia-Africa BlueTech Superhighway Project Climate-Resilient Aquaculture Systems for Africa	Gender Equality and Inclusion accelerator

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
	constraints faced by women and youth in livestock and fish systems				Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Sahara Africa  Technologies for African Agricultural Transformation Phase II  CGIAR Livestock Partnership – Gender	
4	Co-designing and testing of transformative interventions that address restrictive gender and youth norms.	5.3	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>North Africa-</b> Tunisia; <b>South Asia-</b> Bangladesh; and <b>Southeast Asia-</b> Vietnam.	New and continuing	Asia-Africa BlueTech Superhighway Project  Climate-Resilient Aquaculture Systems for Africa  Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Sahara Africa  Technologies for African Agri Transformation Phase II  CGIAR Livestock Partnership - Gender	Gender Equality and Inclusion Accelerator
5	Co-design and testing of youth employment opportunities through AAF Systems	5.3	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>South Africa-</b> Zambia; and <b>Southeast Asia-</b> Vietnam.	New	Asia-Africa BlueTech Superhighway Project  Climate-Resilient Aquaculture Systems for Africa  Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Sahara Africa  Technologies for African Agri Transformation Phase II  CGIAR Livestock Partnership – Gender	Gender Equality and Inclusion Accelerator

<b>Act</b>	<b>Title/Description</b>	<b>TOC Output</b>	<b>Geography</b>	<b>New or Continuing</b>	<b>Linked Bilateral Projects</b>	<b>Linked Science Programs / Accelerators</b>
6	Integration of gender considerations in the Livestock Master Plan	5.3	<b>West Africa-</b> Nigeria	Continuing	CGIAR Livestock Partnership - Gender	
7	Engagement with policymakers to progress toward gender and youth equality.	5.3	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>North Africa-</b> Tunisia; <b>South Asia-</b> Bangladesh; and <b>Southeast Asia-</b> Vietnam.	New and continuing	Asia-Africa BlueTech Superhighway Project Climate-Resilient Aquaculture Systems for Africa  Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa  Technologies for African Agri Transformation Phase II  CGIAR Livestock Partnership - Gender	
8	Collaboration with the other AoW to develop STIBS that are gender and youth-responsive. .	5.4	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>South Africa-</b> Zambia; and <b>Southeast Asia-</b> Vietnam.	New and continuing	Asia-Africa BlueTech Superhighway Project  Climate-Resilient Aquaculture Systems for Africa  Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa  Technologies for African Agri Transformation Phase II  CGIAR Livestock Partnership - Gender	Gender Equality and Inclusion Accelerator

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
9	Endlines to assess the impact of social interventions in tandem with technical interventions (STIBS) on empowerment and equality	5.4	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>South Africa-</b> Zambia; and <b>Southeast Asia-</b> Vietnam.	New	Asia-Africa BlueTech Superhighway Project Climate-Resilient Aquaculture Systems for Africa Development & Scaling of Sustainable Feeds for Resilient Aquatic Food Systems in Sub-Saharan Africa Technologies for African Agri Transformation Phase II CGIAR Livestock Partnership - Gender	
10	Meta-analysis on the performance of STIBs across commodities and countries to identify the ones that can best lead to more equality.	5.4	<b>East Africa-</b> Kenya, Ethiopia, Tanzania; <b>West Africa-</b> Ghana/Nigeria; <b>South Africa-</b> Zambia; and <b>Southeast Asia-</b> Vietnam.	New		
11	Study the scaling of equity-enhancing interventions	5.4	<b>East Africa-</b> Kenya, Tanzania; <b>West Africa-</b> Ghana; <b>South Africa-</b> Zambia	New and continuing		Scaling partners

**Table 6. Data & Digital Area of Work proposed activities linked to TOC outputs and geographies, and linked bilaterals and science programs / accelerators**

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
1	Country Level Landscape Studies  Country level studies of Animal and aquatic food systems (AAF systems) to understand digital and data usage, needs, and baselines	6.1 6.3	<b>East Africa</b> - Kenya, Ethiopia; <b>South Asia</b> – India; <b>South East Asia</b> – Vietnam; <b>West Africa</b> - Senegal; <b>South America</b> - Colombia	Continuing	Africa Asia BlueTech Superhighway	
2	Integrating and expanding existing data sources  Standardized, expand, and integrate existing data platforms (e.g. FishBase)	6.3 6.4	<b>East Africa</b> - Kenya, Ethiopia, Tanzania; <b>Southern Africa</b> – Mozambique; <b>South Asia</b> – India; <b>South East Asia</b> - Timor-Leste; <b>West Africa</b> -Senegal; <b>South America</b> - Colombia	Continuing	Africa Asia BlueTech Superhighway	
3	AAF systems index development  Setup an expert community group to design, develop, and collect data for AAF systems indices	6.3 6.5	<b>East Africa</b> - Kenya, Ethiopia, Tanzania; <b>Southern Africa</b> – Mozambique, <b>South Asia</b> - India, <b>South East Asia</b> -Vietnam, <b>West Africa</b> - Senegal	New		
4	Co-creation of dissemination tools  Design and development of ICT tools, including the design, development, and testing through participatory approaches (workshops, FGD), and prototyping digital platforms.	6.2	<b>East Africa</b> - Kenya, Ethiopia, <b>South Asia</b> - India, <b>West Africa</b> - Senegal, <b>South East Asia</b> - Vietnam	Continuing	Africa Asia BlueTech Superhighway	Digital Transformation Accelerator
5	Digital tools and Data assessment needs  Studies to understand country level data management protocols, storage, and privacy protection	6.1 6.5	<b>East Africa</b> – Tanzania; <b>Southern Africa</b> – Mozambique; <b>South East Asia</b> – Vietnam; <b>South Asia</b> – India; <b>East Africa</b> - Kenya	New		Digital Transformation Accelerator

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
6	SAAF cross-cutting digital platform integration  Protocols and tools to integrate digital and data solutions across work areas	6.1 6.2	Global	New		
7	Evidence for resilient agriculture  A detailed ontology and meta-dataset describing the context, management and outcomes of livestock experiments.	6.3 6.5	Global	Continuing		Climate Action, Sustainable Farming
8	Digital tools for scoring credit risk and financial inclusivity  Continued development and evaluation of climate-linked credit scoring across a broader range of systems, farmer typologies, and (M)FI partners.	6.2 6.3	<b>South America – Colombia; East Africa – Kenya; Southern Africa - Zambia</b>	Continuing		Climate Action, Catalyzing Impact
9	Digital citizen science for improving the availability and accessibility of AAF systems data  Existing citizen science tools using citizen science approaches will be improved or new ones deployed to enhance the availability of data for AAF systems and make it FAIR as well as AI-ready	6.2	<b>East Africa - Kenya, Ethiopia</b>	Continuing		Climate Action, Digital Transformation

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
10	Digital Livestock Climate Advisory Services  Develop or strengthen tools (including AI-enabled) and models that translate, tailor to user needs, and disseminate climate and weather data into actionable climate services for fishers, livestock keepers and herders.	6.2	<b>South Asia – India; East Africa – Kenya; West Africa – Senegal; South America - Colombia</b>	Continuing	CGIAR Livestock Partnership - African Dairy Genetics Gains	Climate Action, Digital Transformation, Catalyzing Impact
11	Data analytics, AI for tradeoffs and AAF systems decision support tools  Develop, test and deploy user-centric and gender-inclusive decision support tools based on data analytics, AI and other latest techniques to improve productivity, health and income of smallholders in AAF systems	6.5	<b>East Africa – Kenya; Southeast Asia – Vietnam; South Asia - India</b>	Continuing	CGIAR Livestock Partnership - African Dairy Genetics Gains  Improving human health through sustainable value chains in human-animal-environmental interactions using ICT in Vietnam	Climate Action, Digital Transformation
12	Digital AAF systems Livestock COPs and collaboration mechanisms  Establish and facilitate a Community of Practice (COP) for researchers and practitioners of digital innovations in AAF systems and co-create DPI concept for AAF systems	6.3	<b>East Africa – Kenya; Southeast Asia – Vietnam; South Asia - India</b>	new		Digital Transformation

Act	Title/Description	TOC Output	Geography	New or Continuing	Linked Bilateral Projects	Linked Science Programs / Accelerators
13	Digital innovations in livestock insurance for improving design and reducing transaction costs  Continued development of data infrastructure, AI/ML modeling approaches, and software systems for improving livestock insurance schemes with public and private stakeholders.	6.2	East Africa - Kenya	Continuing		Climate Action

**Table 7. Illustrative partners who may receive pooled funding budget**

Country	Illustrative key partners who may receive pooled funding budget
Bangladesh	<b>NGOs, cooperatives:</b> NGO Forum for Public Health; Bangladesh Fisheries Research Institute (BFRI)
Cambodia	<b>Agriculture Research Institutes and academia:</b> Inland Fisheries Research and Development Institute (IFReDI); Institute of Technology of Cambodia (ITC)
Colombia	<b>NGOs, cooperatives:</b> Ganaderia Sonstensible, Fundación Ecotonos
Côte d'Ivoire	<b>NGOs, cooperatives:</b> Centre Suisse de Recherche Scientifique en Côte d'Ivoire, One Health Platform of Côte d'Ivoire (Plateforme Une Seule Santé (PLUSS))
Egypt	Central Laboratory for Aquaculture Research, feed companies (Skretting) and fish farmer association
Ethiopia	<b>Government and para-governmental entities:</b> Addis Ababa Water and Sewerage Authority, Institute of Animal Health, Regional Agricultural Research Institutes (ARARI, OARI, SARI, SWEARI, TARI), Universities; Private partner: AbacusBio, <b>livestock services delivery agents;</b> Civil Society Organization: Women Empowerment (WE)- Action,
Ghana	<b>Agriculture Research Institutes and academia:</b> Council for Scientific & Industrial Research - Water Research Institute (CSIR-WRI); University of Ghana <b>Government and para-governmental entities:</b> Fisheries Commission <b>Private entities:</b> CowTribe

Country	Illustrative key partners who may receive pooled funding budget
	<b>NGOs, cooperatives:</b> CARE;
Guatemala	<b>NGOs, cooperatives:</b> Comite de ganaderos de Izabal, YAPU solutions
India	<b>Agriculture Research Institutes and academia:</b> Indian Council of Agricultural Research; <a href="#">Indian Institute of Technology Roorkee</a> <b>Private entities:</b> Crea2Sol <b>NGOs, cooperatives:</b> Farmer Groups; The agri collaboratory
Kenya	<b>Agriculture Research Institutes and academia:</b> Kenya Agriculture and Livestock Research Organization; Kenyan Marine Fisheries Institute <b>Government and para-governmental entities:</b> Kenya Meteorological Department; <b>Private entities:</b> Kuza Biashara; <b>NGOs, cooperatives:</b> Farmer groups; Mercy Corps; Ripple Effect
Malaysia	University Science Malaysia, Department of Fisheries, The Universiti Malaysia Terengganu, Malaysia Fisheries Society
Mali	<b>Government and para-governmental entities:</b> Mali-Meteo; Institute of Rural Economy (IER), Central Veterinary Laboratory (LCV)
Myanmar	<b>NGOs, cooperatives:</b> Myanmar Fishery Federation; Mercy Corps; Hope Putao <b>Private entities:</b> KT Feed Mill Co., Ltd.; Fresh Studio
Nepal	<b>Government:</b> National Animal Breeding and Genetics Research Centre, Department of Livestock Services, Ministry of Agriculture and Livestock development
Nigeria	<b>Agriculture Research Institutes and academia:</b> Departments of fisheries, Lagos State University, University of Ibadan, Nigeria Institute of Oceanography and Marine Research, local feed mills and hatcheries, Aquaculture Association of Nigeria
Senegal	<b>Government and para-governmental entities:</b> Agence Nationale de l'Aviation Civile et de la Météorologie; L'Agence Nationale de Conseil Agricole et Rural <b>Private entities:</b> Jokolante
Solomon Islands	<b>Aquaculture and Fisheries Divisions of the Ministry of Fisheries and Marine Resources</b> , Aquaculture and Fisheries Association of Solomon Islands
Tanzania	<b>Agriculture Research Institutes and academia:</b> Tanzania Agriculture and Livestock Research Institute TALIRI <b>NGOs, cooperatives:</b> Shujaaz
Timor Leste	Department of Fisheries of the <b>Ministry of Agriculture and Fisheries</b>
Tunisia	<b>Government:</b> National Institute of Agronomic Research of Tunisia, INRAT
Uganda	<b>NGOs, cooperatives:</b> Ripple Effect
Vietnam	<b>Agriculture Research Institutes and academia:</b> National Institute of Animal Science of Vietnam; Vietnam National University of Agriculture <b>Government and para-governmental entities:</b> Provincial and district-level governments; <b>NGOs, cooperatives:</b> Farmer groups; Vietnam Women's Academy;
Zambia	<b>Government and para-governmental entities:</b> Zambia Meteorological Department; Water Resources Management Authority (WARMA); SmartZambia, Department of Fisheries <b>NGOs, cooperatives:</b> Youth for Ecosystem Restoration, Natural Resources Development College, Musika Zambia, Aquaculture Association of Zambia, Aller Aqua Zambia

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