



United Nations Food Systems Summit 2021  
Scientific Group  
<https://sc-fss2021.org/>

# SCIENCE DAYS

## IMPLICATIONS FOR A SCIENCE AGENDA FOR THE UNITED NATIONS FOOD SYSTEMS SUMMIT | 08-09 JULY 2021

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### INTRODUCTION

Science, technology and innovation are essential to accelerate the transformation to healthier diets and more sustainable, equitable and resilient food systems. What science and innovation are needed and how they can inform related policies were the focus of the [Science Days](#), a virtual conference organized by the [Scientific Group to the UN Food Systems Summit](#) and facilitated and hosted by the [Food and Agriculture Organization of the United Nations](#) on July 8-9, 2021 (see Annex 1 for the program). In addition, partners held more than [40 side events on July 5-7](#) to present their insights on science, technologies and innovations that can drive food systems transformation (see Annex 2).

More than 2,000 participants from research, policy, civil society and industry came together to examine how to unlock the full potential of science, technology, and innovation to transform food systems. They also discussed:

- advancing science-based options for achieving more healthy diets and more inclusive, sustainable and resilient food systems;
- putting science to work, especially through stronger science-policy interfaces, investments in institutional and human capacity, and capitalizing on models and data;
- addressing missed opportunities and contentious issues hindering the advancement of science;
- empowering and engaging key players, including youth, Indigenous Peoples,

food industry and start-ups, and women;

- pushing the frontiers of science, especially in bio-science innovations, digital innovations, and policy and institutional innovations; and
- looking ahead to the world in 2030 and beyond, and prioritizing urgent actions to achieve Agenda 2030 and the Sustainable Development Goals (SDGs), especially SDG2.

Brief highlights of the discussions that took place during the two days follow, with an emphasis on opportunities for investments in science and knowledge and evidence gaps that must be addressed to meaningfully and successfully transform food systems to achieve ending hunger and ensure more healthy diets, as well as enabling more inclusive, sustainable and resilient food systems.

## 1. SCIENCE FOR THE FOOD SYSTEMS SUMMIT: UNLOCKING THE POTENTIAL OF SCIENCE, TECHNOLOGY AND INNOVATION (STI) FOR FOOD SYSTEMS TRANSFORMATION

**QU Dongyu, Director-General, United Nations Food and Agriculture Organization (FAO)**, highlighted the need to adopt *“a holistic, coordinated approach to transform our agri-food systems”* and stressed that *“to achieve the ambitious transformative changes required, we need to change policies, mindsets, behaviours and business models.”*

**Amina Mohamed, UN Deputy Secretary-General and Moderator of the Summit Advisory Committee**, emphasized that

*“food systems transformation demands that we deepen our understanding of how to best calibrate our policies and investments, so they address all dimensions of sustainable development.... It’s no longer enough to think only of enhancing productivity. We must also account for the relationship with human and planetary health.”*

**Agnes Kalibata, UN SG’s Special Envoy for the 2021 Food Systems Summit**, underlined that food systems transformation will contribute towards achieving multiple SDGs, noting that *“the complexity and importance of agri-food systems need to be recognized, not only to combat hunger and malnutrition, but also to reduce inequalities and eradicate poverty.”*

**Joachim von Braun, Chair of the Scientific Group**, stressed the need for an interdisciplinary approach to food systems transformation, urging that *“all sciences – natural sciences and social sciences, basic sciences and applied sciences – can and must deliver the innovations needed for food systems transformation.”* He presented a set of seven [science-driven innovations](#)<sup>1</sup> put forward by members of the Scientific Group to catalyze, support and accelerate food systems transformation to achieve the Summit goals:

1. Innovations to end hunger and increase the availability and affordability of healthy diets and nutritious foods.
2. Innovations to de-risk food systems and strengthen resilience, in particular for negative emission farming and climate-resilient food systems.

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<sup>1</sup> These are presented in greater detail in the strategic paper on **Science for Transformation of Food Systems: Opportunities for the UN Food Systems Summit** by Joachim von Braun, Kaosar

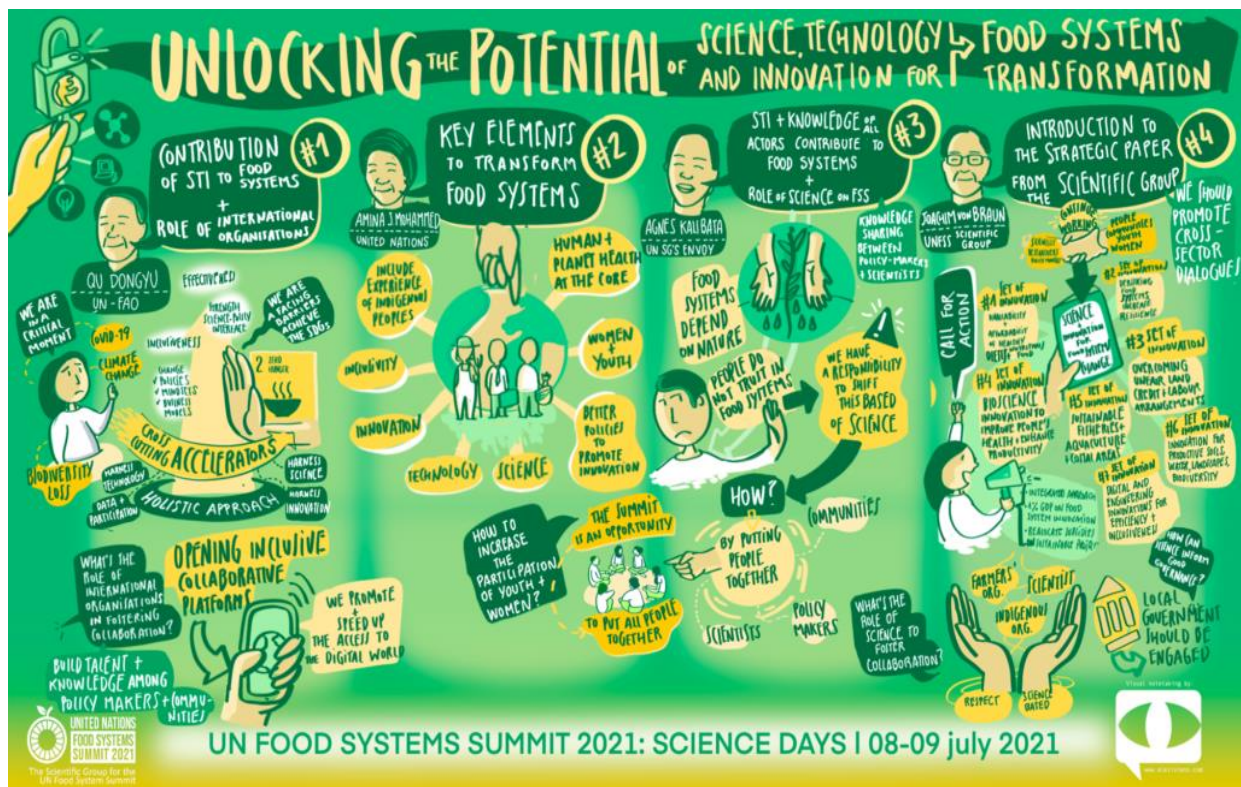
Afsana, Louise O. Fresco and Mohamed Hassan, July 2021.

3. Innovations to overcome inefficient and unfair land, credit, and labor arrangements, and to facilitate the inclusion, empowerment and rights of women and youth.
4. Bio-science and digital innovations for improving people’s health, enhancing systems’ productivity, and restoring ecological well-being.
5. Innovations to keep – and, where needed, regenerate -- productive soils, water and landscapes, and protect the agricultural genetic base and biodiversity.
6. Innovations for sustainable fisheries, aquaculture, and the protection of coastal areas and oceans.
7. Engineering and digital innovations for the efficiency and inclusiveness of food systems and the empowerment of rural communities.

emerged during the discussions, with speakers (i) calling on governments to invest in STI, noting that current levels are insufficient; (ii) calling for intergovernmental action, noting that food systems science cannot be undertaken by a single ministry; and (iii) calling for local governments to be engaged as food systems are local, ecology is local, and natural resources are local.

Another key theme focused on collaboration between scientists and other stakeholders, with speakers urging scientists to engage with citizens and be prepared to answer difficult questions, calling on scientists not to “talk about” but rather “talk with” Indigenous Peoples and other communities, and suggesting that platforms should be created or strengthened to facilitate collaboration between scientists and other knowledge communities in food systems.

Governance and the role of science in food systems governance was a key theme that



## 2. SCIENCE AS ACTION: SCIENCE-BASED OPTIONS TO ACHIEVE MORE HEALTHY DIETS AND MORE INCLUSIVE, SUSTAINABLE, AND RESILIENT FOOD SYSTEMS

### 2A. SCIENCE AS ACTION: SCIENCE-BASED OPTIONS TO ACHIEVE MORE HEALTHY DIETS AND MORE INCLUSIVE, SUSTAINABLE, AND RESILIENT FOOD SYSTEMS

This session focused on science, technology, policy and institutional innovations to enhance productivity, and incentivize the availability, affordability, and uptake of nutritious and safe foods.

Several knowledge/evidence gaps were highlighted, including the notion that more research/evidence is needed on (i) the effects – including environmental effects – of different types of diets including plant-based diets (vegan/vegetarian) and aquatic foods; (ii) the effects of different policy interventions on consumption patterns; and (iii) approaches for reducing antimicrobial resistance. Concepts and definitions should be standardized based on a unified approach towards health. Large, standardized data sets – especially in/for Africa – should be collected. Collaboration among researchers, innovators, and regulatory bodies needs to be enhanced.

The role of bioinformatics and nanotechnologies in ensuring food safety standards needs to be better understood. Modalities need to be explored for strengthening local food chains for improving the access to and affordability of diversified diets, and minimizing food loss and waste. The issue of healthy diets should be approached holistically, i.e. using the One Health approach, i.e. the notion that human, animal, plant and planetary

health are interconnected and interdependent.

### 2B. ACHIEVING MORE *INCLUSIVE FOOD SYSTEMS* – STI FOR ELIMINATING HUNGER AND POVERTY AND ADVANCING EQUITABLE LIVELIHOODS

This session focused on science, technology, policy and institutional innovations to eliminate hunger, malnutrition and poverty and advance equitable livelihoods.

Technological and institutional innovations in food systems have enabled great progress in hunger reduction and improvement, but with massive adverse consequences for planetary health and social justice. Despite the advances in the production of staple food crops that help to increase global caloric availability, food systems fail to provide healthy diets for all with additional challenges caused by the COVID-19 pandemic. Huge social disparities across and within countries persist, notably – for example – between rural and urban areas, which have led to inequities in access to resources and institutional participation. Thus, innovations need to be more inclusive and should not exclude some food systems actors.

Several key knowledge and evidence gaps emerged during the discussion, such as which technology bundles are required to boost productivity of smallholders, how to change institutional frameworks/bring forward institutional change to make food systems more inclusive and reduce social inequities, and how to avoid overlooking negative externalities of proposed solutions (e.g. small-scale irrigation and consequences on water availability).

## **2C. ACHIEVING MORE SUSTAINABLE AND RESILIENT FOOD SYSTEMS – STI FOR MAKING SUSTAINABLE USE OF NATURAL RESOURCES AND MANAGING AND PREVENTING RISKS AND CRISES, INCLUDING CLIMATE CHANGE AND COVID-19**

This session focused on science, technology, policy and institutional innovations to achieve more sustainable and resilient terrestrial and marine-based food systems and foster more climate-neutral, climate-positive, and climate-resilient food systems.

Diversification can play an important role in increasing the resilience of food systems at various levels. In food production, for instance, resilience could be built through the diversification of cultivars or by shifting from annual to perennial cropping systems. Diversification efforts should focus on both the protection of the existing agrobiodiversity and farming systems as well as the development of new approaches, such as breeding of new cultivar(s) that are better adapted to changing conditions. Diversification of food baskets – including a greater focus on indigenous foods – could increase resilience at the consumption level. A more holistic view of food production is also needed that goes beyond a focus on staple crops to take into account crop production, animal husbandry, forestry and non-food uses of biological resources.

Building resilience will require structural changes, not only at the individual level but also at the societal and cultural level. Farmers are risk averse, but not necessarily technology averse. To mainstream STI, there is a need to understand farmers and establish trust between farmers and

scientists. Another way to facilitate the adoption of STI and reduce risks is by working with communities, enabling participants to decide which technologies to adopt.

## **3. PUTTING SCIENCE TO WORK: SCIENCE, PEOPLE AND POLICY**

### **3A: STRENGTHENING THE SCIENCE-POLICY INTERFACE ACROSS DISCIPLINES AND POLICY AREAS INCLUDING ECONOMICS, AND HEALTH-, NUTRITION-, CLIMATE-, ECOLOGICAL-SCIENCES**

This session focused on how to strengthen the science-policy interface at the national and international levels to enable food systems transformation.

Three key features are necessary for a successful science-policy interface: (i) salience, translating science and knowledge in ways that are relevant to policymakers; (ii) credibility, holding high scientific quality and being trustworthy; and (iii) legitimacy, being viewed by stakeholders as the appropriate body for the job. The accountability and inclusiveness of such an interface are also important. Research has both an *ex-ante* and *ex post* role in policy-making. Science informs policies based on existing evidence but must also continuously gather new evidence through the evaluation of policies in place. Science-policy interfaces must play both of these roles. The lags between innovations and the markets and those between end users and innovators can be reduced by strengthening science-policy platforms.

At the national level, platforms that can bring together all of the stakeholders – ministries, researchers, data repositories –

from different disciplines are needed. At the international level, there is a need for an intergovernmental mechanism: speakers called for more investigation on whether we should build on what currently exists or create a new body.

Discussions also highlighted the notion that unsustainable food system subsidies must be replaced with policy innovations. Scientists can help policy-makers to design policies that help to achieve multiple goals/wins. Such policies can be designed by identifying synergies, and multidisciplinary and collaborative research is a pre-requisite for identifying these synergies.

### **3B. INVESTING IN INSTITUTIONAL AND HUMAN CAPACITY FOR SCIENCE AND INNOVATION**

This session focused on the type of investments needed to strengthen institutional and human capacity to enable food systems transformation.

Regional and international collaborations in food system science need to be promoted and funds provided to support programs that empower youth, farmers, and women. The role of academics and science in building institutions can be strengthened through global networks that generate new types of knowledge and enable collaboration at the local, national, and global levels by bringing together different expertise. New programs, projects, and ways of teaching to overcome old barriers are required. Curricula and training courses need to be updated and state-of-the-art materials included. Greater emphasis needs to be placed on transdisciplinary research and education (in terms of courses and degrees). In addition, to make related studies more

attractive to students, mindsets need to be changed to see food system activities as a business, whereby entrepreneurs in agribusiness and R&D can act as role models and support innovations from idea to output and give practical examples. A more efficient food system demands not only adjustments on the production side, but also a shift in the mindset of consumers to foster healthy diets. Changing consumption patterns towards more sustainable and healthy diets requires investments in human resources (e.g. nutritionists, food advisers) and educating the younger generation.

As future food systems become increasingly knowledge-intensive, universities (and research organizations) require increased financial support to play a key role in food systems transformation. This could be achieved through specific official development assistance (ODA) designed to support science and technology in the recipient country by making science an integral part of development projects (with a percentage of ODA-funded programs and projects going to local and national research organizations, such as academies and universities) aimed at strengthening research and higher educational systems.

### **3C. CAPITALIZING ON MODELS, DATA, AND COMMUNICATIONS REVOLUTIONS, AND NEW METHODS**

This session focused on capitalizing on and expanding investments in models, data, methods, and communications to enable food systems transformation. Speakers highlighted the utility of models as labs where innovations can be tested to understand their direct and indirect effects. This is particularly useful regarding

food systems that are highly complex. Different types of models and other data-driven tools can be applied in this regard. For instance, crop models can assess the impacts of innovations on agricultural productivity or landscapes. They can also predict yields in specific contexts to inform crop insurance schemes. Initially developed at the field scale, they are increasingly also being applied at regional and global scales. However, they have limitations, as it is only possible to model a certain range of crops, and information on different management approaches is limited. Another important source of data is satellite images, which can be used – for example – for damage assessments and early warning. However, the local context can constrain their use: analysis of smallholder landscapes is difficult due to mixed crops and landcover, often making additional fieldwork necessary.

To take full advantage of these analytical tools in the study of food systems, it will be important to integrate different types of models, including crop models, economic models or GIS-based tools. This remains a major challenge. Limited data availability can also reduce the extent to which these tools can be applied. Moreover, data alone will not be enough; rather, the tools need to be based on sound theory and decision support systems to make sense of the data. In addition, further efforts are urgently needed to bridge the last mile to end users and provide them with the necessary information to assist them with decision-making on the ground.

#### **4: WHY THE FIGHT: GETTING TO GRIPS WITH MISSED OPPORTUNITIES AND CONTENTIOUS ISSUES IN SCIENCE AND INNOVATION FOR FOOD SYSTEMS**

This session explored the causes of important lingering and emerging food

systems-related science controversies, as well as missed opportunities in STI for food systems transformation, and discussed the role of research to address such controversies and move beyond polarization. Speakers highlighted several missed opportunities and contentious issues concerning (i) agro-ecology, (ii) protein from aquatic foods, and (iii) biotechnology.

Agroecology is about diversification (diversification of landscapes, actors, knowledge [traditional/scientific]), which reduces trade-offs between ecosystems and natural resources and food productivity. To mainstream agroecological practices, it is important to address incoherent policies, excessive dependency on markets, and inadequate participation of citizens. Any diversification strategy needs to be context specific. Diversification is not a contradiction to productivity, nor is it the sole solution to the problem, but it can enhance the resilience of food systems.

Protein from aquatic foods is a missed opportunity to transform food systems. Diversification should include diverse foods from land and water systems. A major challenge is to change the narrative from feeding to nourishing, which gives an entry point to transform water systems (e.g. in Cambodia, the most important part of the diet is aquatic food). More research is needed on the implications of incorporating wild aquatic foods, e.g. seaweed that are high in micronutrients and protein, into diets. The importance of wild food in general appears to be underestimated, and more data and research are needed on this.

Biotechnology alone cannot solve the issue of hunger, but it is a part of the solution. CRISPR provides the ability to increase the

quantity and quality of yields, as well as the micronutrient content of those yields. However, the political economy strongly influences the functioning of food systems. Science can be the solution if there are the right incentives in place. The major issue is having the right incentives in policy. Technology needs to be regulated based on its outcomes.

A challenge is also posed by misinformation about what would be required to create sustainable food systems, and at the same time provide financial returns for all stakeholders. Scientists can help in amplifying the voice for new tools that can drive the necessary policies and support the critical dialogues engaging policy-makers. Scientists producing evidence can put it in context, advise, and suggest pathways to implementation.



## 5: ACHIEVING THE 2030 GOALS: OPPORTUNITIES, TRADE-OFFS, OBSTACLES AND SYNERGIES

Drawing upon global foresight models and scenario exercises, this session looked ahead to the world in 2030.

Food systems are threatening key planetary boundaries, with some critical boundaries already being surpassed. Feeding the world is currently at odds with sustainable food production. Tackling the

food system challenges demands a systemic approach and the provision of cross-cutting knowledge. Therefore, research and public policies need to be connected and actions from all actors in the area must be mobilized. Food system transformation needs to address both the supply and demand side in a holistic way starting from research output that addresses societal needs to policy-making that integrates the civil society. Participatory governance and research are key. Investment in multi-stakeholder partnerships is mandatory, and



communities must be empowered to become part of research and policy processes. Asymmetries in information need to be reduced (e.g. through trade and knowledge). It is crucial to involve citizens in making science choices, rather than just explaining to them technologies based on risk assessment.

For Africa, as the majority of its population lives in rural areas and engages in

agriculture, a vibrant agricultural sector is required to achieve inclusive development and socioeconomic transformation. This requires financial and infrastructure capacity building and investment in human capital. African investment in national public research is critical but insufficient. Trade and regulation are key for food systems transformation. Intra-African trade needs to be boosted, and free access to global food markets is critical.



## 6: EMPOWERING AND ENGAGING KEY PLAYERS IN FOOD SYSTEM INNOVATION

### 6A. YOUTH

This session focused on how to effectively and appropriately engage, include, incentivize, and empower youth in science and innovation for food systems transformations.

Today's youth are the decision-makers of tomorrow. It is crucial to engage youth on two fronts: on the one hand, there is a need to capitalize on their potential, knowledge and ideas to foster innovation for food system transformation, and on the other hand there is

a need to listen to them and their needs on an equitable basis.

Food systems transformation must be inclusive of the youth. Meaningful representation is the key to meaningful engagement. Youth are still under-represented, especially in international fora. This is a manifestation of power imbalances and lack of inclusiveness (and lack of understanding of thereof). Science is essential not only in providing innovative ideas and knowledge for food systems transformation, but also as a platform of engagement of youth at local and global scales through interdisciplinary, intergenerational and intercultural networks. At the same time,

acting only at the international level is not sufficient because many groups are not represented at this level. Youth must be approached at both national and grassroots levels where young people self-organize in informal ways on a voluntary basis, but without proper resources for action.

Youth have a particularly high stake in ensuring climate justice, which needs to go hand in hand with environmental and food justice. Trade-offs between these goals may exist and need to be addressed. This requires collective multilateral approaches. Youth can be drivers of change in this regard rather than passive beneficiaries.

## **6B. TRADITIONAL AND INDIGENOUS KNOWLEDGE**

This session focused on how to effectively and appropriately support and use traditional and Indigenous Peoples' knowledge and facilitate access and benefit-sharing.

Speakers highlighted that indigenous food systems are multifunctional and holistic, as well as self-sufficient and nutritious. Nature not only generates food but medicine, shelter, energy and supports cultural identity, social and spiritual life. Additionally, Indigenous Peoples' innovations do not deplete natural resources or increase carbon emissions. Women are knowledge keepers, sharing and sustaining knowledge by passing it on to their descendants. However, it is insufficient to only acknowledge this, but rather the move must take place from acknowledgment to specific actions. It is necessary to let the keepers of knowledge sit at decision tables, not only to protect their knowledge but also to confer the lessons of their knowledge about resilience and sustainability to address global challenges. Furthermore, it is important to recognize Indigenous Peoples' knowledge and treat it equally with other knowledge

systems, continue to encourage transdisciplinary collaborative research and co-production of knowledge that will support equitable benefit-sharing, and promote collaboration and network of champions for up-scaling. To empower and engage knowledge holders, universities and scientific bodies should participate in local initiatives and integrate indigenous knowledge into school curricula.

Going forward, the key knowledge gap to address is how to better integrate Indigenous Peoples in decision-making and scientific processes.

## **6C. SCIENCE IN AND BY THE FOOD INDUSTRY AND START-UPS**

This session focused on how to effectively and appropriately support and use science in and by the food industry and start-ups, and foster partnerships between food industry science and public sector, academia and civil society science.

This session showcased private sector-led examples of technological and institutional innovations that can support the achievement of the SDGs on several levels. In India, for instance, innovations have benefited smallholders (satellite imagery/remote sensing), contributed to reducing poverty (white revolution) and improved nutrition (biofortification). Cultured meat as an alternative protein source can support food security by providing nutritious and affordable food cost-effectively and with a smaller environmental footprint. Innovations in the blue sector (including capture fisheries, aquaculture and non-fish aquatic foods) can improve the access to and affordability of healthy and diverse diets. Cultured meat and aquatic foods, along with other innovations, could strongly increase not

only the quantity but also the quality of protein, whereby the latter is often overlooked especially in low- and middle-income countries.

Developing and commercializing technological and institutional innovations requires a supportive start-up ecosystem that engages local communities and industry. In particular, challenges related to product registration and regulations for new products and novel foods remain to be addressed in many lower-income markets. A lack of harmonization currently inhibits advancement, given that all countries have different regulatory processes. The EU could be a useful role model in this regard. Innovation environments should support both incremental and transformative innovations to improve food systems and achieve sustainable agriculture.

Sustainability in the aquatic foods sector will be key to its long-term viability. Both the private and public sectors have to be involved for sustainable fisheries and aquaculture. Good resource management systems for public goods (i.e. fisheries) need to operate across borders and should be based on science. On the other hand, the industry has a responsibility to harvest with the right tools, reduce pressure on fisheries by sustainably increasing fish farming around the world, and share knowledge on breeding for improvements of growth and a reduction of disease outbreaks.

## 6D: WOMEN

This session focused on strengthening rights, and the effective and appropriate engagement, inclusion, and empowerment of women in science and innovation for food systems transformation.

Speakers highlighted that there exist synergies between the two goals of achieving more gender equal societies and economies and the transformation of food systems into more equitable and sustainable food systems. Processes that disempower women are also those that exclude women from food systems. However, food systems and gender relations are diverse, and this diversity should be considered when prioritizing the pathways towards food systems transformation. Land and credit are the key resources that can empower women, although women have reduced access to these two key resources. Women's access to markets is hindered by cultural norms, gender-based violence, and limited mobility exacerbated by unavailability of affordable transport. Greater access to markets has been evidenced to improve women's decision-making as well as improved incomes and nutritional outcomes. The pathways to gender equity and food system transformation are similar. Both require not only science-driven innovations but also social, legal, and cultural change.

The key knowledge and evidence gaps needed to address the overarching question of how to induce food system transformation to gender equitable food systems include:

- How to limit hijacking of social networks among women by privileged individuals (and men).
- How to identify and create new business models that put women at the center.
- How to engage men in the empowerment process, and create male champions for gender equality.
- How to understand intra-household inequalities to induce change towards gender equitable food systems, particularly at scale.

- How to break the default male-oriented system (not only the food system).

## 7: BRAVE NEW WORLD: PUSHING THE FRONTIERS OF SCIENCE FOR FOOD SYSTEMS

### 7A: BIO-SCIENCE INNOVATIONS

This session focused on the frontiers of science for food systems, in this case the frontiers of bio-science innovations such as genome editing, synthetic biology, microbiomes, alternative protein sources, alternative sources for essential micronutrients, cell factories and more.

Bio-sciences offer various opportunities to tackle malnutrition. For instance, this includes the use of underutilized crops to increase the diversity of the gene pool, technologies for precision selection and accelerated crop improvement, and biofortification to improve nutritional quality of foods that are easily accessible for a large population. Bio-sciences also have strong potential to impact personalized nutrition (i.e. nutrition that takes into consideration individual genetics, phenotype, dietary habits, etc.), but research in this area is still at an early stage.

Related innovations can also contribute to more sustainable production. Although synthetic fertilizers/pesticides have allowed us to significantly increase agricultural production and reduce food insecurity, their mis-use can have serious adverse effects for biodiversity and human health. There are many promising bio-based innovations that can help make agricultural production more sustainable (e.g. artificially synthesized pheromones to control insect populations, microbiome-based inputs to improve carbon

sequestration, reduce methane emissions from ruminants, etc.). Synthetic biology will also have an important role in vaccine development (e.g. for cattle). In the long run, these technologies could be personalized for different micro-environments (personalized farming). As bio-science innovations are developed, it is important to understand the needs of those who will use these new technologies at all stages of the value chain. For example, what do farmers want from bio-inputs? What do end consumers want from alternative protein sources?

Moreover, developing technologies is insufficient; rather, these technologies must be available to smallholders, and smallholders must have the resources needed to adopt them if they wish to do so. Regional harmonization on standards can speed up the adoption and increase transparency of suitable biotechnologies. More coherent regulatory frameworks can avoid creating barriers for competition, trade, and innovation. In some cases, regulating products instead of technologies may be preferable (e.g. not restricting the use of gene-editing, but creating regulations to ensure that the technology will not be mis-used).

### 7A. DIGITAL INNOVATIONS

This session focused on the frontiers of science for food systems, in this case the frontiers of digital innovations such as artificial intelligence, machine learning, the Internet of Things, remote sensing, big data analysis, robotics, and more.

Many digital tools are now available in the different agricultural sub-sectors, in particular crop and livestock production, which support farmers with information, access to markets and financial services. Additional investments are needed to

move more of these solutions to scale and make them available for producers and other food system actors. A better science base will be crucial to inform the design and scaling of these digital tools, requiring closer collaboration between researchers and entrepreneurs. This will allow STI products from the lab/university, etc. to be useful in the farm/market. Building subject matter-expertise among the providers of digital solutions as part of teaching curricula could contribute to bridging this gap. Moreover, better integration of the diverse digital solutions into broader platforms can reduce marketing costs and generate added value for users.

Data protection remains an under-regulated and under-researched issue. A balance must be struck between capitalizing on the data available through the digital tools to inform decision-making and protecting the privacy of data among those that provide it. Users should be given the option to retain their data or be compensated for their use, either financially or through improved service provision. In addition, efforts need to be made to make available data actionable and lead to relevant solutions on the ground. If data access and decision intelligence remain unequal, digital solutions will not level the playing field nor address competitive disadvantages.

## **7B. POLICY AND INSTITUTIONAL INNOVATIONS**

This session focused on the frontiers of research on policy and institutional innovations such as financing the actions for food systems transformations, repurposing subsidies, innovating taxes, designing regulations, facilitating collective action, governing common goods, revising gender norms, improving market functioning, re-assessing the price and value of food and more.

Economic policy reforms that can help to achieve different goals at the same time need to be developed and implemented. Some of the current subsidies within the food systems, e.g. for intensive animal farms that contribute to environmental degradation, must be redirected to encourage and support sustainable practices. Consideration should be given to promoting technologies such as cellular meat and fish, low impact vertical farming, and regenerative ocean farming as well as public sponsoring of food industry initiatives that promote healthy food habits.

There is a need for eliminating price and market distortions. Market distorting subsidies should be replaced by income supporting programs for low-income consumers and producers. Internalizing the true cost of food into the price of food through taxes or policy instruments should be explored, but it must be considered whether poor people can afford those prices. Social protection would need to be enhanced. True cost accounting must be integrated into national accounting, from GDP account to GEP (growth and ecosystems) accounting. Price surveys, production surveys, and ecosystem services accounting surveys should be integrated.

Continuity of effective policies can be ensured through institutionalizing science-policy interfaces at national and regional levels. Bridging scientific and indigenous knowledge, building consensus on key definitions and communication between policy, science and consumers are some of the key roles for these science-policy interfaces.

There is room for better communication of scientific evidence for effective policies, whereby the trade-offs and synergies of

different policies must be clearly articulated, and priorities must be identified for policy-makers.

## **8: LOOKING AHEAD: STRATEGIC FOOD SYSTEMS SCIENCE BEYOND 2030**

This session closed the Science Days with reflections on the long-term (beyond 2030) issues, opportunities, and challenges for STI.

The essential role of science for food systems transformation was highlighted throughout this session. While many of the food systems are operated within and by the private sector, governments have a key role to play in creating appropriate macroeconomic frameworks and providing appropriate incentives and regulations to facilitate proper functioning of the private sector, creating positive externalities where the true cost of food is not reflected in market prices, and investing in research and development. Both public and private sectors have important roles to play in research and development. Both basic and applied research are necessary. Investment in scientific research on and for food systems needs to increase by both the public and private sector.

It is insufficient to generate new innovations. Many innovations and solutions already exist that are ready to be implemented. It is critical to understand and overcome hurdles in innovation, including ensuring wider access to

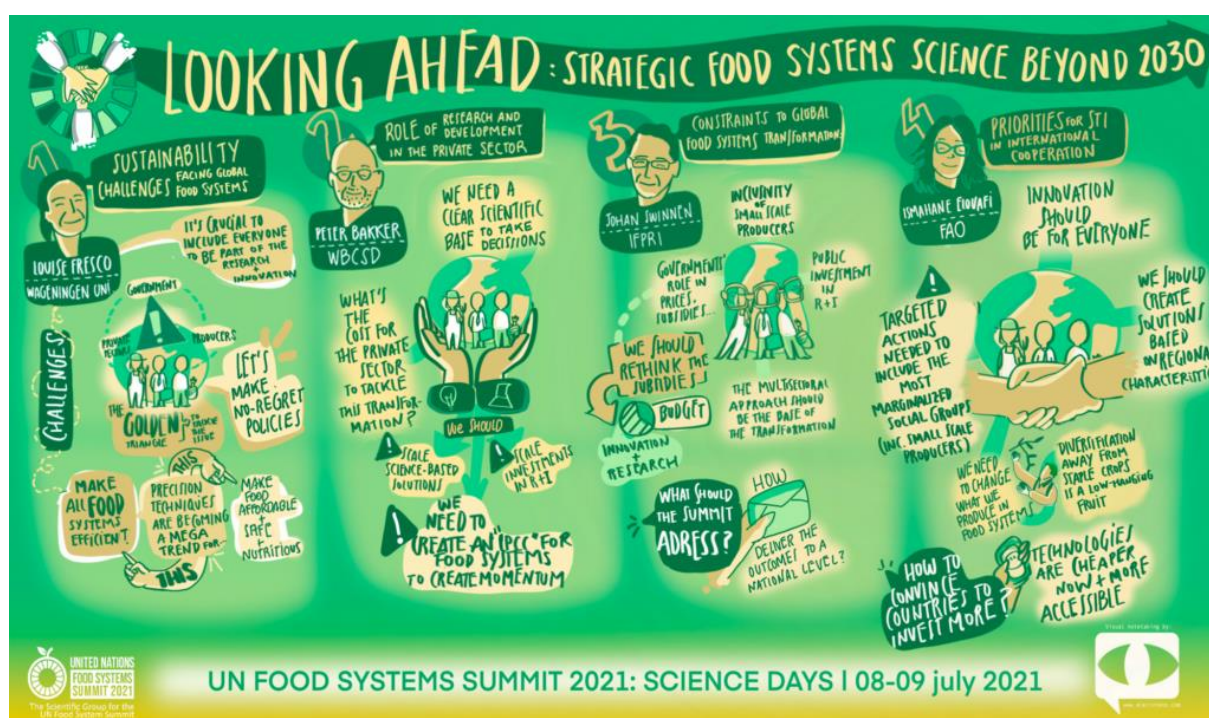
innovations, especially by populations that were missed in the millennium agenda.

Technology should be adapted to user demands. Farmers and consumers must come together with scientists and be involved in technology design instead of simply being the recipients of technologies. This engagement of science and scientists with the end users will only be effective if it is long term, institutionalized, and iterative.

Food systems transformation and food security is not only about the supply side, but also the demand side. Affordability of healthy diets is a huge issue that must be tackled.

Key areas of research highlighted included assessing the true cost of food, improving resource use efficiency, overcoming hurdles to implementation of innovations, increasing affordability of healthy diets, increasing productivity and production of fruits and vegetables, and reducing food loss and waste.

The need for a global science-policy interface on food systems was highlighted. Suggestions were made for an intergovernmental platform, perhaps along the lines of the IPCC, and more broadly to explore a global agreement for food systems, perhaps along the lines of the Paris Agreement on climate. These would convey and entail a longer-term commitment by governments to overhaul the food systems. A radical change in food systems is needed, not incremental change.



## CLOSING REMARKS AND WAY FORWARD

Joachim von Braun, Chair of the Scientific Group, reiterated that the Science Days brought together all sciences – social and natural sciences – to facilitate transformation towards sustainable food systems, with the key objective of ending hunger and malnutrition.

While food systems marginalize hunger, this must not be tolerated. The undernourished, youth, women, Indigenous Peoples, and all those who are marginalized have the right of agency on all matters of the food systems. The 1.5-degree global warming goal is equivalent to the zero hunger by 2030 goal. To get there, accelerated science investments and the resulting complex set of innovations need to be one of the top game-changing actions of the Summit.

Science Days was a great learning and research exchange experience. Game-Changing actions partly resulting from the important five Action Tracks that shape

Summit agendas were shared. The FSS as a whole needs to become the game changer.

Frontiers of science themes that bring resilience and equity were on the agenda. There was a call for poverty lines to change given that many of them are ridiculously low, not permitting a healthy diet. The opportunities of data revolutions and related analytics were noted, as were the related monopolization risks. Biotechnologies and digitization play a key role in several contexts. Micro-biome research is very relevant for understanding both human nutrition and soil health, plant and animal health, namely One Health. Agroecological approaches should be part of the science agenda, and landscapes need to change, monoculture agriculture abandoned, and digital precision farming innovations embraced to facilitate increased biodiversity. The opportunities for modeling were stressed, and the key role of trade arrangements was highlighted. All sessions touched upon the COVID-19 crisis, and the fragility of the

food systems due to climate crises. There were calls for more sharing of science.

Ideas for addressing the finance challenges were shared, and it was noted that both the corporate and public sectors are needed for finance. The InterAcademy Partnership suggested to connect science funding to ODA development program spending. The Scientific Group called upon governments to spend at least the equivalent of 1% of food systems GDP for food systems science.

It was a bold decision by the UN leadership to unleash a multi-stakeholder process as well as invite an independent Scientific Group to mobilize science communities around the world and advise with evidence on the Summit agenda. The science

communities broadly welcomed that move by the UN, but it is normal that this is not welcomed by everyone, such as concerns articulated by the HLPE of the CFS. It is time to move to productive so-called “cooperative conflicts”, to use a term from Amartya Sen. Proposals are on the table to strengthen existing science-policy interfaces and consider new mechanisms. Academies of sciences and business leaders suggested to establish an IPCC type mechanism for food systems, and it was welcomed that the EU has set up a high-level expert group to sort out such options. In closing, consideration was given to explore options for continuation of this Science Days format in the future a few times until 2030, including watching progress on the FSS commitments from an independent science perspective.



## SCIENCE DAYS PROGRAM

[HTTPS://SC-FSS2021.ORG/EVENTS/SCIENCEDAYS/PROGRAM/](https://sc-fss2021.org/events/sciencedays/program/)

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### DAY 1: 08 JULY 2021

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13:00 – 14:00 CEST *Plenary Session*

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#### **SESSION 1: SCIENCE FOR THE FOOD SYSTEMS SUMMIT: UNLOCKING THE POTENTIAL OF SCIENCE, TECHNOLOGY AND INNOVATION (STI) FOR TRANSFORMATION OF FOOD SYSTEMS**

This session will set the stage for Science Days, and focus on the role of STI in transforming food systems, on the evolving state of the art of STI, how to unlock the potential of STI, and setting the agenda for science to accelerate the transformation of food systems to contribute to achieving the SDGs, especially SDG2.

**Moderator: Magdalena Skipper**, Editor in chief, NATURE

**QU Dongyu**, Director-General, United Nations Food and Agriculture Organization (FAO)

**Amina J. Mohammed**, UN Deputy Secretary-General and Moderator of the Summit Advisory Committee

**Agnes Kalibata**, UN SG's Special Envoy for the 2021 Food Systems Summit

**Joachim von Braun**, Chair, Scientific Group of the UN Food Systems Summit 2021 – Introducing a strategic paper from the Scientific Group

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14:00 – 14:15 CEST *Transition from Plenary to Parallel Sessions*

14:15 – 15:30 CEST *Parallel Sessions*

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#### **SESSION 2: SCIENCE AS ACTION: SCIENCE-BASED OPTIONS TO ACHIEVE MORE HEALTHY DIETS AND MORE INCLUSIVE, SUSTAINABLE, AND RESILIENT FOOD SYSTEMS**

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##### **2A. Achieving more *healthy diets* in food systems – STI for affordable and accessible nutritious foods for healthy diets**

This session will focus on science, technology, policy and institutional innovations to enhance productivity, incentivize availability, affordability, and uptake of nutritious and safe foods such as through diversified production systems, taxes, subsidies, regulation, labeling, food fortification, pricing. What is working and what is not in what contexts, and what are the key knowledge and evidence gaps that must be addressed?

**Moderator: Lynnette Neufeld**, Director-Knowledge Leadership, Global Alliance for Improved Nutrition (GAIN)

**Marta Hugas**, Chief Scientist, European Food Safety Authority

**Andrew Kambugu**, Executive Director, Infectious Diseases Institute (IDI), College of Health Sciences, Makerere University

**Chizuru Nishida**, Unit Head, Safe, Healthy and Sustainable Diet Unit, Department of Nutrition and Food Safety at World Health Organization

**Pauline Scheelbeek**, Assistant Professor in Nutritional and Environmental Epidemiology, London School of Hygiene & Tropical Medicine

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## **2B. Achieving more *inclusive food systems* – STI for eliminating hunger and poverty and for advancing equitable livelihoods**

This session will focus on science, technology, policy and institutional innovations to eliminate hunger, malnutrition and poverty and to advance equitable livelihoods, such as through improving smallholder productivity, overcoming inefficient and unfair land, credit, and labor arrangements, advancing rights-based approaches, and facilitating greater inclusion and empowerment of marginalized groups. What is working and what is not in what contexts, and what are key knowledge and evidence gaps that must be addressed?

**Moderator: Claudia Sadoff**, Executive Management Team Convener and Managing Director, Research Delivery and Impact, of the CGIAR

**Christopher B. Barrett**, SB&JG Ashley Professor of Applied Economics and Management, International Professor of Agriculture, and Professor of Economics, Global Development and Public Policy, Cornell University

**Shen Xiaomeng**, Director, UNU Institute for Environment and Human Security

**Uma Lele**, President, International Association of Agricultural Economists

**Ishmael Sunga**, CEO, Southern African Confederation of Agricultural Unions

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## **2C. Achieving more *sustainable and resilient food systems* – STI for making sustainable use of natural resources and managing and preventing risks and crises, incl. climate change and COVID-19**

This session will focus on science, technology, policy and institutional innovations to achieve more sustainable and resilient terrestrial and marine-based food systems and to foster more climate-neutral, climate-positive, and climate-resilient food systems such as through transforming agronomic, ecological, livestock, forestry and fisheries practices; enhancing productivity, protecting and regenerating productive soils, land, and water, reducing food loss and waste, protecting biodiversity, reducing risk through novel insurance products and early warning systems and through innovative finance and social protection programs. What is working and what is not in what contexts, and what are key knowledge and evidence gaps that must be addressed, as well as how do related sustainability actions impact on nutrition, poverty, and hunger (i.e. how to address trade-offs)?

**Moderator: Lisa Sennerby Forsse**, past President, Royal Swedish Academy of Agriculture and Forestry (KSLA)

**Kaoru Kitajima**, Professor at Kyoto University Graduate School of Agriculture

**Jean-François Soussana**, Vice-President of International Policy at the Institute national de la recherche agronomique (INRAE)

**Morakot Tanticharoen**, Professor and Senior Advisor to the President of the National Science and Technology Development Agency (NSTDA)

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15:30 – 15:40 CEST *Transition between Parallel Sessions*

15:40 – 16:55 CEST *Parallel Sessions*

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### SESSION 3: PUTTING SCIENCE TO WORK: SCIENCE, PEOPLE AND POLICY

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#### 3A. Strengthening the *science-policy interface* across disciplines and policy areas incl. economics, and health-, nutrition-, climate-, ecological-sciences

This session will focus on how to strengthen the science-policy interface at national and international levels to enable food systems transformation. What are effective mechanisms to connect knowledge from science (e.g. economics, health, climate, ecology and more) with policy action, how can governments and the private sector support food systems science, how can science support effective policy-making, how can international sharing of science be facilitated including through new or strengthened international scientific bodies and their linkages with national and regional counterparts, what platforms can they use to better coordinate their engagement, and what methods can they use to better integrate their sciences?

**Moderator: Ousmane Badiane**, Executive Chairperson, AKADEMIYA2063

**Nawal Al-Hamad**, Deputy Director, Assistant Undersecretary, Public Authority for Food and Nutrition, Kuwait

**Jennifer Clapp**, Canada Research Chair in Global Food Security and Sustainability, University of Waterloo, and Member of HLPE

**Shenggen Fan**, Professor at the College of Economics and Management, China Agricultural University

**Miyuki Iiyama**, Program Director, Information Program at Japan International Research Center for Agricultural Sciences (JIRCAS)

**Gerardine Mukeshimana**, Minister of Agriculture and Animal Resources, Rwanda

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#### 3B. Investing in institutional and human capacity for science and innovation

This session will focus on what type of investments are needed to strengthen institutional and human capacity to enable food systems transformation, including how to encourage and support these investments within and across disciplines and geographies, how to support basic science and applied science/natural science and social science, and what mechanisms to push the frontiers of science.

**Moderator: Mohamed Hassan**, President, The World Academy of Sciences (TWAS)  
**Patrick Caron**, Vice-President, University of Montpellier  
**Julius Ecuru**, Head, BioInnovate Africa  
**Volker ter Meulen**, Special Advisor, InterAcademy Partnership  
**Jing Zhu**, Professor and Dean of the College of Economics and Management, Nanjing Agricultural University

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### 3C. Capitalizing on models, data, and communications revolutions, and new methods

This session will focus on how we can capitalize on and further expand investments in models, data, methods, and communications to enable food systems transformation. What type of models and modeling platforms do we need for food systems; what innovations are happening or should happen to speed up (big) data availability, utilization, analysis and effective use in decision-making, how do we creatively tap into the communications revolution, and what new methods are being developed within and outside food systems science that can be creatively put to work to push the frontier of knowledge?

**Moderator: Frank Ewert**, Professor, Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF)  
**Renata Dainese**, Production Research Scientist, Bayer Crop Science  
**David Laborde**, Senior Research Fellow, International Food Policy Research Institute (IFPRI)  
**Catherine Nakalembe**, Assistant Research Professor, Department of Geographical Sciences, University of Maryland, and Africa Food Prize Laureate 2020

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16:55 – 17:00 CEST *Transition from Parallel to Plenary Sessions*  
 17:00 – 18:00 CEST *Plenary Session*

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### SESSION 4: WHY THE FIGHT: GETTING TO GRIPS WITH MISSED OPPORTUNITIES AND CONTENTIOUS ISSUES IN SCIENCE AND INNOVATION FOR FOOD SYSTEMS

This session will explore causes of important lingering and emerging food systems-related science controversies, as well as missed opportunities in STI for food systems transformation, as well as discussing the role of research to address such controversies and move beyond polarization.

**Moderator: Anne Mullen**, Chief Editor, Nature Food  
**Ertharin Cousin**, Founder and CEO, Food Systems for the Future  
**Urs Niggli**, Honorary professor, Kassel University  
**Shakuntala Thilsted**, Global Lead, Nutrition and Public Health, WorldFish, and 2021 World Food Prize Laureate  
**David Zilberman**, Professor, Department of Agricultural and Resource Economics, University of California at Berkeley

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## Day 2: 09 JULY 2021

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13:00 – 14:00 CEST *Plenary Session*

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### **SESSION 5: ACHIEVING THE 2030 GOALS: OPPORTUNITIES, TRADE-OFFS, OBSTACLES AND SYNERGIES**

Drawing upon global foresight models and scenario exercises, this session will look ahead to the world in 2030. What will it take to achieve the SDGs especially SGD2 and how much will it cost, what do different scenarios offer under differing conditions/assumptions, what are the key trade-offs and synergies to look out for, and what are the key opportunities to tap?

**Moderator: Maximo Torero**, Chief Economist, FAO

**Thomas Hertel**, Professor of Agricultural Economics, Purdue University

**Elizabeth Mkandawire**, FSNet-Africa Network and Research Manager, University of Pretoria

**Jean Eric Paquet**, Director-General, Directorate-General for Research and Innovation, European Commission

**Josefa Sacko**, Commissioner for Rural Economy and Agriculture

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14:00 – 14:15 CEST *Transition from Plenary to Parallel Sessions*

14:15 – 15:30 CEST *Parallel Sessions*

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### **SESSION 6: EMPOWERING AND ENGAGING KEY PLAYERS IN FOOD SYSTEM INNOVATION**

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#### **6A. Youth**

This session will focus on how to effectively and appropriately engage, include, incentivize, and empower youth in science and innovation for food systems transformations.

**Moderator: Oliver Kirui**, Senior Researcher, Center for Development Research (ZEF), University of Bonn

**Lahcen El Youssfi**, Associate Professor Agro-biology and Natural Resources Management, Moulay Slimane University, Morocco

**Mike Khunga**, Vice-Moderator of the UN Food Systems Summit Action Track 5

**Preet Lidder**, Technical Adviser, FAO

**Yugratna Srivastava**, Youth Constituency Focal Point to UN Environment Programme

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## 6B. Traditional and indigenous knowledge

This session will focus on how to effectively and appropriately support and use traditional and Indigenous Peoples' knowledge and facilitate access and benefit-sharing.

**Moderator: Kaosar Afsana**, Professor, BRAC University

**Oren Lyons**, Faithkeeper Turtle Clan, Onondaga Nation Council of Chiefs, Haudenosaunee Confederacy

**Tania Martinez Cruz**, Post-doctoral Research Fellow, Natural Resources Institute, University of Greenwich

**Elisabetta Moro**, Professor of Cultural Anthropology, Suor Orsola Benincasa University of Naples

**Gam Shimray**, Secretary-General, Asia Indigenous Peoples Pact

**Mariam Wallet Mohamed Aboubakrine**, Member, Arramät ۞۞۞۞ network

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## 6C. Science in and by food industry and start-ups

This session will focus on how to effectively and appropriately support and use science in and by food industry and start-ups, and foster partnerships that serve achieving the SDGs between food industry science and public sector, academia and civil society science.

**Moderator: Robynne Anderson**, Director General, International Agri-Food Network

**Ashok Gulati**, Professor for Agriculture, Indian Council for Research on International Economic Relations (ICRIER)

**Lee Recht**, Head of Sustainability, Aleph Farms

**Bente Torstensen**, Head of Aquaculture Division, Nofima AS

**Aman Wirakartakusumah**, Professor Em., Department of Food Science and Technology, Bogor Agricultural University

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## 6D. Women

This session will focus on strengthening rights, and how to effectively and appropriately engage, include, and empower women in science and innovation for food systems transformation.

**Moderator: Jemimah Njuki**, Director for Africa, IFPRI

**Lawrence Haddad**, Executive Director, GAIN

**Emma Naluyima**, Vice Chairperson, Green and Fresh farmer's Cooperative, Uganda, Africa Food Prize laureate

**Sundus Saleemi**, Senior Researcher, Pakistan Institute of Development Economics and

Center for Development Research (ZEF), University of Bonn  
**Maria Virginia Solis Wahnish**, Co-founder and CEO, Matera

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15:30 – 15:40 CEST *Transition between Parallel Sessions*

15:40 – 16:55 CEST *Parallel Sessions*

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## **SESSION 7: BRAVE NEW WORLD: PUSHING THE FRONTIERS OF SCIENCE FOR FOOD SYSTEMS**

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### **7A. Bio-science innovations**

This session will focus on the frontiers of science for food systems, in this case on the frontiers of bio-science innovations such as genome editing, synthetic biology, microbiomes, alternative protein sources, alternative sources for essential micronutrients, cell factories and more. What are the important new and emerging bio-science innovations, what will it take to put them effectively to work to transform food systems, and what are potential risks and unintended consequences?

**Moderator: Martin Cole**, Chair, High-Level Panel of Experts on Food Security and Nutrition (HLPE)

**Frances Arnold**, Professor of Chemical Engineering, Bioengineering and Biochemistry, California Institute of Technology (Caltech)

**Pedro Coelho**, Co-founder and CEO, Provivi

**Rob Bertram**, Chief Scientist, USAID Bureau for Resilience and Food Security

**Robin Fears**, Biosciences Programme Director, European Academies' Science Advisory Council (EASAC)

**Najat Mokhtar**, Deputy Director-General, International Atomic Energy Agency

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### **7B. Digital innovations**

This session will focus on the frontiers of science for food systems, in this case the frontiers of digital innovations such as artificial intelligence, machine learning, the Internet of Things, remote sensing, big data analysis, robotics, and more. What are the important new and emerging digital innovations, what will it take to put them effectively to work to transform food systems, and what are potential risks and unintended consequences, and ethical implications?

**Moderator: Heike Baumüller**, Coordinator, Program for Accompanying Research for Agricultural Innovation (ZEF)

**Mustapha Diyaol-Haqq**, Co-founder, Okuafo Foundation

**Su Kahumbu Stephanou**, Founder and CEO, iCow

**Matthew McCabe**, Professor, Director of the Climate and Livability Initiative, King Abdullah University of Science and Technology

**Suvankar Mishra**, CIO & Co-founder, eKutir

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## 7C. Policy and institutional innovations

This session will focus on the frontiers of research on policy and institutional innovations such as financing the actions for food systems transformations, repurposing subsidies, innovating taxes, designing regulations, facilitating collective action, governing common goods, revising gender norms, improving market functioning, re-assessing the price and value of food and more. What are the important new and emerging policy innovations, what will it take to put them effectively to work to transform food systems, and what are potential risks and unintended consequences?

**Moderator: Sheryl Hendriks**, Professor, Department of Agricultural Economics, Extension and Rural Development, University of Pretoria

**Nicoletta Batini**, Lead Evaluator, Independent Evaluation Office, International Monetary Fund

**Jikun Huang**, Professor of Agricultural Economics, China Center for Agricultural Policy

**Elizabeth Hodson de Jaramillo**, Professor Emeritus, School of Sciences of the Pontificia Universidad Javeriana

**Fadel Ndiame**, Deputy President, Alliance for a Green Revolution in Africa

**Tom Arnold**, Chair of the High-Level Expert Group of the European Commission

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16:55 – 17:00 CEST *Transition from Parallel to Plenary Sessions*

17:00 – 18:00 CET *Plenary Session*

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## SESSION 8: LOOKING AHEAD: STRATEGIC FOOD SYSTEMS SCIENCE BEYOND 2030

This session will close the Science Days with reflections on the long-term (beyond 2030) issues, opportunities, and challenges for STI, with special consideration given to ethical issues, nutritional issues, equity issues, rights and justice issues, culture issues, demographics, risk management issues, and international scientific cooperation.

**Moderator: Thin Lei Win**, Food & Climate Correspondent, Thin Ink

**Louise Fresco**, President of the Executive Board, Wageningen University & Research

**Peter Bakker**, President & CEO, World Business Council for Sustainable Development (WBCSD) and Member of the Advisory Committee to the UN Food Systems Summit 2021

**Johan Swinnen**, Director General, IFPRI

**Ismahane Elouafi**, Chief Scientist, FAO

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**17:55: Joachim von Braun** Closing remarks and way forward

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## SIDE-EVENTS TO THE SCIENCE DAYS FOR THE UN FOOD SYSTEMS SUMMIT 2021

<https://sc-fss2021.org/events/sciencedays/side-events/>

### JULY 5-7, 2021

In the lead-up to [Science Days](#) and the [UN Foods Systems Summit 2021](#), the side-events on July 5-7 offer an opportunity for partners to present their insights on science, technologies and innovations that can drive food systems transformation.

#### Side-Events: July 5, 2021

**Science and Sustainable Food Systems in Southeast Asia – Challenges and Ways Forward** [Convened by ILSI; ILSI Southeast Asian Region; AIPG-AIP; SEAMEO-SEARCA]

**Science, Technology and Innovation For Food Systems Transformation. The role of nuclear and related technologies** [Convened by FAO/IAEA Center; NAFRI; MAAIF; PPRI; Ministry of Agriculture and Food Security, Lesotho]

**Transformative Sustainable Agri-food systems for sustainable diets with traditional plants** [Convened by SLU, Sweden; CNRST, Burkina Faso; SLE, Germany; IITA, Nigeria; UCAD, Senegal]

**Global Food Systems Governance – The Role of Food Science and Technology** [Convened by IUFoST; IFPRI; UNIDO; ICLR, Canada; IAFoST; ROA]

**The importance of plant genetic resources in the context of Indigenous Peoples' Food Systems: the role of the International Treaty on Plant Genetic Resources for Food and Agriculture** [Convened by FAO; UNPFII; AIPP; Gaia Amazonas; Arramat; FILAC; Inuit Circumpolar Council; University of Greenwich; University of Cambridge; Ekta Parishad, Norway]

**Capacity development for agriculture innovation systems: lessons learned and future action of the Tropical Agriculture Platform partnership** [FAO; tap; DeSIRA; AFAAS; agrihatura; APAARI, APIRAS; CoSAI; crea, FARA; IICA, RELASER]

**Transforming Food Systems in Emerging Economies** [Convened by AGFEP China; IGIDR India; INSPER Brazil]

**Learnings from country-level pathways to the global food policy debate** [Convened by FSEC, FABLE Consortium; UNECA; IIMA India, ISLA Mexico; INSP Mexico; CIDE Mexico; IPN Mexico; UCSD – CIDE; China Agricultural University; FABLE South Africa; Universidad de Guadalajara (UdG)]

**Accelerating Innovation for Food Systems Transformation with National and Regional Impact** [Convened by Innovation Lever, WEF; Eat Better Wa'ik, Guatemala]

**Malabo Montpellier Forum – Connecting the dots: Policy innovations for food systems transformation in Africa** [Convened by AKADEMIYA2063 – The Malabo Montpellier Panel; African Union Commission; Imperial College London; ZEF]

### Side-Events: July 6, 2021

**Protein for All: The Importance of Protein Quality in Equitable, Sustainable Food Systems** [Convened by Global Dairy Platform (GDP); IICA, PAU India, Riddet Institute, GRSB, FIL-IDF, IEC; IMS; IPC]

**Nourishing people and planet with aquatic foods** [FAO; WorldFish; ICAR India, Sylhet Agricultural University Bangladesh, LUANAR Malawi]

**Sustainable Financing of Research and Innovation to Improve the Performance of Africa's Food System** [Convened by Forum for Agricultural Research in Africa (FARA); PARI; One Africa Voice; CCARDESA; ASARECA; CORAF ]

**A New Paradigm for Research and Innovation: A practical application with Forgotten Foods** [Convened by GFAR; CIAT; FARA; APAARI; AARINENA; AFA; ICRISAT; ASARECA; CCARDESA]

**Transforming Food Systems from the Ground Up: The Potential of Groundwater in Achieving Food Security and Prosperity in Africa** [Convened by African Ministers' Council on Water (AMCOW); Ministry of Water and Environment, Uganda; Ministry of Agriculture, Water and Land Reform, Namibia; IFPRI; IWMI; AfDB; The World Bank]

**Gender Equality, Women's Empowerment, and Food Systems** [Convened by IFPRI and Self-Employed Women's Association (SEWA)]

**Achieving healthy diets for all: What are the evidence gaps constraining progress?** [Convened by GAIN; University of Ghana; IUNS]

**Transforming Food Systems through Agroecology: Learning from Evidence** [Convened by CIAT Alliance; FAO; IDDRI; CGIAR; IDDRI; Food System Economic Commission; World Food System Center, Switzerland]

**Strengthening international research cooperation on food systems** [Convened by INRAE France; unesp]

**A Perennial Revolution of Agriculture – is it desirable, possible, imminent?**

[Convened by The Land Institute, USA; Birzeit University, Palestine; Lund University, Sweden; Swedish University of Agricultural Sciences; Yunnan University, China]

**Risks to agricultural production from air pollution** [Convened by WMO and IISER India]

**The role of Agricultural Research and Innovation on food systems transformation** [Convened by FARA; COLEACP]

**COVID-19, food systems, and One Health in an urbanizing world: Research responses at a national level** [Convened by CGIAR; RUAF; World Bank Group; Federal Ministry of Agriculture and Rural Development, Nigeria; Ministry of Agriculture, Ethiopia]

**The White/Wiphala Paper on Indigenous Peoples' food systems: Indigenous Peoples' contributions to food system's thinking and sustainability** [Convened by CIAT; CIFOR-ICRAF; IRD, France; UNPFII; AIPP; UNFCCC; UNESCO; TIP, Gaia Amazonas; FILAC; Cenesta; INFOODS; University of Massey; Monash University; University of Cambridge; University of Greenwich; CINE McGill University]

**Bridging scientific and indigenous peoples' knowledge for sustainable and inclusive food systems** [Convened by ZALF, Germany; University of Pretoria, South Africa; Welthungerhilfe Germany]

**Priorities for inclusive urban food systems transformations in the global South** [Convened by Cirad, VAAS Vietnam; Michigan State University; HIVOS/RUAF; UNESCO]

**Science and Technology and Food Security: A Step Towards Greener Revolution** [Convened by GCSAYN; Lukenya University, Kenya; PCGFS, USA; Narasingh Choudhury Autonomous College, India; IICA; AAVF, Africa]

**Bridging the Digital Divide** [Convened by THP, Farmerline, AGRA, Microsoft]

**Bioeconomy for a biodiversity-and-science-based sustainable development of food systems in Latin America and the Caribbean** [Convened by UN-ECLAC; UNESCO uniTWIN, cods]

**Engaging Stakeholders for Adaptation and Food Security: Contributions by the AgMIP A-Teams** [Convened by AgMIP; IPAR, Senegal; University of Ghana; ICRISAT Malawi; Columbia University]

**Climate Resilient Development Pathways for Food Systems' Transformation** [Convened by WFP; CGIAR-ILRI; CSIRO]

### Side-Events: July 7, 2021

**When science meets policy to boost food systems transformation** [Convened by FAO; AFA; European Commission]

**Microbiome Supporting Regenerative Agriculture** [Convened by NSTDA; Forschungszentrum Jülich]

**Regional perspectives on the role of science, technology, and innovation for transforming food systems** [Convened by IAP; EASAC; NASAC; IANAS; AASSA]

**SOLAW21: Sustainable, Scalable and Dynamic Solutions in Land and Water Management towards Food System Transformation** [Convened by FAO, Griffith University Australia]

**Is Organic Agriculture a viable option for the Global South?** [Convened by FiBL, Switzerland; KALRO, Kenya; icipe, Kenya; University of Ghana; Biovision Africa Trust, Kenya]

**Climate Change & Food Systems' Transformation: Focus on Small Island States and Indigenous Peoples** [Convened by WFP, ICCAD and UNDP Fiji, ANU, Massey NZ University, Queensland University, Columbia University]

**Promise of the Commons for Sustainable and Equitable Food Systems** [Convened by IFPRI; FES, India; University of South Australia; Azim Premji University]

**A New Paradigm for Plant Nutrition** [Convened by IITA; Scientific Panel on Responsible Plant Nutrition]

**Food prices and the economics of food system transformation: Making markets work for inclusive growth, sustainability, and health** [Convened by IAAE; AAAE;

Tufts University]

**Domestication for sustainable seaweed aquaculture: a major research challenge for the future of blue food systems** [Convened by Safe Seaweed Coalition; Zanzibar Seaweed Cluster Initiative; Lloyd's Register Foundation; UN Global Compact, CNRS France]

**Decision-making for Sustainable Livestock: Capitalizing on Models, Data and Communications** [Convened by World Farmers' Organization and Scientific Council; ILRI, Alliance Bioversity-CIAT]

**Reforming Agricultural Policies to Support Food Systems Transformation** [Convened by IFPRI; ICRIER India; AGFEP, China Agricultural University]

**Local food, Sustainable City? Is Vertical and Controlled Environment Agriculture Relevant Contributions to Resilient and Sustainable Future Food Systems?**

[Convened by Plantagon International Association Sweden; Good Minds® Network Sweden; Tirambhapur Askote RAJ Ecosystems Ltd, India]

**Scaling Up Innovations and Partnerships to Modernize African Food Systems** [Convened by TAAT; IITA]

**The Critical Role of Research and Development in Achieving Resilient and Sustainable Food Systems** [Convened by USAID; ReNAPRI; AfDB; Alliance for African Partnership; The World Bank, BIFAD]

**Monitoring and Evaluation for Food Systems Transformation** [Convened by Alliance for Climate and Food Systems Research; WBCSD; University of Pretoria South Africa]

**Post-COVID 19 Implications on Genetic Diversity, Genomics Research and Innovation: A Call for Governance and Research Capacity** [Convened by CIRAD; CERAAS; CSTEPS Arizona State University; Keystone Policy Center USA]

**The True Cost and True Price of Food** [Convened by True Price Foundation; University of Pretoria; Tufts University]

**The authors are:**


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**Sundus Saleemi; Senior Researcher,** Pakistan Institute of Development Economics and Center for Development Research (ZEF), University of Bonn

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