

ACIAR SDIP Foresight Component

Report on A Participatory Exercise on Foresight for Food Systems in South Asia



Australian Government
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Executive Summary

Bracing for the future: A Participatory Exercise on Foresight for Food Systems in South Asia was held on the 11th – 14th February 2019 in Kathmandu, Nepal. The workshop was convened by IFPRI, supported by ACIAR SDIP and linked to the Foresight4Food Initiative. The event explored key impacts and future trends for food systems, at both local and regional levels. More than 50 participants from Bangladesh, India and Nepal joined the workshop, representing a range of sectors and expertise, and with a good mix of gender and career stage. This diversity led to highly energized and engaged discussions as the group worked through the different elements of foresight for food systems.

The workshop was designed as a series of training presentations and participatory exercises in methods for foresight and scenario analysis, using real world examples based on the four focus geographic regions of ACIAR SDIP: Bihar, West Bengal, Nepal (Terai) and Bangladesh.

Key note speaker Professor Prabhu Pingali from Cornell University gave an excellent overview of the different factors influencing food systems in South Asia. More detailed synthesis presentations on the trends of climate change, gender, labour and migration, trade and markets and the energy-irrigation nexus in the EGP allowed participants to explore these issues deeply. A range of modelling options was presented that can potentially support foresight approaches at different levels.

Throughout the workshop, participants worked in regional groups to define a set of foresight activities that could be undertaken at the local level to inform and improve the future of food systems. These plans were summarized and presented to the ACIAR SDIP Steering Committee on the final afternoon. A range of specific activities are proposed. Nepal will use foresight approaches as a policy dialogue tool to understand the implementation of agricultural development at a range of local levels (community, municipal, provincial). In West Bengal, foresight will contribute to expanding our understanding of the impacts of CASI for sustainable and equitable rural livelihoods. In Bangladesh, the potential for high value crops for a diversified food system will be explored. Potential pathways to achieve a “healthy plate” based production system will be considered in Bihar. As well as the set of local level activities, key information will be synthesized to support a regional level analysis of the food system.

All presentations for the workshop can be found here <https://aciarsdip.com/meetings>.

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1 Background

ACIAR and IFPRI organized a learning and professional development workshop titled ‘Bracing up for the Future: Foresight & Scenario Analysis for Food Systems in South Asia’ in Kathmandu, Nepal from 11th-14th February 2019. More than 50 participants from government, civil society organizations, private companies, research institutions and think tanks of Bangladesh, India, and Nepal participated in the event. It was held as a part of a two-year project to better understand food system changes in Eastern Gangetic Plains (EGP) supported by the Sustainable Development Investment Portfolio (SDIP) funded by the Australian Government’s Department of Foreign Affairs and Trade. Support on foresight approaches was provided by the global Foresight4Food Initiative.

2 Objectives of the Workshop

The workshop had three main objectives:

- To bring actors from different sectors, disciplinary backgrounds, and geographical areas of the EGP together to develop a better understanding of the systems perspective on food and the value of foresight exercises,
- To expose participants to the key concepts, techniques, modeling tools and processes involved in foresight for food exercise through a series of participatory exercise, and
- To generate ideas for the future work on foresight for sustainable food systems in the EGP region that can be considered for implementation under the Sustainable Development Investment Portfolio.

These objectives will help achieve the goal of fostering greater collaboration between key regional partners to strengthen understanding of longer-term food systems changes and the implications for food, water, and energy security in the Eastern Gangetic Plains (EGP).

3 Workshop Activities

We set out to achieve these objectives by bringing together leading experts and highly motivated and engaged partners from the region to work on a series of interactive and practical exercises. Each day of the workshop had a clear set of learning objectives and a set of group activities focused on different geographical areas of EGP or key thematic areas of the food systems. The activities conducted included:

- Short presentations synthesizing our best understanding of the current food systems in the three countries;

- Interactive modules to introduce the framework for foresight analysis by experts with examples from other parts of the world;
- Practice sessions for a) mapping food system dynamics in the region and b) foresight exercises to develop a better understanding of how to use existing frameworks or techniques to inform policy discussions and decisions;
- Introduction to quantitative modeling of food systems at local and regional levels to get a better understanding of what sorts of modeling tools are available to answer different questions and when and how can we use them, and;
- Participatory scenario-building exercises to understand ways in which it is different from forecasting and to learn how to use it to inform policy discussions in the face of uncertainties.

4 Presentations, Learning and Sharing activities

Day 1 – Introduction to foresight and food systems for the EGP

Learning Objectives

- Overview of big food systems issues in South Asia
- Understanding of food systems framework
- Overview of foresight and scenario methodology
- Understanding of SDIP Foresight exercise and how this workshop will contribute to it.

The workshop started with two brief ice-breaking small group exercises where participants shared their understanding of what foresight meant to them. In the second exercise, everyone wrote down their reasons for attending the workshop and their expectations from the four days and shared it with the whole group.

The ice-breaking exercises were followed by a participatory trend and issues analysis where people in small groups discussed what were the big questions regarding the evolution of food systems that they need to be exploring. Each group wrote down 4-5 big trends and then tried to identify key interactions between different trends and their future implications.

These initial discussions were followed by a learning-by-walking session where everyone looked at what other groups had discussed and listed as the key trends and interactions.

After the introductory group exercises, Professor Andrew Campbell, CEO ACIAR made his opening remarks. He said that the challenges for the food, energy and water security and the transformational opportunities in the Eastern Gangetic Plains provide a rich context for this

meeting. The future is inherently unknowable, and the past is not a great guide when planning about the future. This is a major challenge for formulating policies, making long-term investments into infrastructure and finding ways to organize society even in rich countries of the world. To do so in areas like EGP is extremely challenging, but also essential.

He emphasized the need for engagement at the local and national levels because there are few levers of change at the global level. The agency for change is at the subnational, national and regional levels. Prof. Campbell underlined the need for partnerships with local stakeholders but suggested that the foresight work has to be connected to the bigger work other agencies are doing and be strategic about what we do to influence and engage big decision makers.

Prof. Prabhu Pingali of Cornell University delivered the keynote speech where he highlighted the emerging opportunities and challenges for the food systems in South Asia and underlined the need to account for the large intra-regional differences within the region. Poverty has come down rapidly in South Asia, but the region has not done as well in reducing hunger. Achieving the Sustainable Development Goal 2 (SDG2) to achieve zero hunger through investments in sustainable agriculture and keeping a focus on smallholders remains a challenge. Since South Asia has the largest number of smallholders in the world, the success of SDG2 depends a great deal on what happens to smallholder agriculture there. Key messages from Prof Pingali's presentation include:

- **Think beyond staples.** Diversification out of the current staple grains centric system is crucial to building a more healthy and nutritious food system. SDG2 seeks to double smallholder productivity. There is a significant gap in staple yields, but if we look beyond staples, the gap and the potential are even higher. Diversification helps reduce both malnutrition and over-nutrition. When thinking about the future, let's think beyond staples too.
- **Promote trade.** Discussions on food system often ignore trade. Trade has an enormous role for smallholders. There is a need to promote agricultural trade not only of rice, wheat, and maize but also other commodities that are only thinly traded now, and by focusing on the comparative advantage of each region.
- **Account for regional differences within South Asia.** There are significant regional disparities within S. Asia. In EGP states like Bihar, incomes are as low as in Sub-Saharan Africa while Delhi and Goa are closer to middle-income countries in Latin America. Similarly, there are significant intra-country differences in levels of malnutrition also. Much of South and North-West India have relatively lower levels of undernutrition, but eastern parts have a very high incidence of undernutrition. Why is it that some parts of the country are doing better than other areas? Researchers should look at both success stories and failures within countries and see what kind of lessons we can learn.
- **Feeding the growing urban population.** By 2030, more than 50% of South Asians will be living in towns and cities. A big challenge for food policy is how to feed the growing urban population. Trying to figure out ways to meet the demands of the

middle class is one of the biggest challenges for food policy, but it is also the greatest opportunity. The EGP region can grow by figuring out how to meet the changing diets of middle-class populations in urban Bangladesh, India, and Nepal.

- **Commercialization of smallholder agriculture.** The transition from farming as a way of life to agriculture as a business is already taking place. The pressure on smallholders to commercialize will also grow. Governments need to explore ways to enable smallholders to link with modern value chains like supermarkets. The transaction costs of smallholders will be especially high in lagging regions like the EGP, but there are also big opportunities.
- **The incidence of diet-related non-communicable diseases is rising.** Increased consumption of convenience food is taking place. It is happening because of the rising opportunity cost of women's time. But it is also happening because healthier food is relatively much more expensive than staples. Processed food is often cheaper, triggering a switch from an undernutrition world to world with rising global burden of NCDs. Today a large part of the disease burden we see is due to diet-related diseases. Being able to address these diet-related diseases is a major public health challenge.
- **S. Asia is a global hotspot for climate change,** especially with regard to rises in temperature. Detailed analysis is needed to find mitigation options. We always say that if we have irrigation, we can mitigate the impact of climate change. GW tables are declining rapidly in the most productive parts of South Asia. Climate impact plus a dramatic decline in GW table is a double whammy. Managing both will be a huge challenge. The good news for EGP is that water is not a major problem in this region.
- **Rightsizing sustainable technologies is a challenge.** Lots of new science is available that can make agriculture smarter and efficient by reducing the input intensity and negative environmental externalities. The challenge for South Asia is that many of these new technologies are not adapted to small holdings. How do we downsize a technology developed for 2,000 hectare farms to work for 1 hectare farms? We do not have that capacity yet. In addition to that, the incentives for farmers need to change. If we keep subsidizing urea and electricity heavily, we cannot expect farmers to become more efficient. The political economy that keeps distortionary incentives in place in the region is the least understood aspect of the food system here.

Introduction to Foresight and Scenarios

Jim Woodhill and Saher Hasnain from Oxford University introduced the core ideas of food systems, foresight and scenario planning. The Foresight framework illustrated below provided an overview of how the different elements being covered in the workshop fitted together into an overall approach to foresight.

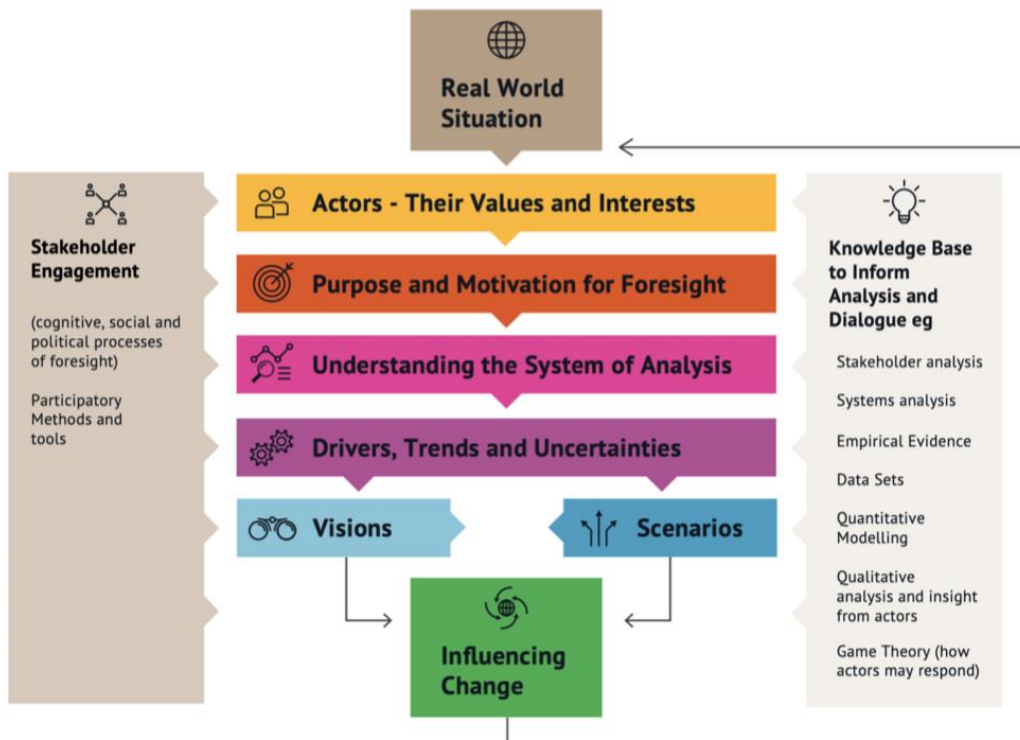


Figure 1: The Foresight framework followed throughout the workshop.

Team Tasks

At the end of Day 1, participants were requested to join one of four working groups—one for each state/country in the EGP (Bangladesh, Bihar, Nepal, and West Bengal).

The first focus for the group was to develop a ‘rich picture’ of the food system in the region. This was then the basis for the work throughout the workshop for that region. A rich picture is visual representation of all aspects of a situation that need to be considered in taking a systems view. It helps to show key relationships and to draw out how different actors see different parts of the system and the way they interact.



Figure 2: Examples of rich picture from Bangladesh and West Bengal

Each working group was tasked with making a brief presentation to the ACIAR SDIP steering committee on the last day of the workshop to draw together the various activities and outputs throughout the workshop. Additionally, this provided an opportunity to propose a foresight activity in their location, that will be conducted with SDIP support. The presentation would also include:

- A synthesis of the activities undertaken during the workshop that summarises the narrative for the location
- Consideration of what foresight could involve in the location and what piece of this SDIP can support given limited time and resources
- Ideas on how foresight exercises could be used to trigger and inform policy discussions
- Reflections on the workshop content and process

One reason for creating the working groups was to generate ideas or proposals for location-specific foresight activities from the highly motivated, qualified and diverse stakeholders attending the workshop. However, being a part of working groups also helped greater involvement and interest in all the activities and group discussion throughout the workshop.



Figure 3: The Bangladesh team developing a rich picture of food systems in Bangladesh

Day 2 – How modeling and data contribute to foresight and scenario analysis

Learning Objectives:

- Understand the role of models and data in supporting foresight and scenario analysis
- Understand what is meant by models and their predictive/analytical power
- Awareness of the key models for looking at food systems, which ones have been applied in the EGP
- Understanding of the data needed is feed models and key data sets for the EGP
- Awareness of how models can be used to inform policy and provide visual outputs to support dialogue and debate

The second day of the workshop sought to provide a brief introduction to different types of modeling, particularly the need to be aware of assumptions, uncertainties, accuracy, and precision when using them. Experts presented examples of food system models, agronomic and resource use modeling for farm and production level situations, modeling climate change and its impacts and participatory models for planning and prioritization. Presentations focused

less on the intricate details of the models and more on the context in which different models can be used and the ways to use modeling to generate visual and other forms of information to trigger discussion and inform policy processes.

Food System Models

Saher Hasnain of Oxford University showed a glimpse of different types of food system models used for foresight exercises across different parts of the world. Examples included AGMIP, Aglink Cosimo, and Climate. She tried to give participants some idea of the strength and limitations of different modeling approaches and used examples to show different settings in which these models could be used. Saher also showed examples of visuals that can be generated by different modeling exercises to support discussions on foresight for food. She emphasized the need to think about the purpose of the model. She also suggested that models should not be used in isolation. Interdisciplinary approaches are becoming more popular in food system modeling and as a result, assumptions used in models are becoming more transparent. She also shared links to websites where interested participants could find more resource materials on different models she showed.

Avinash Kishore of IFPRI made a short presentation on The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) and shared examples of outputs generated by the application of IMPACT in the EGP region. He stressed the fact that IMPACT is designed for scenario analysis, and not forecasting. IMPACT shows the likely impact of different scenarios and defines preferred pathways. The current version of IMPACT was fit for national, regional or basin level analysis, but not for analysis at state or local levels.

Modelling Water Resources and Farm Systems

Don Gaydon of CSIRO introduced participants to the Agricultural Production Systems sIMulator (APSIM) model and showed examples of its application for a better understanding of agricultural systems in the EGP region using simulations of plant, animal, soil, climate and management interactions. APSIM can also model GHG emissions. He presented examples of his own work in the region and shared a new idea on using APSIM to look at not only at the biological yield gap, but also economic and water availability yield gaps. He showed how APSIM can help answer the 'what if' questions. For example, farmers can know the effect on soil, water, crop output, and GHG emissions if they change their agronomic practices in some way. Don emphasized the importance of complementing field trials with modeling to understand implications across different climates, long term risk, etc.

Dr. Gaydon also made a second presentation on water resources modeling in EGP. The presentation was based on Dr. Mohammad Mainuddin's (CSIRO) ongoing work in Bangladesh, showed how integrating plot-level water resources models with the basin level models can offer new and even surprising insights.

The discussion following presentations on the food system and crop models focused mainly on exploring ways to apply these models. There was a recommendation to model the changing energy-irrigation nexus in Bihar. Participants from Nepal proposed the idea to use the APSIM model to develop better, more targeted agri-information services. Prof. Jahangir Alam from Bangladesh suggested the need to use modeling to understand the likely impact of the ongoing

shift from Boro to Aus rice production on HH income and nutrition. Dr. Arup from UBKV, West Bengal showed interest in using modelling to do an ex-ante analysis of the impact of increase in the adoption of CASI from less than 1% of today to 20% of all farmers in the future on water, energy, and other inputs in agriculture and the second generation impacts of increase in farmers' income rural food systems and diets.

Climate Change Modelling

Brian Dawson presented a status report on climate change in the EGP. His presentation synthesized the most up to date scientific understanding of the likely effects of climate change weather parameters (temperature, precipitation), glaciers, water resources availability, natural disasters, and crop water requirements, and the potential impacts of these changes on agricultural systems. He talked about the areas on which there are a broad scientific consensus and the aspects of climate change projections around which there is still a relatively high level of uncertainty. Climate change may have different impacts in different parts of EGP, but we do not have a great deal of information about the regional or sub-regional level impacts. More research and modeling efforts are needed to develop prognosis at sub-national levels.

Arun KC of CCAFS presented examples that showed how CCAFS has used crop models, climate and weather models, etc. to inform policy-makers, design insurance products for agriculture and select the best sites to promote climate-smart agriculture in Bangladesh, India, and Nepal. Arun emphasized the need for partnership with farmers, private companies and policy-makers for greater impact.

Participatory Modelling

Dr. Madhav Karki of CGED led a group exercise on using participatory 3D modeling (P3DM), a community-based mapping method that uses visual tools like cardboard cut-outs to build and validate three-dimensional models. P3D modeling helps show synergies, captures indigenous knowledge and provides a communication platform for understanding the local environment. P3D modeling helps participants develop a better sense of the geography of the region and facilitates better communication, planning, and prioritization. Participants in our workshop used P3D modeling for a quick prioritization exercise using visual tools. This was the first exposure to P3D modeling for many participants in the room and they found it quite useful.

In discussions following the presentations on modeling, several participants showed interest in learning more about the individual models in greater detail. Some participants even requested organizers to plan training programs for capacity building in different types of modeling in project locations.

The second day of the workshop ended with group work that focused on data availability in terms of what is established, and where the gaps in knowledge are. This included a discussion on participants' observations, ideas, and suggestions on how to use modeling tools to inform policy processes and foresight for food exercises in the EGP region. Some participants suggested organizing workshops dedicated to modeling for capacity building and sharing notes among modelers working in the region.

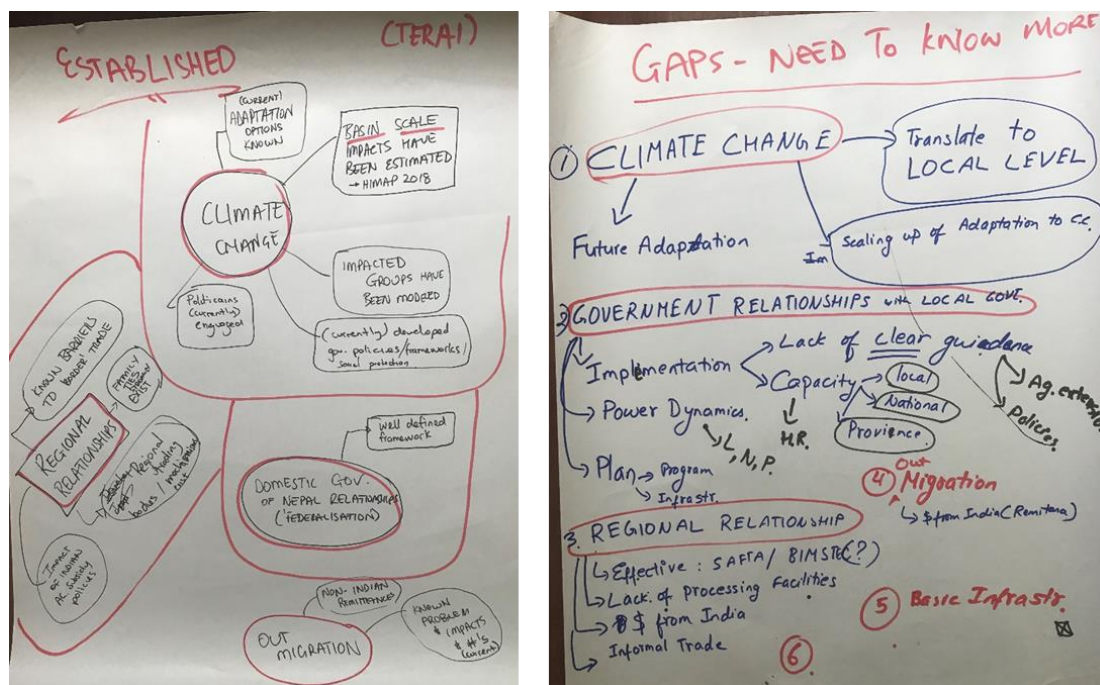


Figure 4: An example of data identification – what is known and what the gaps are for food systems in Nepal

Dr. Robyn Johnston of ACIAR synthesized the day’s deliberations and suggested future directions for ways to use modeling to inform science, policy-makers, and practitioners in EGP.

Day 3 - Mapping the dynamics of food systems and emerging drivers, trends and issues

Learning Objectives:

- Understanding of different systems mapping approaches to identify key elements and relations in a system
- Know how to do a causal loop diagram
- Understand key drivers, trends, and issues in key areas of food systems
- Awareness of the overall key drivers and trends in food systems for EGP
- Understand the notions of uncertainties and weak signals

The third day of the workshop was designed to develop to a more detailed exploration of the dynamics in four different aspects of the food system in EGP: 1). Water-energy nexus; 2). Women in agriculture; 3). Labor, migration and occupational diversification, and 4) agricultural trade and markets. Participants self-selected themselves into one of the 4 groups according to their interest and expertise. We had already designated a theme leader for each of the four themes. Dr. Aditi Mukherji, Dr. Sucharita Sen, Dr. Avinash Kishore, and Dr. Jahangir Alam were the four theme leaders. Each theme leader was asked to prepare a short (20 minutes) presentation around the following questions:

- What are the big issues on this theme and why is it important to the future of agri-food systems in EGP?

- b. What are the main future trends?
- c. What do, and don't we know on this theme?
- d. What are some of the critical trade-offs that will have to be considered and what does this mean for different stakeholder interests and potential conflicts?

There were four parallel sessions where each group did a deep dive on issues related to their theme in the entire EGP region. Theme leader's presentations to their group set the agenda for the discussion. Members in each group discussed a) the most important drivers and trends in different parts of the EGP; b) critical uncertainties; c) policy-makers' priorities and d) key relationships between their theme and the other aspects of the food system in the region.

Dr. Jim Woodhill and Dr. Saher Hasnain gave a short demonstration on how to use causal loop diagrams for systems mapping in the first session of the day. Each group used inputs from the presentation and the discussion to develop a causal loop diagram. Causal loop diagrams are tools to visualize relationships among different parts or variables of a system using arrows to show positive and negative causal links and reinforcing or balancing feedback loops. Figure 5 shows a causal loop diagram developed to explore the factors that impact on the amount and type of labour that is available for agriculture.

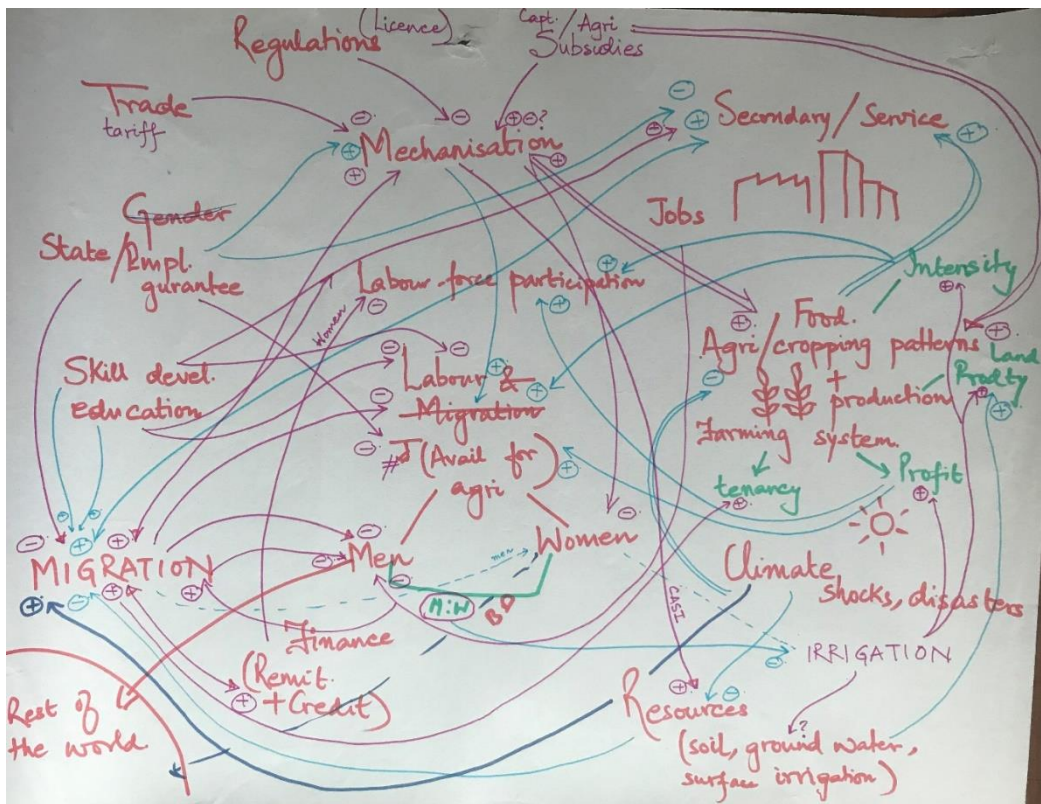


Figure 5: An example of a causal loop diagram developed to understand the factors that impact on the amount and type of labour that is available for agriculture.

After the discussion and preparation of causal loop diagrams in parallel sessions, each group made a 10 minutes presentation to the plenary where they highlighted the most important issues related to their theme, showed the systems map with the key interrelations, identified

specific studies to fill the evidence gaps, and shared their ideas on how to use scenario thinking to nudge systems in better directions. Each group presentation was followed by discussion, feedback and suggestion to improve systems maps from members from other groups.

The Water-Energy Nexus

The group working on water-energy nexus in EGP restricted its discussions and mapping to the food-energy-groundwater irrigation nexus. They decided not to discuss issues related to dams and hydropower. Energy supply and pricing policies have a direct bearing on farmers' access to and use of groundwater irrigation. We can control groundwater extraction through energy policies (electricity, diesel and solar). Many parts of EGP have water and energy policies that are inappropriate for the bio-physical realities of the region. The region is water-rich, but till recently there were policies in place that restricted water uses for irrigation. However, in recent years, some of these restrictions have been removed, especially, in West Bengal. Rapid electrification of irrigation pumps is underway in West Bengal and Bihar. There is a need to understand how access to electricity for irrigation affects agriculture, water resources and farmers—both pump owners and water buyers. The EGP region also offers opportunities for solarization of irrigation without the potential downsides one needs to worry about in the rest of South Asia where groundwater use needs to be regulated. We need a better understanding of the policies that can accelerate the adoption of solar pumps in the region.

The decline in water table may not be a serious concern in most parts of EGP, but depletion in water quality, especially Arsenic contamination is a concern that may affect decisions on groundwater use.

Lack of equity in access to groundwater is a key concern in EGP. Farmers access water through both formal and informal institutions. Informal institutions, like water markets, are widely prevalent in the region while formal institutions like water user associations (WUAs) are weak. How do public policies affect the configuration of these institutions? What kind of policies and investments favor poorer farmers? Access to groundwater is linked to the land. What kind of policy levers will ensure that access to water does not reinforce existing inequalities in the region? There is a need to generate rigorous evidence-based policy recommendations on these key questions related to water-energy nexus in EGP.

Dr. Sucharita Sen emphasized the need to gather evidence on how access to water affects women. She recommended adding a gendered loop to the systems map of energy-irrigation nexus in the region.

Agricultural Markets and Trade in Bangladesh, India, and Nepal

The discussion on agricultural markets and trade in EGP focused on the international trade between Bangladesh, India, and Nepal (BIN) and the region's trade with other parts of the world. International trade can contribute to increased farmer incomes, lower price volatility, and more sustainable cropping patterns. BIN has a larger agricultural GDP than the ASEAN countries, but food trade in the BIN region is much smaller in value. Non-tariff barriers (NTBs) are a major reason for low trade volumes in EGP. The NTBs have pushed a lot of trade into the

illegal/informal sector. It is widely believed that the informal food trade in the BIN region may be larger than the formal trade.

Food trade among BIN country is not only small, but it is also highly vulnerable to price shocks. During the food price crisis of 2008, India banned rice exports. Rice prices were rising in Bangladesh at that time and the regional trade did not help mitigate the shocks. This negative experience has pushed Bangladesh to achieve rice self-sufficiency even when relying on imports would have helped farmers there to diversify to high-value crops and earn higher incomes. A lot of rice in Bangladesh is grown in the water-scarce Barind region. The unreliable regional food trade regime is, therefore, hurting both poor farmers and the environment.

China has rapidly emerged as one of the largest food importers in the world. BIN countries have not benefited from the emergence of this large market in their neighborhood. Their total share of China's food imports is less than 5%. Here too ASEAN countries perform much better accounting for nearly 15% of China's food imports.

China's exports of cheap agricultural machinery like pump-sets and power-tillers to BIN is rising in value. Nepal imports these machines through India. Bangladesh liberalized imports of agricultural equipment in the early 1990s. Import liberalization has helped Bangladesh agriculture to mechanize faster than India or Nepal at lower fiscal costs.

The group on trade and markets suggested developing a research and policy engagement agenda that helps us understand how institutions, policy changes, and dialogue could help increase trade volumes in the region.

Dr. Aditi Mukherji informed the house that unlike food trade, electricity trade between Bhutan, Bangladesh, India, and Nepal (BBIN) is a success story that should be looked into to draw lessons for agricultural trade also. Documenting the success story in electricity trade will fit in the WEF nexus framework.

Women in Agriculture

There are significant differences between Bangladesh, Bihar, West Bengal, and Nepal in the levels of involvement of women in agriculture and the changes in their nature of involvement over the last few years. There is some evidence of defeminization of agriculture in Bangladesh and India, but the opposite is true in Nepal. The reasons for defeminization also vary. In some places, the rise in incomes of farm households (i.e. prosperity) is driving defeminisation while in other cases, women are not working in agriculture because of lack of employment opportunities (i.e. distress). Who are the winners and losers of the process? We do not know. There is not enough information. Does greater participation of women in agriculture mean women's empowerment? It is also not clear.

Agricultural mechanization and adoption of conservation agriculture technologies and practices have broader implications for women, but they are not well understood. Issues vary for women depending on their role – the same process can have different impacts on women who earn wage income from agriculture and women who do unpaid labor on family farms.

The group stressed the need to generate more evidence on the impact of different interventions, including agricultural mechanization on different groups of women while building upon the work that has already been done in SRFSI and other projects. Avinash suggested using the Women's Empowerment in Agriculture (WEA) studies and data from Bangladesh, India, and Nepal to improve our understanding of women's role in agriculture and food system and their agency in decision-making in this domain.

Labor, Migration and Occupational Diversification

Landholdings are small in the EGP even by South Asian standards, and the population pressure on land is high. Most farm households are struggling to eke out a decent livelihood from agriculture. Occupational diversification is becoming a norm in farm households in the region and many able-bodied men migrate to other parts of South Asia for employment, especially from Bihar and Nepal. Despite high population density and relatively lower agricultural wages (compared to many other parts of South Asia), farmers in the EGP experience labor scarcity and wage squeeze resulting in rapid mechanization of agriculture in most parts of the region, except West Bengal. When machines displace human labor, men migrate or try to find other jobs. Women in rural EGP, however, have few other options for earning wage income outside agriculture. Female wage rates are significantly lower than the male wage rates and the wage gap has not shrunk over the last 10-15 years.

How does occupational diversification away from agriculture affect farm households' investments and interest in agriculture, especially their inclination for sustainable intensification of agriculture? What is the impact of male migration on women farmers and farm-laborers? How does agricultural mechanization affect men and women in peasant and landless households? The group working on labor, migration and occupational diversification highlighted how we have very little data or evidence on all these questions critical to family welfare and sustainable intensification of agriculture in the EGP. Rural economies of the EGP are no longer predominantly agricultural economies. The group recommended more investment in understanding the linkages between agriculture and non-agricultural sectors and its implications for the overall food system in the region.

After a rich discussion on the four thematic areas, participants regrouped into the area-based working groups created on the first day to prepare their proposals and presentation to the steering committee on the final day of the workshop.

Day 4 - Scenarios for food systems in the EGP and planning for foresight work

Learning Objectives

- Participants know how to facilitate a scenario exercise
- Participants have explored different scenarios for their area
- Participants have reflected on how foresight and scenario analysis could help food system transformation and policy processes in their area
- Participants know how to take the next steps with the SDIP Foresight exercise

The fourth day of the workshop started with an introduction to participatory scenario planning by Dr. Madhav Karki of CGED. He introduced scenario analysis and planning as a systematic method to think creatively about the future with all its uncertainties, and identify strategies to prepare for a range of possible outcomes. He showed examples of different types of scenario analysis like the exploratory forecasting scenarios where stakeholders create projections about what may occur in the future and the alternative paths to getting there, and the normative or back-casting scenarios where the desired future situation is agreed upon and the groups work backward from there to identify steps needed to realize the desired future. He emphasized the need and the value of participatory scenario development in the EGP where all stakeholders are involved in the creation of scenarios and the strategies to reach desirable futures and mitigate potential problems. Participation of a wide range of stakeholders helps make scenarios more relevant to people's needs and priorities, extends the range of scenarios developed, leads to more detailed and precise scenarios by integrating the local and the scientific knowledge and helps facilitate adaptation to future change.

Madhav's presentation was followed by a short practice session where the four area groups engaged into initial scenario development exercise for their regions where they tried to develop and prioritize scenarios emerging from discussions over the last three days for further study. Groups also discussed ways to make scenario development relevant to the local contexts and the policy discussions going on in each region.

The four regional groups had worked for the first three days to develop a proposal with a set of key actions to be completed over the next year as part of the on-going work of Component 2 (Foresight). These proposals were presented to the ACIAR SDIP Steering Committee for feedback, in the last session of the workshop.

The Nepal team, led by CIMMYT and the Department of Agriculture, proposed a foresight exercise engaging village communities and all three all levels of government (municipal, provincial, federal) in a series of policy dialogues to facilitate the devolution of agricultural development to the newly created provinces in the country. The group felt that the change in the governance structure of Nepal from a unitary to a federal state offers a unique opportunity for policy-relevant foresight for food exercises.

The group proposed to start with analytical work to identify major trends and then engage farmers and all three levels of government in a series of policy dialogues where they will use foresight approaches to develop desired future situations and identify ways to reach there. This work will include both qualitative or narrative methods and technical, social and political analysis. They plan to start at the community level, then move up through the municipal and provincial agencies, incorporating learnings from each level to develop a comprehensive picture of aspirations and technical, social and political pathways. The group proposed to focus on Provinces 1 and 2, linking their work with the CIMMYT SRA on pathways for mechanization.

UBKV led the WEST BENGAL team. They proposed to examine the impact of large-scale adoption of CASI (conservation agriculture for sustainable intensification) on food systems in West Bengal. The state government is promoting CASI with a target of its adoption by 20% of all farmers in the state. Studies under SRFISI have tried to assess the biophysical outcomes of adoption of CASI at the farm level. The West Bengal team proposed to apply a food systems

approach to the analysis of the impact of large-scale adoption of CASI on the livelihoods, employment, and nutrition of women and men farmers.

This study will address research questions of:

- What is the relationship between increased income and rural diet and nutrition?
- Can an extended CA system reabsorb the labor displaced by mechanization through community-based micro-enterprises based on local service provision and post-production?

The team proposed to use the existing data supplemented by surveys, focus group discussion and key informant interviews in the SRSFI sites in 4 districts, each with a population of around 5 million people. This activity can provide important inputs into state government plans for scaling of these technologies.



Figure 6: The team from UBKV developed plans for a local level foresight project, with inputs from Professor Sucharita Sen of JNU

The Bangladesh team led by the Bangladesh Agriculture University (BAU) focused on identifying opportunities for promotion of high-value crops for sustainable and inclusive food system in North-West Bangladesh. The current government focus in Bangladesh is to diversify the rice-rice cropping pattern to increase the area under high-value crops with lower water demand (maize, pulses, fruit, and veg) and promote aquaculture and animal husbandry.

Research questions to be addressed include:

- What is the status of high-value agriculture in NW Bangladesh?
- What is the current dietary diversity (accounting for gender and cultural differences)
- What would be the impact on farm incomes and nutrition of allocating part of the land to high-value crops?
- What would be the impact if farmers can participate in national / international trade markets?

Activities will include scenario analysis based on stakeholder consultations; policy dialogue with ministries; research and a validation workshop. The study will use secondary information from different sources, interviews with key stakeholders and will explore options to use modeling approaches like participatory system dynamics model, partial equilibrium models or even general equilibrium model if data are available.

The Bihar group, led by IFPRI, proposed to undertake a study to examine alternate pathways for shifting diets and food production from current patterns in Bihar to a system that would provide a healthy food plate using the EAT-LANCET report as a starting point. Research questions include:

- What does the existing plate of food (based on production) look like?
- What should a localized healthy food plate look like? This work would involve contextualizing EAT-LANCET recommendations for local resources and preferences.
- What transition would be needed to shift from current to the healthy plate, in terms of production, markets, and public policies?
- What pathways for such a transition are possible?

The project will invite a range of groups with different priorities and perspectives, and different methodologies (both quantitative and qualitative) to define, describe and assess their proposed pathways (for example: focusing on energy / water nexus; gender issues; markets; subsidies). Outcomes will be assessed in terms of costs and benefits, and the extent to which different pathways contribute towards meeting SDG goals.

The Steering Committee suggested that future pathways for Bihar should not ignore trade with other states of India and other parts of the world to secure healthy food and increase farmer incomes. The current policy goal of achieving food self-sufficiency may not be in consumers' or farmers' interests. The Committee also suggested looking at both short-term and long-term answers as the could be different.

Workshop Outcomes

The workshop was highly participatory, and all the participants remained engaged in group activities, dialogue, and discussion, exchanging ideas across disciplines and areas of expertise. Most participants gave us feedback that they found their participation in workshop rewarding. They appreciated the content, the program design and the balance between presentations and group exercises.

Younger participants showed great enthusiasm in group discussions and took lead to present their group's discussion to the plenary. They appreciated the opportunity to openly share their views and to make presentations on complex issues to a large group of experienced participants. Some of the participants from the national research systems requested for special

workshops on quantitative modeling tools introduced on the second day of the workshop. They were interested in learning these models and their applications in greater detail.

Participants from all three countries showed keen interest in organizing foresight for food exercises in their states or countries with government officials and farmer communities.

Some participants felt that there should have been more cross-country team exercises. They enjoyed the thematic exercises on Day 3 and suggested that there should be more such activities in the future.

The four country working groups presented interesting ideas in their proposals for future work in the component 2 of ACIAR SDIP. All four groups took the presentations seriously and showed keen interest in taking these proposals forward.

Presentations and outputs from the workshop are available at the following site: www.aciarsdip.com/meetings. A repository of data and information relating to food systems in the EGP will also be added to this website.

The workshop generated new ideas for future work and also helped created a group with shared interest in undertaking foresight exercises for sustainable food systems in different parts of EGP.

Appendix A: Agenda

Bracing for the future: A Participatory Exercise on Foresight for Food Systems in South Asia

11th – 14th February 2019

Kathmandu, Nepal

Day 1 – Introduction to foresight and food systems for the EGP

Learning objectives:

- Understanding of food systems framework
- Overview of foresight and scenario methodology
- Overview of big food systems issues in EGP
- Understanding of SDIP Foresight exercise and how this workshop will contribute

Day 1: Introduction to foresight and food systems for the EGP		
Inaugural session [9.30 - 11.30]		
<i>Chairperson:</i> Eric Huttner		
<i>Rapporteur:</i> Avinash Kishore, Devesh Roy		
Time	Session	Facilitation and Input
9:00-9:30	Registration and Welcome Tea	
9.30 – 9.40	Welcome address	Andrew Campbell
9.40 – 9.50	Introduction to the project and the workshop	Kuhu and Tamara
9.50 – 10.45	Self-introduction of all participants	Avinash Kishore & Jim Woodhill
10.45 – 11.30	Transforming Food Systems in South Asia	Prabhu Pingali
Tea Break: 11:30 – 12:00		
Session 1: The future of food in the EGP [12.00 – 13.00]		
<i>Chairperson:</i> Kuhu Chatterjee		
<i>Rapporteur:</i> Vishruta Choudhary		
12.00 – 12.30	Introduction to Food Systems and Foresight Methodology	Jim Woodhill & Saher Hasnain
12.30 – 12.50	Key takeaways from the WEF meeting on India's food systems	Ajay Vir Jakhar

12.50 – 13.00	Questions and feedback	
Lunch: 13:00 – 14:00		
Session 2: Foresight Analysis [14.00 – 15.30] <i>Facilitated Session: Tamara Jackson</i> <i>Rapporteur: Chetali Chhabra</i>		
14.00 – 15.10	Rich picturing of the food systems in Eastern Gangetic Plains: Bangladesh, Bihar, West Bengal, and Nepal	Jim Woodhill & Saher Hasnain
15.10 – 15.30	Country Presentations	
Tea Break: 15:30 – 16:00		
Session 2: Foresight Analysis (continued) [16.00 – 17.00] <i>Chairperson: Pratibha Singh</i> <i>Rapporteur: Vishruta Choudhary</i>		
16.00 – 16.45	Drivers of change in food systems: the known, the unknown and the uncertain	Jim Woodhill Mohammad Jangir Alam
16.45 – 17.00	Introduction to the team task for the week	Avinash Kishore

Day 2 – How modelling and data contribute to foresight and scenario analysis

Learning Objectives:

- Understand the role of models and data in supporting foresight and scenario analysis
- Understand what is meant by models and their predictive/analytical power
- Awareness of the key models for looking at food systems, which ones have been applied in the EGP
- Understanding of the data needed to feed models and key data sets for the EGP
- Awareness of how models can be used to inform policy and provide visual outputs to support dialogue and debate

Day 2: How modelling and data contribute to foresight and scenario analysis		
Session 3: Modelling approaches [9.30-11.00 am] <i>Chairperson:</i> Robyn Johnston <i>Rapporteur:</i> Tamara Jackson		
Time	Session	Facilitation and Input
9.30 – 9.40	Setting the agenda for the day	Robyn Johnston
9.40 – 10.00	Introduction to models for food systems <ul style="list-style-type: none"> • IMPACT • Global models that can be used in Food Systems Foresight 	Avinash Kishore Saher Hasnain
10.00 – 11.00	Understanding models from the grounds up: APSIM Modelling in the EGP region	Don Gaydon
Tea Break: 11:00 – 11:30		
Session 3: Modelling approaches (continued) [11.30 – 13.00] <i>Chairperson:</i> Kuhu Chatterjee <i>Rapporteur:</i> Mohammad Jahangir Alam		
11.30 – 12.00	Water resources modelling in the EGP	Don Gaydon for Mohammad Mainuddin
12.00 – 12.30	Climate Change in South Asia: What do models tell us? What are the big unknowns and uncertainties?	Brian Dawson
12.30 – 13.00	Discussion and questions	Tamara Jackson

Lunch: 13:00 – 14:00		
Session 3: Modelling approaches (continued) [14.00 – 15.30]		
<i>Chairperson: Jim Woodhill</i>		
<i>Rapporteur: Saher Hasnain</i>		
14.00 – 14.30	How can models inform policies and programs in South Asia? Examples from CCAFS work in Bangladesh, India and Nepal	Arun Khatri-Chhetri
14.30 – 14.45	Participatory 3-Dimensional Modelling	Madhav Karki (TBC)
14.45 – 15.30	Panel discussion: Making better use of models to support foresight Panel discussion	Jim Woodhill
Tea: 15:30 – 16:00		
Session 3: Modelling approaches (continued) [16.00 – 17.00]		
<i>Chairperson: Eric Huttner</i>		
<i>Rapporteur: Avinash Kishore</i>		
16.00 – 16.45	Reflections on different models and modelling approaches for South Asia. Working group discussion on how modelling could contribute foresight exercises in the relevant locations	Tamara Jackson & Kuhu Chatterjee
16.45 – 17.00	Wrap up	Robyn Johnston

Day 3 - Mapping the dynamics of food systems and emerging drivers, trends and issues

Learning Objectives:

- Understanding of different systems mapping approaches to identify key elements and relations in a system
- Know how to do a causal loop diagram
- Understand key drivers, trends and issues in four key areas:
 - Water, food and energy nexus
 - Women in food systems
 - Agriculture, labour, migration and livelihoods
 - Regional trade and markets
- Awareness of the overall key drivers and trends in food systems for EGP
- Understand the notions of uncertainties and weak signals

Day 3: Mapping the dynamics of food systems and emerging drivers, trends and issues		
Session 4: Mapping the dynamics of food systems [9.00-13.00] <i>Facilitated Session: Jim Woodhill & Saher Hasnain</i> <i>Rapporteur: Vishruta Choudhry</i>		
9.00 – 10.00	Introduction to systems mapping and causal loop diagrams	Jim Woodhill and Saher Hasnain
10.00 – 12.00	Participants divided into 4 thematic groups: a) energy-water nexus in EGP; b) agricultural trade and food markets; c) women in agriculture; d) labour, migration and occupational diversification in EGP	Aditi Mukherji: EW nexus Mohammad Jahangir Alam: Agricultural trade and food markets Sucharita Sen: Women in Agriculture Avinash Kishore: Labour, Migration and Occupational Diversification
12.00 – 13.00	Present outputs back to main group	Saher Hasnain
Lunch: 13:00 – 14:00		
Session 5: Working Groups Prepare for their Presentation on the Final Day [14.00 – 17.00] <i>Facilitated Session: Tamara Jackson & Kuhu Chatterjee</i>		
14.00 – 17.00	Synthesis of Foresight work by country	Tamara Jackson & Kuhu Chatterjee
Tea: 15:30 – 16:00		

Day 4 - Scenarios for food systems in the EGP and planning for foresight work







Learning Objectives




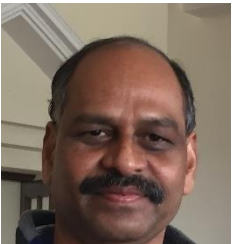


- Participants know how to facilitate a scenario exercise
- Participants have explored different scenarios for their area
- Participants have reflected on how foresight and scenario analysis could help food system transformation and policy processes in their area
- Participants know how to take the next steps with the SDIP Foresight exercise







Day 4: Scenarios for food systems in the EGP and planning for foresight work		
Session 6: Scenario analysis for foresight exercises [9.00-13.00]		
<i>Facilitated Session: Tamara Jackson</i>		
<i>Rapporteur: Shambhavi Saran</i>		
Time	Session	Facilitation and Input
9.00 – 10.00	Introduction to scenario planning and analysis	Jim Woodhill, Saher Hasnain
10.00 – 11.30	Scenario analysis for food systems – small groups	Jim Woodhill Madhav Karki Andrew Johnson
Tea: 11:30 – 12:00		
12.00 – 12.30	Present outputs back to main group	Jim Woodhill
12.30 – 13.00	Finalise presentations for post lunch session	All
Lunch: 13:00 – 14:00		
Session 7: Synthesis of work throughout the workshop [14.00 – 15.30]		
<i>Chairperson: Jim Woodhill</i>		
<i>Rapporteur: Chetali Chhabra</i>		
14.00 – 14.05	Introduction to synthesis presentations	Jim Woodhill
14.05 – 14.15	Bangladesh	Mohammed Jahangir Alam
14.15 – 14.25	Bihar	Ram Datt Mishra
14.25 – 14.35	Nepal	Madhav Karki







14.35 – 14.45	West Bengal	Prateek Bhattacharya
14.45 – 15.00	South Asia/EGP	Avinash Kishore
15.00 – 15.30	Discussion and invited questions from the SC members	Jim Woodhill
Session 8: Future collaborations and wrap up [15.00 – 16.00] <i>Chairperson: Avinash Kishore</i> <i>Rapporteur: Pratibha Singh</i>		
15.00 – 15.30	Setting the agenda for the foresight meeting in December 2019	Tamara Jackson and Jim Woodhill
15.30 – 15.45	Building collaborations for foresight for food exercises in south Asia. Summing up on way forward.	Kuhu Chatterjee
15.45 – 16.00	Closing remarks	Jim Woodhill Andrew Campbell Madhav Belbase
Tea: 16:00 – 16:30		

Appendix B: List of participants

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