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Adaptation Research Alliance

Food system research priorities in the context of climate change

CHAIR'S SUMMARY | CONSULTATION FINDINGS | NOVEMBER 2021



Canada

About the Adaptation Research Alliance



The [Adaptation Research Alliance](#) (ARA) brings together funders, researchers, and practitioners to catalyse increased investment in action-oriented research, providing a common platform for planning research and its uptake. It builds on the United Nations [2019 Call for Action on Adaptation and Resilience](#) and is intended to provide the pioneering science and technical expertise to inform and underpin the work of the Adaptation Action Coalition. To date, over 110 organizations across 40 economies have joined the Alliance.

About the International Development Research Centre



Part of Canada's foreign affairs and development efforts, [the International Development Research Centre \(IDRC\)](#) invests in knowledge, innovation, and solutions to improve lives and livelihoods in the developing world. [IDRC is an ARA member.](#)

About Inclusive Innovation



[Inclusive Innovation](#) delivers workshops focused on topics aligned with the [UN's Sustainable Development Goal](#) mission of bringing 'peace and prosperity for people and the planet, now and into the future'. An international team of facilitators design and deliver interactive and engaging meetings, workshops, and other events that facilitate novel and unexpected ways to solve complex challenges.

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Smallholders in their field in Haranahalli village, India.

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Executive Summary

As a member of the [Adaptation Research Alliance](#) (ARA), the [International Development Research Centre \(IDRC\)](#) is working with the Alliance Secretariat to oversee a consultative process to ground the perspective of action-oriented research within a set of themes. The aim is to surface opportunities for cooperation, the barriers to action research, and how the Alliance can act on these.

Over September and October 2021, IDRC hosted a two-part consultation on food systems, consisting of a survey and virtual consultation, to surface priorities and recommendations for action research in adapting food systems. This report summarizes the findings from that consultation. In addition, IDRC will prepare a summary as an input to the [UN Food Systems Summit follow-up Independent Dialogues process](#).

Healthy, sustainable, and equitable food systems are essential for food security, and highly sensitive to the impacts of climate change. They also have the potential to play a key role in mitigating and adapting to climate change. Seven priority areas related to food systems were identified in this consultation, and are presented in detail in this summary:

- Transforming food systems
- Transitions toward agroecology
- Supporting healthy and sustainable diets
- Justice, equality, and inclusion in food systems
- Supporting the resilience of smallholder farmers
- Anticipatory planning for climate risk in food systems
- Reducing emissions in food systems

Of these seven priorities, six were deliberated on in the workshop. While nearly 42 potential action research areas were identified for reducing emissions in food systems, no participants selected it as their preferred topic for group discussion. Barriers, opportunities for action, and the need for collaboration in each of these priority areas are detailed in Section 2 of this summary, and summarized in table format in Annex B.

In chairing the consultation, IDRC notes that transforming food systems is very broad and requires tackling aspects of all the other priorities that were identified. As a result, discussions around this priority focussed on the role of multi-stakeholder governance and cooperation across sectors in scaling innovations and increasing transparency and equitable participation in value chains. Other overlapping areas that were highlighted during the consultation include that several priorities link with agroecology, and justice, equality and inclusion must be seen as cutting across all the other priorities. This highlights the need to think holistically, rather than addressing each priority as a silo.

The consultation also noted the absence of some important priorities, including a focus on how we might transform food systems through a better understanding of market demands for increased protein (in particular, meat), and a focus on economic incentives to move towards agroecology.

Cross-cutting observations for the ARA to consider include:

- the enormous scale and cost of adapting food systems in the context of climate change, which will demand considerable investment and a transformation in thinking;
- the need to consider the pros and cons and ideal circumstances for international collaboration, taking into account that adaptation is essentially local and that collaboration carries transaction costs in terms of time and effort to coordinate action research across diverse actors;
- a request that the Alliance document and share the learning from across different research collaborations and experiences;
- the urgent importance of understanding and communicating risks and uncertainties, and using risk assessments for decision-making - as a starting point for every project; and
- the need to think holistically, rather than addressing each priority as a silo.

In chairing this consultation, IDRC notes its value in exploring which priorities best lend themselves to action research, and which require collaboration. It will nonetheless be important for the ARA to also draw from evidence reviews in designing its research support agenda.

1. What we set out to achieve

In September and October of 2021, the International Development Research Centre (IDRC) hosted a consultation to surface priorities and recommendations for action research in adapting food systems. As a member of the Adaptation Research Alliance (ARA), IDRC is working with its Secretariat to oversee a consultative process to ground the perspective of action-oriented research within a set of themes. The aim is to identify barriers to action and opportunities to overcome them through collaboration across disciplines and stakeholder groups — and how the Alliance can seize these opportunities.

This summary encapsulates the fresh thinking on food systems research surfaced by nearly 40 survey respondents and 23 workshop participants in the course of this consultation. It serves as an input to help inform forthcoming research calls related to climate-resilient food systems, and to jumpstart further sessions designed to co-create new projects and programs.

This consultation on food systems is part of a wider consultative process within ARA. Other topics being explored include:

- Gender Equality and Social Inclusion (organized by IDRC)
- Global Health (organized by Public Health England and the Red Cross and Red Crescent Climate Centre)
- Climate Risk Assessments in Least Developed Countries (organized by the University of Cape Town)

2. Emerging action research priorities

Here, we present the main consultation findings for each of the seven action research priority areas surfaced through the consultation. Note that summary tables for each of these areas can be found in Annex B.

How to transform food systems

Focus: *The role of multi-stakeholder governance and cooperation across sectors in scaling innovations and increasing transparency and equitable participation in value chains*

Why is this important?

Transforming innovation systems to deliver impacts at scale and making knowledge and innovation more accessible and actionable to farmers should be a priority. Research in this area would accelerate the deployment of demonstrated technologies and shed light on innovative financing mechanisms to scale new approaches and harness the power of the private sector. We need to better understand how to shift power dynamics and the status quo to transform food systems. Understanding the impacts of this bundling approach is vital for building systemic resilience against climate.

Barriers

Research and innovation organizations tend to focus on their own incentives more than on impact and the need for system transformation. Food systems are undermined by protectionist trade practices and transformation of these systems is hindered by inequalities such as racism and a failure to build on the agency of the most vulnerable. There is also inadequate funding for shared learning among various actors.

Opportunities for action

The consultation surfaced 33 opportunities that can be characterized as a set of approaches to exploring food system transformation that focus on the drivers, process and intended “destination” of transformation.

1. Understand the different motivations, drivers, incentives of different food system actors - and those of researchers - and test key leverage points for changing these incentives. For example:

- Explore market incentives to support national exports that use sustainable practices.
- Develop guidelines for large supermarkets around minimum share of local supply.
- Direct market linkage to reduce food prices and reduce the exploitation of small farmers (such as by eliminating intermediaries or creating cooperatives that will increase farmers’ bargaining power).

2. Ensure the PROCESS of transformation is participatory, and that stakeholders, including underrepresented groups (indigenous communities, women, smallholder farmers, low-income households) are aligned to address the root causes of systemic problems. This entails:

- Research that adopts a systematic perspective, doesn't reproduce power inequalities, and values local, traditional, and Indigenous knowledge; and
- Research on the best ways to link farmers (and other often ignored groups of producers such as pastoralists and urban/peri-urban farmers), businesses, governments, and donors to work in the same direction despite their different motivations, drivers, and decision-making processes.

3. Clarify the “destination” - what should we be aiming for in new food systems? Focus on what would bring about a climate resilient and food secure future for all, in each specific context and globally. This includes:

- Understanding the trade-offs (such as between adaptation and mitigation, or between food security and food sovereignty) and context specificity, acknowledging that there are different types of farmers and therefore different pathways for transformation; and
- Socializing narrative on what it takes to transition to a healthy and sustainable food system, such as reducing meat and unhealthy food consumption; improving environmental regulation in agriculture; engaging all of society; and adopting a wholesale ‘end-to-end’ approach across food systems, from ‘farm to fork’.

Why collaborate?

The goal of transformation is a huge challenge with powerful resistance, which demands collective effort to address. A diverse range of food system actors - smallholders, large commercial farmers, transporters, food processors, farmer cooperatives, consumer associations, etc. - all need to be engaged in developing a research agenda and action plan.

There is a need to:

- align on advocacy for new incentives to engage researchers in action-oriented research, and
- share lessons on leverage points to change incentives for food system actors to enable transformation.

There are few established processes for aligning so many actors at once, so we need to encourage experimentation and sharing on what works and what doesn't. This includes focusing on governance to ensure alignment among many actors and their genuine inclusion and empowerment through these processes.

A collective effort is also the only way to address the high risks and impacts of climate change. Trade-offs will be pervasive, and having a consistent global message/dialogue about them may help prevent them from being used as excuses for inaction.

Whenever there is a high degree of context specificity, it's important to see if general principles emerge across diverse contexts, as these can help accelerate action. Only a large alliance/consortium can gather and synthesize all this information.

“Local action and global activism are equally important. Can ARA bring them together?”

Observations on this priority

A number of participants observed a lack of clarity in the framing of this priority, with the need to specify what kind of transformation was desired or intended, and where it was headed. They also noted a lack of consistency between the priority (which focused on governance and cooperation) and the barriers identified.

How to transition toward agroecology

Focus: *Practical research to identify the conditions and drivers to achieve the agroecological transition needed to contribute to soil regeneration and food systems that are more sustainable, equitable and climate resilient.*

Why is this important?

Agroecology has the potential to contribute to both adaptation and mitigation of climate change; it would enhance food security at the national level while promoting greater inclusion by benefiting smallholder households and indigenous small producers.

Barriers

There is entrenched political and commercial support for industrial agriculture and a lack of a shared or accepted understanding of the value or conceptualization of agroecology.

Opportunities for action

Building on a total of 30 opportunities for action identified through the survey and virtual workshop highlighted the need for funding to support alliances that would broadly engage around the urgent need to shift towards agroecological production, given its contribution to both human resilience (through nutrition, health and social benefits) and natural resilience (preserving soils, biodiversity, and ecosystem services).

As part of this paradigm shift, national policies need to promote climate resilient and sustainable food systems, rather than focusing only on for-profit commercialisation of food products. Within the research and policy community, there is a need to build consensus around the central principles of agroecology, getting past the terminology to reduce polarization. To support transition at the farm level, a focus on research-into-use opportunities, such as integrating agroecological production within extension services, will help farmers apply new knowledge and techniques. At the popular level, there is a need to promote collective action and education demanding healthier and sustainable diets.

Research must be transdisciplinary and participatory, ensuring leadership from marginalized groups. This may be advanced through collaboration with agroecological and food sovereignty-focused civil society movements around the world, such as Via Campesina, the Alliance for Food Sovereignty in Africa, and IFOAM Organics.

In terms of research focus areas, the consultation surfaced a number of opportunities, including:

- developing monitoring and accountability systems (including development of metrics) that track health and environmental outcomes of food system policies;
- protecting local knowledge, seed biodiversity, plant genetic resources through farmer seed exchanges, and participatory technology development;
- generating evidence on the economic advantages of agroecology, and developing business models to make the case for agroecology at scale; and
- understanding agroecology trade-offs (and potential 'triple wins') for people, nature, and climate in LDCs with context-specific evidence.

Why collaborate?

Participants outlined the need to work together with different stakeholders, including the private sector, to achieve a paradigm shift. This would entail a focus on economic drivers, education processes, and advocacy to shift people's current relationship with the earth. Alliances – with civic organizations, b-corps, etc. – would aim to promote learning and socialization to engage producers and consumers around the health and environmental effects of our food production systems.

“Since this agenda is inherently political and confronts existing power structures, [we] need to [...] use our collective strengths and perspectives to enable this shift in thinking, investment, governing, and being in the world.”

How to support healthy and sustainable diets

Focus: *Incentives for healthy consumption patterns of sustainably produced food, including plant-based food and low agrochemical inputs*

Why is this important?

The consultation highlighted the health and environmental advantages of a plant-based diet and the potentially high impact of wide-scale adoption of more sustainable and health diets.

Barriers

Along with the challenge of establishing links between specific dietary changes and climate resilience, efforts are needed to overcome entrenched dietary norms and investment patterns. This is compounded by the cultural nature of food consumption and the fact that shifting diets entails changing all parts of the food system. As with other priority areas, achieving buy-in and the political will for change will be key challenges.

“[We] need more focus on the people, the agents of change, rather than on the agrobiological system.”

Opportunities for action

A total of 43 opportunities were identified, focusing largely around four key areas of potential action:

1. Institutional procurement

There is a need to build on existing interventions to ensure that procurement programs (such as for school food) meet the joint goals of enriching diets and sourcing food sustainably. This is very relevant for Asia and Africa. To achieve the desired outcomes, the type and effectiveness of delivery mechanisms are important, as is proper implementation. Given potential commercial interest in procurement programs, these must be designed with care to ensure the desired nutritional and environmental

outcomes. It will be important to research the effectiveness of program design and consider carefully which food system actors need to be included. For equity purposes, decision-making cannot involve only government officials or private businesses, but must also include community representatives - particularly those who are food insecure.

2. Food policy bundle (including taxes, subsidies, labelling, marketing regulation)

This focal area would aim to create a more enabling policy and regulatory environment – helping to shape demand for more sustainable and healthy diets while also addressing supply-side factors. It may involve, for example, dismantling elements of trade agreements that undermine the competitiveness of sustainable local farmers. The objective is to have macro-level regulatory and economic policy tools that would influence the consumption and supply of not only food products, but also carbon emissions and agricultural inputs (fertilizers, water, and land). This would make the resource allocation in food systems more environmentally sustainable and improve health and equity outcomes. The aim would be to make unhealthy and unsustainable products more expensive than healthy sustainable foods.

3. Building narratives that support a shift to healthy, sustainable diets

Addressing food insecurity, dietary quality, and environmental sustainability requires multi-sectoral action and negotiating trade-offs (such as between the returns to farm labour and profits for private enterprise, and between food quality and prices). Given the many actors and their incentives, standard critiques that delay action - such as the cost of transitioning to healthy diets and the potential impact on private industry of regulations - can be barriers to change. These need to be countered by creating narratives on why and how to make the shift to healthy sustainable diets (such as by illustrating the co-benefits for environment and health, and opportunities to increase wages for low-income food system workers). Such narratives can help create an incentive structure to shift industry practices for farmers, agri-business, and vendors towards better nutritional and ecological outcomes. Creating these narratives will require support for advocacy and civil society mobilisation, including through investigative journalism that exposes the powerful interests that support unhealthy food systems and reports on the health, economic, and environment impacts of industrial agriculture.

4. Increasing the diversity of food sources (including traditional and local and sustainable foods)

Multiple food systems can co-exist. We need to expand the reach of food systems that incorporate diverse food sources while addressing food insecurity and ensuring food accessibility, availability, and affordability - which all depend on well functioning global value chains. Increasing this diversity demands understanding the mechanisms for change - how, for instance, increasing the supply of a particular crop involves trade-offs between farmer incomes, land use, and dietary diversity. It also requires understanding the political economy of the relevant food system and how the integration of global food value chains interacts with requirements for ensuring food sovereignty. Bringing consumers closer to local producers, such as through community-supported agriculture and support for consumer cooperatives, may also help to increase consumer access to local sustainable foods. This issue is thematically interlinked with agroecology.

Why collaborate?

The concept of sustainability needs to be understood as encompassing both environmental and socio-economic sustainability. For example, we need to understand and negotiate the trade-offs between low-

cost, nutritious food and incomes from farming. There are links here to other priority research areas, including justice and inclusion and food system transformation, so several disciplines and stakeholder groups must be involved.

The discussion on policy and regulatory approaches exemplifies the value of transdisciplinary collaboration, given the need to understand and negotiate trade-offs such as “cheap healthy food” vs “viable incomes for farmers”. There is also debate on the effectiveness of information campaigns for shifting consumption patterns vs the effectiveness of shifting relative prices (pricing unhealthy foods to be more expensive than healthy foods).

How to promote justice, equality, and inclusion in food systems

Focus: *Combatting food insecurity for vulnerable groups and supporting collective action for food sovereignty and more equal access to healthy and sustainable food for all*

Why is this important?

This is a cross-cutting priority that intersects with all other areas for action research on food systems, and is instrumental to advancing progress on the sustainable development goals (SDGs). The Intergovernmental Panel on Climate Change (2019) finds that empowering and valuing women increases their capacity to improve food security has a multiplier effect, contributing to poverty reduction, food security, and better nutrition for families and whole communities.

Barriers

The lack of land rights for women and Indigenous people and entrenched gender norms and power inequalities are barriers to more just and inclusive food systems. There is an absence of political will to tackle the persistent exclusion of marginalized groups, who have limited ability to organize to better access finance and opportunities for productive activities.

Opportunities for action

The consultation surfaced 29 opportunities which, through discussion, crystallized around three key research opportunities:

1. Address how research is carried out in food systems for more inclusive and just outcomes.

This entails engaging all actors in the food system, including women and marginalized groups, through a highly collaborative approach — building coalitions and collective action through the research process itself. This includes an emphasis on rights-based approaches.

- Support research that drives and scales collective action and resilience practices, such as by linking researchers to civil society groups working on food sovereignty (among other areas), and explore ways to incentivize food producers to embrace resilience and nutrition rather than only mass production.

- Understand the behavioural factors that underpin social change processes, such as by focussing on knowledge translation, engaging youth, and improving education on climate change and food systems.
- Intentionally integrate justice, equity, and decolonizing lenses into every stage of research to drive food system transformations that support the most vulnerable.
- Prioritize transdisciplinary and participatory research that combines traditional, local, and Western knowledge systems.

2. *Link social policy goals and related support measures (such as social safety nets and access to finance) to climate and agricultural policy through incentives.*

- Focus incentives for transforming food systems on tackling the root causes of inequality. Such incentives might include, for example, measures that help overcome powerful business interests and ‘growth at any cost’ economic models, or that link local producers with community groups serving the vulnerable.
- Target subsidies to promote agroecological production that meets food, social, and ecological goals, and discourage environmentally harmful practices.
- Create voucher systems that link people with limited means to local food systems.

3. *Address the structural and systemic exclusion of marginalized groups, removing institutional and governance barriers they face, and increasing their access to and influence over decision-making.*

- Take a rights-based approach, including respect for the tenure and land claims of Indigenous groups.
- Move beyond action research toward a rights-based approach that prioritizes legal empowerment of marginalized groups. For example, entrench the right to a healthy environment in law, thereby providing legal recourse for marginalized people.
- Use education to inform grassroots groups pressuring elected leaders to shift policy.
- Integrate analysis of power relations into food systems research to reveal vested interests and engage influential actors in food system change.

Why collaborate?

Given the highly systemic nature of food systems and the many disempowered and marginalized actors along the value chain, the research process itself needs to support collective action and facilitate inclusion to enhance equitable outcomes.

Addressing the broader development agenda also demands connecting different actors and disciplines, and fostering collaboration among different policy actors (in finance, education, health, environment etc.) ARA members need to use their power and privilege to drive systemic change, generating evidence of examples where collective action has worked to improve equity, justice, and inclusion outcomes.

How to support the resilience of smallholder farmers

Focus: Promote locally produced and consumed food and increase the access of smallholder farmers to markets and to climate adaptation and mitigation options.

Why is this important?

Enhancing the welfare and resilience of smallholder farmers in the context of climate change is essential for food and nutrition security.

Barriers

In the context of climate change, smallholder farmers face lower crop yields which will challenge their capacity to produce food for local needs. Their adaptation and resilience are hampered by a lack of access to:

- finances (for marketing and consumer education, for accessing digital technologies and the training needed to use them);
- technical support for start-ups and food processing SMEs; and
- strategies to avoid food loss and waste.

Smallholders are often excluded from value chains. In an uneven playing field, where they must compete against much larger firms, they are also undermined by their lack of collective power. Among smallholders, specific groups such as pastoralists face additional challenges.

Opportunities for action

From a total of 34 opportunities identified, discussion focused on three key areas of potential action:

1. Help smallholder farmers access markets and grow their incomes.

Markets-related action research emerged as a critical opportunity to address this priority because it can facilitate smallholder farmers' access to markets, helping them grow their incomes and achieve both financial and food security.

Markets can be split into two research opportunities:

- institutional innovations in terms of how market actors, particularly smallholders, collaborate; and
- exploring what kinds of markets support different kinds of smallholder farmers. There is a wide range of types and scales in farming.

We can also explore what happens to markets and how they respond in crises, and how to support well functioning markets where transportation links are minimal, especially during and after crisis situations such as conflicts or climate-related disasters. Digital communications - particularly of market-relevant information (such as climate services, commodity prices, or market access information) – are increasingly important. It's also important to explore innovations to address value chain disruptions

considering the range of different market actors – including smallholders - affected by such disruptions. The needs of pastoralists, who are also producing important sources of food, are often ignored.

Research around markets should include a comprehensive and systemic approach to food production and distribution. Examples include food hubs and local food system platforms linking food production, transport, commercialization, and consumption. Smallholder farmers should also have access to climate advisories, early warning systems, and adaptive safety nets to reduce risks coming from climate variability and extreme events. Gender considerations are important to ensure the care burden and time poverty of women farmers are addressed to enable them to participate in markets.

In considering how to grow farmers' incomes, it is also critical to explore alternative opportunities for income generation through economic diversification programs.

2. Promote e-commerce and other mechanisms to facilitate direct interactions between consumers and producers.

Rapid e-commerce growth in certain countries during the pandemic caused a number of disruptions for farmers. While e-commerce offers important opportunities, it also poses risks to small farmers. How can we increase smallholder farmers' access to this technology and help them tap its strength in connecting with consumers? Many do not have access to the connectivity and infrastructure required. There are also big regional - and gender - differences in access.

E-commerce can support income growth for smallholder farmers, but it requires appropriate linkages among different actors involved. For example, local governments can be important enablers in supporting access when they cluster specific commodity producers through cooperatives or other mechanisms, or pair producers with restaurant chains and other large markets that are generally not accessible to smallholders. In other contexts, NGOs or other entities may be better suited to this role. Context-specific research can shed light on how best to facilitate these linkages.

The sharp increase in the use of e-commerce presents a clear opportunity for action research and policy influence, finding innovative ways to make these digital technologies more user-friendly to both men and women farmers and more accessible to youth, which could motivate their renewed participation in agriculture and food production.

E-commerce platforms also offer the potential to bring together farmers, governments, and private sector and non-governmental organizations in different ways.

3. Enhance information access, training and capacity development for smallholder farmers.

For smallholder farmers to be relevant and profitable in the current competitive environment, continued education, timely knowledge access, and training emerged as important. Farmers need further training and information in such areas as climate-smart (climate-resilient) crops and practices, sustainable agronomic practices, and financial management. Farmers need information and training provided in practical and accessible terms and in local languages.

Developing and implementing well designed training programs for agricultural extension workers - who can in turn adapt knowledge to their local contexts in ways that smallholders can understand and implement - is another area of research opportunity. Supporting knowledge sharing and peer learning, and bridging research-into-use through a range of digital tools were also expressed as opportunities.

Why collaborate?

- Research needs to be impact oriented and focused on rapid response. It is important for researchers to collaborate with actors in the field that provide social protections and safety nets - including financial inclusion, access to credit, and cash transfers - to help farmers cope during shocks and crisis situations. Research needs to engage with organizations on the ground. Collaborations should also create policy supports that provide the right enabling environment to improve the resilience of smallholder farmers.
- Collaborations are needed for research that can help us understand market failures (in crises situations) and how farmers adapt.
- Successful innovation requires understanding the “food production ecosystem” - from farm to fork – and adaptation initiatives. Some actors get a lot of visibility while others are hidden, yet really important.
- Some countries are more advanced in making e-commerce available to small farmers. Transferring lessons from one place to another demands collaboration.
- Good governance requires collaboration with the private sector, local communities, and regulators. It is important to ensure smallholder farmers are active and equal participants in these collaborations recognizing that they have local knowledge and experience based-solutions to offer.

How to plan for climate risk in food systems

Focus: *Adapting to extreme and slow on-set changes through rapid learning, foresight, and sustainable agricultural practices*

Why is this important?

Climate change and extreme events pose a wide range of human and economic costs, including famine. Focusing on reducing climate risk in food systems would benefit local governments and those engaged all along the food supply system.

Barriers

Planning for climate risk is impeded by entrenched patterns of decision-making around agriculture and food systems and a lack of political will to make changes that would increase anticipatory action. The global scale and systemic nature of the food system and the wide range of actors involved at each stage in the value chain compound this challenge. These factors increase the opportunity for risk to spread quickly in food systems, transferring the impacts of extreme events in one place to very distant ones. It is difficult to plan locally, when risks that materialize in one part of the system have knock on effects elsewhere. There is also a lack of information on, and investment in, climate-smart agriculture and other agricultural practices that can reduce sensitivity to risk.

Opportunities for action

From a total of 27 opportunities identified, participants focused on three priority action areas:

1. *Create storylines (socialization in public discourse) to communicate narratives that support transformation in a complex system.*

This would entail improving communication:

- between government ministries and departments, to help to surface trade-offs. Irrigation, for example, may reduce risk in terms of agricultural productivity, but may increase risk in the water sector, or the health sector;
- with consumers - who are shifting their diets or may want to do so - on the implications of their choices; and
- with various actors along the value chain, including between extension service providers and farmers.

This links with the need for capacity development, including the capacity to better communicate, assuming that better narratives need to be co-developed.

There is a need to better communicate risk, in a timely manner, in ways understood by communities, with accompanying explanations on how to feasibly reduce risk. This is important because too often risk awareness is not followed by action, or because it is communicated too late, or without risk management options that communities can afford. It is also important to mobilize key actors, including civil society, in demanding justice in the way risk is managed and communicated.

2. *Assess climate risks and opportunities along value chains.*

Along with focusing on better risk communication, there is a need to better understand risks, underlying factors, and uncertainties and to improve risk assessments for decision-making. Such assessments should be conducted at the beginning of projects, not at the end. Assessment must include risks triggered by actions aimed at reducing other types of risk.

Risk needs to be assessed along all parts of the food system value chain, including how risk is unevenly distributed among actors. This entails co-assessing climate risks, with all stakeholders, taking into consideration who uses or needs to use the information, and fine-tuning the information accordingly. This is linked to the need to communicate risk properly, advancing solutions, and not leaving it weighing on communities. Risk is not properly assessed if it is not effectively communicated to all users.

- Use system thinking to assess how risk travels along value chains, how it is altered across actors, its ripple effects, and implications of our actions.
- Better understand how risks are distributed, in type, timing, and magnitude: Are there equal risks across the value chain? Where are the weaker parts of each value chain, in different contexts? Can we better target our interventions based on this knowledge? Will minimizing risk in one part of the value chain increase risk in another, or for other people?

- Strengthen the link between risk assessments and solution identification. While risk assessments are well developed, we can't say the same about solution identification, which should be based on equally robust technical assessments.

3. Overcome the 'last mile' challenge in the delivery of climate services.

This demands major investments in proactive climate risk management strategies, including early warning and adaptive safety net programs that have the potential to secure more resilient livelihoods for millions of farmers in low- and middle-income countries. To help user communities and countries cope with climate change, climate services need to be easily accessible to all. Research can play an important role in understanding how to overcome this 'last mile' challenge in the delivery of climate services.

It is important to note, however, that not all risks can be foreseen by better climate services. There are components of risk linked to structural weaknesses of food systems, which may similarly present shocks, as happened with COVID-19. Some of these shocks may be addressed in part through actions – such as changing agricultural practices and shifting diets - proposed under other priority research areas.

Why collaborate?

Addressing this priority entails investment, improving access to climate services and affordable solutions to lower risk exposure or to manage it when it becomes a reality.

- Making climate services accessible implies the need to understand the needs of farmers and other food value chain actors, in order to shape the provision of services around those needs. These users therefore need to be involved.
- Collaboration is needed less on upstream research, but more on research processes and implementation research. The process of using knowledge seems more important than producing knowledge *per se*. (See examples from the WISER program on early warning systems, socio-economic analysis, and costs saving in managing risk well.)
- Risk assessments have been well developed from the technological point of view, but risk perception is different, so there is still a gap from risk assessment to action.
- While funding is often limited to major topics such as risk assessments, other issues such as risk communication, decision making, etc. are rarely given priority. We need this to change.

How to reduce emissions in food systems

Focus: Use of low carbon technologies and methods that regenerate and protect soils and water while reducing food loss

Why is this important?

Survey respondents highlighted the significant contributions of agriculture to greenhouse gas emissions, and the related impact that carbon-intensive industrial agricultural practices have on both soils and people — increasing poverty and vulnerability in fragile contexts.

Barriers

Along with a lack of political will and interest from policymakers and research funders, action on reducing emissions is hindered by conflicts of interest, uncoordinated and contradictory land and land rights policies, and by the high costs and lack of available funding to support the creation and adoption of emission-reducing technologies. There are also inequities in access to innovations, a lack of expertise, and weak institutional links along value chains.

Opportunities for action

Reducing emissions in food systems was the only priority identified in survey responses that was not selected for synthesis discussion by any of workshop participants. While it was highlighted as an area of importance, it was no one's top choice for discussion. We did not therefore get participants' insights into how or why this topic calls for collaboration among different groups.

Nonetheless, the consultation generated more than 40 potential opportunities for action. These have been aggregated as follows:

1. Support agricultural practices that reduce emissions and mitigate impacts on soils.

- Support the diversification of farming practices, including agroforestry and agroecology, permaculture, and others that help to reduce emissions and increase carbon sequestration.
- Research soils across different farming and landscape systems to show the change needed for healthy soils (which reduce emissions and enable climate resilience).

2. Tackle the economic underpinnings of carbon intensive farming.

- Conduct cost-benefit and investment return analyses on agroecological systems, and use the results to advocate for change in agri-business models.
- Address private sector interests, lobbying and disincentives to adopting low-carbon food systems.
- Explore the use of taxes and subsidies to incentivize sustainable, regenerative local food production, and discourage high-emission production.
- Reduce the costs of healthy diets.

- Create incentives for companies to measure and curtail food loss and waste.
- Deploy public private partnerships.

3. Use policy and regulatory reforms to reduce emissions.

- Identify and scale tools and policies to improve transparency and accountability within the commodity supply chains that are driving high emission production.
- Develop regulation and incentives to reduce food waste, such as by encouraging smaller portion packaging, recycling, or increasing food waste disposal costs.
- Use regulation and enforcement, together with real-time remote sensing, to secure and enforce protection of high-carbon landscapes.
- Implement "demand-side" policies that incentivize "supply-side" changes, such as food labelling systems that inform consumers on emissions and water use in food.

4. Invest in innovation.

- Rethink existing investment in agricultural research and innovation to focus more on climate-resilient, low-emission technologies and practices.
- Pressure large financial sector agencies to finance corporations that invest in low carbon foods.
- Explore market-based approaches to incentivize farmers' adoption of climate-smart technologies that also enhance their livelihood.

“USD 50-70 billion is spent on agricultural innovation every year in low- and middle-income countries, [yet] less than 7% of that expenditure seeks to improve the environment or limit climate change and its impacts.”

5. Reduce carbon intensive value chains.

- Shorten and diversify supply chains for greater resilience within food systems.
- Look at emissions in post-harvest, post-production segments of value chains, such as through food loss, transport, storage, and infrastructure.
- Develop early warning and information management systems to reduce food loss.
- Ensure every adaptation project has access to mitigation experts who can help evaluate whether the adaptation changes proposed will increase or decrease emissions.

6. Bridge knowledge gaps on emissions reduction among various stakeholders.

- Foster knowledge sharing to ensure innovations reach farmers.
- Engage high-level policymakers in dialogue on emissions reduction in agriculture – giving them confidence to address it in their Nationally Determined Contributions.
- Support platforms and dialogues at local and regional levels to build policy capacity within governments and extension services.

- Improve our understanding on trade-offs and how to minimize them, such as when improving the diets of marginal communities entails more carbon-intensive infrastructure development.
- Educate and organize the public on food loss and their right to safe, secure, healthy food, so that they start demanding low-emission, low-input and fairly produced food.

Observations on this priority

Despite not being selected for deeper discussion, several workshop participants observed that emissions reduction in food systems is vitally important, and should not be dropped from ARA discussions. One participant noted the frequent siloing of mitigation from adaptation, and therefore emphasised the need for further conversation about how the adaptation research community can better engage with mitigation.

3. Observations that cut across the different priorities

From participants

- We must not shy away from — indeed, we must be explicit about— the enormous scale and cost of adapting food systems in the context of climate change, and the fact that addressing this will demand a transformation in thinking. However, we must also acknowledge that the cost of inaction is much higher for both environmental and health outcomes.
- The ARA needs to choose carefully what to tackle through international collaboration, vs what is best done through local, context-specific work. Adaptation is very locally specific, and coalitions may not be best suited to address every need. How do we connect with the many amazing things happening at the local level?
- We need to also recognize the transaction costs of collaboration in terms of the time and effort required to coordinate action research across diverse actors.
- Focusing on risk communication, understanding risks and uncertainties, and using risk assessments for decision making are urgent. This should be the starting point of every project.
- Consultation participants also suggested that the ARA generate, document, and share the learning that is happening from experiences of doing research differently and collaboratively (including across disciplines). They ask, what are the principles that we need to be sharing?

“The harder you try to have large coalitions of people... the more unsustainable it becomes. It just takes too much effort to bring everyone together... It is about letting many flowers bloom and facilitating to share learning among these flowers.”

One group raised a number of points relevant across priorities, highlighting the need to think about how we do research differently, rather than just identifying research gaps and priorities. This would entail

new ways of rewarding scientists to motivate, support, and reward participatory and transdisciplinary research; better understanding how research can support transformation; and ensuring the people we are trying to help are engaged in the research process.

From the Chair

Given there is already a lot written on the topic of climate change adaptation in food systems, this consultation was particularly helpful in helping to ground the ARA's solutions-oriented action research agenda in a specific set of themes. The consultation process allowed us to explore:

- which priorities best lend themselves to being advanced through action research, and
- which require collaboration or working together across organizations, sectors, and/or disciplines.

These consultations should not be seen as stand-alone activities. Subsequent co-creation among ARA members will also draw from evidence reviews.

In reviewing the findings from the survey and synthesis, we note a few barriers recurring across priority areas, including:

- Lack of political will or incentives (including of researchers) to make systemic change
- Lack of financial investment in priority areas

The consultation also highlighted a number of overlapping areas among priorities, including that aspects of several priorities link with agroecology and that justice, equality and inclusion must be seen as cutting across all the other priorities. This highlights the need to think holistically, rather than addressing each priority as a silo.

We also note the absence of some important priorities, including a focus on *how* we might transform food systems through a better understanding of market demands for increased protein (in particular, meat), and a focus on economic incentives to move towards agroecology.

4. Reflections on the consultation process

What worked

Overall, the consultation process generated extraordinary interest and energy among survey respondents and workshop participants — more than half of whom rated the experience as 5/5¹. This likely reflected not only their professional engagement and concern with the issues, but their enthusiasm for the opportunity to help shape future research calls. Successfully channeling the resulting insights demanded teamwork, involving a cross-organizational team at IDRC and external facilitation and writing support.

¹ A further 38% rated it as 4/5, for a total of 94% of participants ranking the experience at 4/5 or higher.

The strong facilitation by [Inclusive Innovation](#) and the walk-through of both the platform and priorities provided in the “familiarization” stage of the workshop agenda helped to ensure everyone was on the same page and had a chance to absorb at least part of the survey responses.

Notwithstanding this success, in a post-consultation debrief, IDRC organizers reflected on a number of areas that could have been stronger.

Gaps in representation

Some regions (MENA and Asia-Pacific in particular) and stakeholder groups (mainly research users) were underrepresented. ARA and others that use the findings from this consultation process should consider other validation steps to ensure research directions reflect the needs of producers, consumers, and farming communities, not just the perspectives of funders and researchers.

There was also some unevenness in the distribution of expertise. Some group conversations included leading experts. For them the gap was less on *what* to do (they felt there was clear agreement on what works) but *how*. And while social and economic trade-offs rippled across many priorities, we did not have many economists present, so there was no discussion in, for example, the agroecology group, on economic incentives, while in the discussion of healthy sustainable diets, two of the four participants were economists. This likely skewed the selection and elaboration of proposed actions.

Gaps in the workshop process

The final session of the workshop was designed for small groups to synthesize all the action ideas that were surfaced around each priority (both from the survey, and through a brainstorming activity at the workshop). However, there was insufficient time allotted for workshop participants to effectively do this, with the result that group deliberations were rushed. The groups were first asked to rank the actions, but there was no easy way for them to group and sort them in the virtual platform, so some good options may have been omitted from discussion. Synthesis also suffered from the exceptional number of ideas generated through the consultation process – in some cases more than could reasonably be absorbed. As a result, not all the resulting recommendations from group discussions were equally clear. In response, IDRC staff who served as guides to the discussion process have reviewed the summary of actions in each priority area, to address areas that may not have been adequately captured in group notes, given the limited time they had.

Participants could have been better prepared for the virtual consultation by sharing the survey results ahead of time, or with some kind of pre-event task that would have familiarized them with the priorities to be discussed. This could have saved time for the deeper dive of synthesizing and elaborating on action research ideas.

It might also have been better to have more participants in each synthesis group, some of which included only one or two external participants. An alternative might have been to reduce the number of priorities to be discussed, thereby spreading participants over fewer groups.

Finally, little time was devoted to plenary sharing of what came out of the synthesis discussion. Making more time at the end of the agenda would have allowed participants to share and reflect on the bigger picture that came out of the session.

Annex A: Consultation process

The consultation was undertaken by IDRC through two related activities:

- a) a **survey** conducted among researchers, funders and practitioners active in the climate change adaptation research space, and
- b) a **virtual consultation event**

The survey focused on surfacing priority areas for solutions-oriented action research; barriers and opportunities to address each of these areas; and specific recommended actions. Participants in the virtual workshop were then asked to reflect on the priority areas surfaced in the survey, share additional action ideas, and highlight the most strategic among these that ARA members – or other actors working collaboratively - could take in tackling these priorities. Participants in the consultation were also asked to elaborate on *why* collaboration is needed to seize these opportunities.

Preparations for the consultation also drew on:

- IDRC dialogue on the [impacts of COVID](#) held ahead of the UN food system summit which highlighted the role of social protection and the needs of the informal sector;
- The CGIAR research program on Climate Change, Agriculture and Food Security thinking on [transforming food systems](#), which identifies eleven actions, including attention to human mobility and rural livelihoods beyond farming; and
- The International Institute for Applied Systems Analysis and International Science Council report on [resilient food systems](#), which encourages a shift from optimizing production to emphasizing resilience and equity.

Note that the consultation was also designed to serve as an input to the [UN Food Systems Summit follow-up Independent Dialogues process](#).

Survey process and representation

In September 2021, a survey questionnaire and invitation to participate in the consultation process was sent to over 90 recipients, including ARA members, past and present IDRC grantees, knowledge brokers, researchers and other technical experts and donors that IDRC has relationships with. Out of 39 respondents, 32 expressed interest in joining a follow-up consultation workshop to deliberate on the responses.

Respondents were each asked to identify up to two priorities for action-oriented food systems research in the context of climate change in the next 10 years and explain why these are priorities. They were invited to list barriers to moving these priorities forward and to suggest options for addressing these barriers.

In terms of who was represented in this survey:

- Over 46% identified as female.

- More than one-third (36%) were from sub-Saharan Africa, one-fifth from Europe (20%), 18% from Latin America, and 13% from North America. Asia and Oceania were underrepresented (8% for Asia; 5% for Oceania), and there were no responses from the Middle East and North Africa.
- The largest stakeholder group represented were those from science and academia (38%), followed by international NGOs (18%), small-scale farmers (13%), local NGOs (10%) and government and national institutions (8%).
- Among research affiliates, 46% were international or regional research system actors; 15% were international funders of research and 13% respectively were national research system actors or implementing partners. Also represented were businesses with research and development budgets (8%).

A team of five IDRC staff members analyzed the survey responses, grouping overlapping response categories. From this, seven distinct priority areas² emerged:

- Transforming food systems
- Transitions toward agroecology
- Supporting healthy and sustainable diets
- Justice, equality and inclusion in food systems
- Supporting the resilience of smallholder farmers
- Anticipatory planning for climate risk in food systems
- Reducing emissions in food systems

Virtual consultation workshop

On October 13, 2021, in a highly interactive session guided by IDRC and a facilitation team from Inclusive Innovation, 23 external participants worked in a series of breakout groups to build on the priorities, barriers and opportunities identified in the pre-event survey.

A brainstorming session invited participants to familiarize themselves with the priorities surfaced through the survey, and contribute new action ideas to those proposed for each priority. A second activity then allowed small groups to each tackle a single priority in more detail, deliberating further on the recommended actions, and saying why these were important and why collaboration would be needed.

Following the virtual consultation, the results of this individual brainstorming and group work were consolidated and reviewed by IDRC staff who had themselves participated in each of the deliberation groups. These results form the basis of this summary. As chair of this process, IDRC provides further commentary on the priorities presented and the consultation process in Sections 3 and 4.

² The priorities were not ranked.

Annex B: Summary tables on action research priorities

Table 1: How to transform food systems

Why this is a priority? Who benefits?	Barriers
<ul style="list-style-type: none"> To accelerate the deployment of demonstrated technologies, shed light on innovative financing mechanisms to scale new approaches, and harness the power of the private sector. Need to understand how to shift power dynamics and the status quo to effect transformation. Understanding the impacts of this bundling approach is vital for building systemic resilience against climate. 	<ul style="list-style-type: none"> Research & innovation organizations lack a culture of impact and focus on their own incentives over system transformation needs. Bridging mechanisms that allow for learning across actors are underfunded. Nationalist & protectionist trade practices. Power inequalities, racism, and seeing the most vulnerable as victims, rather than agents for change.

Opportunities for action

- Understand the different motivations, drivers, incentives of researchers and different food system actors and test ways to change these incentives.*
E.g. Explore market incentives that:
 - support more sustainable national exports
 - develop guidelines for large supermarkets around minimum share of local supply
 - direct market linkage to reduce food prices and the exploitation of small farmers
- Ensure the PROCESS of transformation is participatory, and that all stakeholders are aligned to address the root causes of systemic problems.* This implies research:
 - from a systematic perspective, that values local, traditional, and Indigenous knowledge and doesn't reproduce power inequalities
 - on the best ways to align farmers and other overlooked groups with businesses, governments, & donors despite their different drivers and decision-making processes
- Clarify the “destination” - what we should be aiming for in new food systems – by focusing on what would bring about a climate resilient and food secure future for all.* This involves:
 - understanding trade-offs and context specificity, acknowledging different types of producers and pathways for transformation.
 - socializing narratives on how to transition to a healthy and sustainable food system and adopting an ‘end-to-end’ approach across food systems.

Table 2. How to transition toward agroecology

Why this is a priority? Who benefits?	Barriers
<ul style="list-style-type: none"> Reduces environmental impact Preserves biodiversity 	<ul style="list-style-type: none"> Lack of political will/enabling environment for transformation Vested interests, lobbies and subsidies geared to maintaining industrial agricultural production and international trade

<ul style="list-style-type: none"> Increases sustainability Strengthens the resilience of smallholder farmers Enhances food security 	<ul style="list-style-type: none"> Agricultural policies and extension services oriented towards specialization and intensification Lack of evidence and difficulties in applying agroecological practices at a large scale. Disagreement on the conceptualization of agroecology and inadequate metrics to measure its success or capture the negative externalities of industrial agriculture Lack of investments in agroecology research and focus on a small number of major commodities.
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Opportunities for action

- Fund alliances to engage broadly around the value and urgency of a shift to agroecology for human (nutrition, health, and social benefits) and environmental resilience (soil health, biodiversity, adaptation, and mitigation of climate change).
- Shift national policy focus from commercialisation to policies that promote climate resilient and sustainable food systems.
- Foster collaboration with agroecological and food sovereignty-focused civil society movements around the world.
- Build consensus around central principles of agroecology (going beyond the terminology to reduce polarization).
- Support transdisciplinary teams and participatory research approaches that ensure leadership from marginalized groups.
- Promote collective action and education demanding healthier and sustainable diets.
- Focus on research-into-use opportunities (e.g. integrate agroecological production in the offer of extension services to help interested farmers transition.)
- Develop monitoring and accountability systems (including development of metrics) that track health and environmental outcomes of food system policies.
- Protect local knowledge, seed biodiversity, plant genetic resources through farmer seed exchanges, participatory technology development.
- Generate evidence on the economic advantages and agroecological business models to make the case for agroecology at scale.
- Understand the trade-offs and triple wins of agroecology for people, nature, and climate in LDCs, with context specific evidence.

Table 3: How to support healthy and sustainable diets

Why this is a priority? Who benefits?	Barriers
<ul style="list-style-type: none"> • A plant-based diet is healthier for all people, less water intensive, & allows for less intensive livestock practices. • Adopting an expansive, comprehensive view of sustainability in healthy diets can have a significant impact. 	<ul style="list-style-type: none"> • Difficulty of changing people's habits & private sector investments • Challenge of providing evidence that links specific dietary shifts to increased climate resilience • Lack of actors' buy-in and political will to change diets for the good of the environment • Recognizing that food is cultural and shifting dietary patterns require changes in all parts of the food system

Opportunities for action

- *Institutional procurement* (such as for school food programs and worker canteens) of nutritious food can influence supply chains and ensure access and affordability. This can directly improve nutritional outcomes while ensuring environmental sustainability in supply chain.
- *Assessing the effectiveness and relevance of existing mechanisms - including taxes, subsidies, labelling, awareness campaigns, etc - to transition towards healthy and sustainable diets.* This could include:
 - dismantling elements of trade agreements that undermine the competitiveness of sustainable local farmers;
 - reducing subsidies that support unsustainable agricultural approaches and the production and consumption of processed foods; and
 - mainstreaming the use of social protection instruments to increase access to nutritious and sustainably produced diets.
- *Building narratives that support a shift to healthy sustainable diets and that counter standard critiques that delay action.* This will require:
 - research on how to shift demand to more sustainably produced food, and
 - support for advocacy and civil society mobilization, including investigative journalism that exposes the powerful interests behind unhealthy food systems and reports on the impacts of industrial agriculture.
- *Increasing the diversity of food sources.* This may entail:
 - expanding the reach of food systems that incorporate diverse food sources;
 - understanding the political economy of each food system, the mechanisms for change, and the trade-offs involved; and
 - bringing consumers closer to producers, such as through CSAs and consumer cooperatives.

Table 4: How to promote justice, equality, and inclusion in food systems

Why this is a priority? Who benefits?	Barriers
<ul style="list-style-type: none"> • Bridging the gender gap contributes to poverty reduction and better nutritional outcomes. • Empowering women increases their capacity to improve food security and has a multiplier affect across households and communities. • Food systems offer the opportunity to contribute to the SDGs and broader development goals. • Vulnerable groups, the resource poor, and Indigenous communities would benefit. 	<ul style="list-style-type: none"> • Lack of land rights for women and indigenous people • Deeply entrenched gender norms and power inequalities • Limited organizing knowledge and skills among marginalized groups, limiting their access to finance for productive activities and microenterprises • Lack of political will to transform current systems tied to our colonial history, resulting in institutionalized racism and persistent exclusion of the Global South, Indigenous peoples, & minority groups

Opportunities for action

- *Address how research is carried out in food systems for more inclusive and just outcomes - engaging all actors in the food system, building coalitions and collective action through the research process itself.*
 - Support research that drives and scales collective action and resilience practices.
 - Understand the behavioural factors that underpin social change processes.
 - Integrate justice, equity, and decolonizing lenses at every stage of research.
 - Prioritize transdisciplinary and participatory research combining traditional, local, and Western knowledge.
- *Link social policy goals and related support measures to climate and agricultural policy through incentives.*

- Focus incentives for transforming food systems on tackling the root causes of inequality.
- Target subsidies to promote agroecological production and discourage environmentally harmful practices.
- Create voucher systems that link low-income people to local food systems.
- *Address structural exclusion of marginalized groups and increase their role in decision-making.*
 - Take a rights-based approach, including respect for the tenure and land claims of Indigenous groups.
 - Prioritize legal empowerment of marginalized groups.
 - Use education to inform grassroots groups working to shift policy.
 - Integrate analysis of power relations into food systems research.

Table 5: How to support the resilience of smallholder farmers

Why this is a priority? Who benefits?	Barriers
<ul style="list-style-type: none"> ● It is essential for food and nutrition security. ● Smallholder farmers, including women farmers, local entrepreneurs, and Indigenous communities, will benefit. 	<ul style="list-style-type: none"> ● Low crop yields; low capacity to produce food for local needs ● Lack of access to finances, market knowledge, training ● Lack of actualized data for farmers and policymakers ● Lack of technical support for producers' start-ups and SMEs ● Marginalization and exclusion of smallholders from value chains ● Lack of production planning and strategies to avoid food loss/waste ● Lack of collective power

Opportunities for action

- *Help smallholder farmers access markets and grow their incomes, with a focus on:*
 - institutional innovations in terms of how market actors collaborate
 - what kinds of markets support which kinds of smallholder farmers
 - how markets respond in crises, and where transportation links are minimal
 - helping smallholders access timely market information, climate advisories, early warning systems, and adaptive safety nets to reduce climate-related risks
 - innovations to address value chain disruptions
 - addressing the care burden on women farmers to enable them to participate in markets
 - alternative income generation through economic diversification programs
- *Promote e-commerce and other mechanisms to increase producer access to consumers through:*
 - context-specific research on how governments, NGOs and others can best facilitate these linkages
 - finding innovative ways to make these technologies more user-friendly to both genders and more accessible to youth
- *Enhance information access, training, and capacity development for smallholder farmers, by:*
 - supporting knowledge sharing, peer learning, and research into use
 - building farmers' capacities to use climate-smart crops and practices and sustainable agronomic practices
 - developing well designed training programs for agricultural extension workers
 - providing practical and accessible training in local languages

Table 6. How to plan for climate risk in food systems

Why this is a priority? Who benefits?	Barriers
<ul style="list-style-type: none"> • The challenge of famine and extreme events is transboundary & costly in terms of lives, economy, and security. • Local governments, producers and suppliers engaged in food systems will benefit. 	<ul style="list-style-type: none"> • Over-emphasis on easier, more tangible actions and avoidance of deeper thinking about decision-making and learning processes that could have a systemic impact • Limited capacity and political will to take anticipatory and preventative action • Highly systemic nature of the food system value chain from global to local levels, with all stages and actors exposed to climate change • Lack of reliable information about climate-smart approaches and financial resources to promote them • Lack of concern in profit-driven food production with food insecurity and lack of understanding of ecological consequences

Opportunities for action

- *Create storylines (socialization in public discourse) to communicate narrative for transformation in a complex system.* Improve communications:
 - between government ministries and departments to surface trade-offs;
 - with consumers, on the implications of their choices; and
 - with various actors along the value chain, addressing injustices in risk communication through co-assessment of risk.
- *Assess climate risks and opportunities along value chains.*
 - Assess risks – including those triggered by actions intended to reduce other risks - at the beginning of projects, not the end.
 - Use system thinking to assess how risk travels along value chains, its ripple effects, and implications.
 - Better understand how risks are distributed, in type, timing and magnitude.
 - Strengthen the link between risk assessment and solution identification.
- *Overcome the ‘last mile’ challenge in the delivery of climate services.*
 - Invest in proactive climate risk management strategies, including early warning and adaptive safety net programs.
 - Make climate services accessible to all, focusing research on ways to overcome this ‘last mile’ challenge in their delivery.
 - Recognize that not all shocks can be addressed by climate service improvements: some demand transformations addressed in other priority research areas.

Table 7. How to reduce emissions in food systems

Why this is a priority? Who benefits?	Barriers
<p>Agriculture is a significant contributor to greenhouse gas emissions. Arid and unproductive soil drives an increase of poverty and</p>	<ul style="list-style-type: none"> • Lack of political will from policymakers; lack of prioritization by local research funding agencies • Conflicts of interest • Uncoordinated and contradictory land policies and land rights policies • High costs involved and lack of funding for technology generation

vulnerability in already fragile contexts.

- Inequitable access to innovation
- Lack of appropriate technologies and expertise
- Weak institutions and lack of institutional linkage along the value chain

Opportunities for action

- *Support agricultural practices that reduce emissions and mitigate impacts on soils.*
 - Support diversification of farming practices that help to reduce emissions
 - Research soils across different farming and landscape systems to show the change needed for healthy soils.
- *Tackle the economic underpinnings of carbon-intensive farming, through:*
 - cost-benefit and investment return analyses
 - tackling private sector interests and disincentives
 - taxes and subsidies to discourage high-emission production
 - reducing the costs of healthy diets
 - incentives to curtail food loss and waste
 - public private partnerships
- *Use policy and regulatory reforms to reduce emissions.*
 - Improve transparency and accountability within high-emission supply chains.
 - Develop regulations and incentives to reduce food waste.
 - Use regulation and enforcement to protect high-carbon landscapes.
 - Implement "demand-side" policies that incentivize "supply-side" changes, informing consumers on emissions and water use in food.
- *Invest in innovation.*
 - Rethink R&D investment to focus more on low-emission technologies and practices.
 - Pressure large financial agencies to fund corporate investment in low carbon foods.
 - Explore market-based approaches to encourage farmers to adopt climate-smart technologies that also enhance their livelihoods.
- *Reduce carbon-intensive value chains.*
 - Shorten and diversify supply chains for greater resilience.
 - Look at post-harvest, post-production emissions.
 - Develop early warning and information systems to reduce food loss.
 - Ensure access to mitigation experts to help evaluate whether actions will increase or decrease emissions.
- *Bridge knowledge gaps on emissions reduction among various stakeholders.*
 - Foster knowledge sharing to reach farmers.
 - Engage high level policymakers in dialogue on emissions reduction, helping them address it in NDCs.
 - Support dialogue to build policy capacity within governments and extension services.
 - Improve understanding on trade-offs and how to minimize them.
 - Educate and organize the public so they can demand low-emission, low-input, fairly produced food.

Annex C: Registered workshop participants

Miguel Albacete Albacete, Latin American Center for Rural Development (RIMISP)

Javier Aliaga Lordemann, Instituto de Estudios Avanzados en Desarrollo (INESAD), Bolivia

Julio Araujo, SouthSouthNorth (SSN)

Elaine Q. Borazon, National Sun Yat-sen University Taiwan

Anna De Palma, UK Department for International Development (DfID)

Veronica Doerr, Australian Centre for International Agricultural Research (ACIAR)

Mamadou Fall, Innovation, Environnement et Développement en Afrique (IED Afrique)

Emile Frison, Panel Member, International Panel of Experts on Sustainable Food Systems (IPES-Food)

Prof Dr Tilakavati Karupaiah, Taylor's University Malaysia

Amos Laar, University of Ghana, School of Public Health

Virginie Levasseur, SOCODEVI

Ana Maria Loboguerrero, CGIAR Consortium of International Agricultural Research Centers

Lisa McNamara, Climate and Development Knowledge Network (CDKN)/ SouthSouthNorth (SSN)

Adella Mueni Mutinda, Canadian Foodgrains Bank /Canadian Coalition on Climate Change and Development (C4D) member

Guillermo Paraje, Universidad Adolfo Ibáñez, Chile

Anand Patwardhan, University of Maryland / Adaptation Research Alliance (ARA) Co-chair

Sivapuram Ventaka Rama Krishna Prabhakar, Institute for Global Environmental Strategies (IGES)

Fiona Percy, Consultant, Climate Resilience

Ernesto F. Ráez Luna, Instituto del Bien Común / Consorcio por la Salud Ambiente y Desarrollo (ECOSAD)

Mark Redwood, Cowater International

Geeta Sandal, Local Governments for Sustainability (ICLEI)

Angele Tasse, CGIAR Consortium of International Agricultural Research Centers

Ying Wang, United Nations Environment Programme (UNEP)