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AGRICULTURAL RESEARCH FOR DEVELOPMENT

CIRAD is committed to sustainable, resilient and inclusive food systems

Tintilou rural market, Burkina Faso © A. Bichard

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Food systems encompass a very broad range of human activities linked in one way or another to food. They relate to our basic fundamental need to eat, play a crucial role in human health and, beyond those basic requirements, also have a major cultural, social and economic dimension. Food is a source of creativity and pleasure as well as a solid pillar of different cultures and religions. It intrinsically links humans and nature. In producing food, human societies transform their environment and have a substantial impact on natural resources (soils, biodiversity, water, and so on), ecosystems and climate. In return, that impact affects food production conditions and access to food. Lastly, food systems generate "wealth" – capital and income – that is distributed among the players in those systems, in various ways depending on the societies that create them, benefit from them or suffer as a result of them.

Food systems – and the social bonds they create – are the fruit of a long human history within a given geographical area. As such, they often acts as a matrix for territories and serve to structure their economic fabric. They are highly dynamic, and evolve in response to demographic, economic, natural, political and legal factors.

Food systems have substantial effects – both positive and negative – on various embedded scales. On a territory level, they directly or indirectly affect the physical, biological, economic and social functioning of that territory and/or of the communities concerned. It is this position at the crossroads between the major challenges for humanity – food, health, jobs and the environment – that makes food systems an absolutely crucial brick in the sustainable development wall.

CIRAD has been working for decades on food systems in a range of countries. In confirming its priorities, it is committing to continue working to transform those systems, in line with the sustainable development goals. ■

The sustainable development goals hinge on transforming food systems

The challenges are greater in the global South

Food systems play a determining role in addressing the challenges surrounding sustainable development: climate change, degraded biodiversity and ecosystems, increasingly scarce natural resources, and ensuring decent jobs and incomes, food, health, culture and security for all. Those challenges apply to every country in the world. However, the low-income countries in which CIRAD works face even greater obstacles in their efforts to satisfy even basic human requirements. Their lack of resources limits their capacity to react and adapt to the crisis of the growth regime. Moreover, they are also being hit by the consequences of climate change.

In those regions – primarily sub-Saharan Africa and South Asia – that have not yet completed their demographic transition, the challenges are further complicated by the pressure caused by the need to provide the young people now entering the labour market, most of them living in rural areas, with jobs and income. Besides agriculture in the narrowest sense of the term, a major proportion of the added value and jobs generated within countries comes from the range of opportunities provided by food systems, from production to consumption.

In world regions in which agriculture accounts for a major share of the economy, transforming food systems plays, and will continue to play, a decisive role in addressing the different sustainable development challenges. The aim is no longer merely to ensure food security. We also need to take on board the fact that how we produce, process, distribute and consume food has, and always will have, a crucial impact on every aspect of sustainable development

Food systems must be transformed

Our current food systems have a substantial environmental and climate footprint. Farming is now more intensified as a result of a model that assumed resources were infinite. This has given a spectacular boost to food production, but the cost has been massive ecosystem degradation, which is in turn threatening the viability of food systems.

In addition, **our current food systems do not ensure food and nutrition security**, and access to food still varies greatly, despite the fact that globally, there is enough food available. The figures speak for themselves: in every region worldwide, there is a double if not a triple nutrition burden, with the widespread co-existence of contrasting types of malnutrition: deficiencies (in terms of nutrients or calories) and excess. On a global level, almost 700 million people are undernourished (a figure that has been rising again since 2015), 2 billion suffer from vitamin and mineral deficiencies and more than 2 billion are overweight or obese, with the raft of diseases that brings.

Lastly, if we look at the 2 billion producers and 7 billion consumers, **there is a vast range of stakeholders involved in these food systems,** from a few global agribusiness and distribution conglomerates to countless SMEs and microenterprises. There are many forms of inequality between those players: access to means of production, distribution of the added value created, coalitions of power, market functioning, etc. The system works cumulatively to favour some players over others, resulting in a concentration of wealth among the few while billions of others remain trapped in poverty. Those inequalities are a source of widespread tensions, social unrest and political crises.

Tackling the whole range of challenges – reducing our environmental and climate footprint, guaranteeing food and nutrition security for all, creating decent, fairly shared jobs and income and ensuring inclusive governance – means **transforming food systems.** That transformation must be both systemic and far-reaching, as the very foundations of how we assess their performance are now shifting: rather than thinking solely in terms of productivity and quantity, we now expect systems to be multifunctional and take on a range of different challenges.

The diversity and dynamism of food systems should be recognized

Food systems are also extraordinarily diverse. Climate, natural conditions, and the history of territories and human societies underpin that variety, which is practically infinite in terms of all the possible combinations and the range of possible scales of both observation and action. As social and economic constructs, they can be analysed on various embedded or interlinked scales. For instance, a village terroir (landscape mosaic) may be a food system in itself: a set of production and processing activities destined to feed its inhabitants. It may also participate in food systems further afield, by producing goods that are processed and sold in urban areas, or exported for consumption by people thousands of kilometres away. All these systems are governed by established regulations and standards on different levels, which are both superimposed and interlinked. This makes them extremely difficult to understand, particularly since in most cases, several systems co-exist within a given space or for a given population group.

The multitude of combinations of socioecological and economic factors, and above all of stakeholders, involved in food systems is an asset when it comes to their transformation. Moreover, some of those systems (which are often little known or promoted) are in fact highly flexible and resilient, and it is important to study and preserve those qualities rather than transforming the systems at all costs. There are many factors for change: signals from nearby or distant markets, power relations, alignments or conflicts of interest, legislation, public food, health or environmental policy, etc.

However, this dynamism faces a range of constraints. Farms and small and medium-sized enterprises (SMEs), which make up the vast majority of these systems, often face huge relational and institutional obstacles, particularly as regards access to credit and to suitable technology. For their part, most consumers are constrained in one way or another by their food environment and by the specific economic and social factors that determine their diet. Nevertheless, despite these various constraints, **there is substantial, widespread capacity to innovate.** This is a real asset for the transformation required. ■

Transformation pathways and the role of research

Understanding the range of possible pathways for food systems

The aim of sustainable development – "the future we want" – determines what will constitute desirable food systems in future: a smaller environmental and climate footprint, fairer, more inclusive generation of added value and income, safer foods and healthier diets, improved global health (humans, ecosystems and animals), greater resilience, etc. **However, while the aim is clear, what is less obvious is how to go about it.** These "transformation pathways" cannot be imposed from outside; they must be built within the very food systems to be transformed, making allowances for their specific complexity.

There is no single pathway or solution that will act as a silver bullet. The links with global economic reality and certain dominant players will sometimes necessitate structural or political change. A raft of non-exclusive, interlinked pathways must be built upon the dynamics and assets specific to the systems concerned, taking account of the co-existences and combinations that must be understood, organized and regulated in order to avoid destructive competition and arbitrate between conflicting interests. Public policy is therefore indispensable.

Food systems are often seen as the fruits of a long history in a given area, and as such, **evolve as a result of the actions of a range of players,** depending on their interests, interactions and constraints, the degree and rate of change possible, and the dynamics at play on sometimes overriding levels such as integrated value chains or distant markets. For a given food system linked to a specific territory but anchored within a broader web of interactions, such as global markets, transformation will mean making many types of changes, each resulting from complex interactions between a range of players. To generate those changes, the players will have to recognize and overcome their conflicting interests and agree on shared objectives and the means of achieving them.

We must fuel the various debates as well as proposing technical solutions

Scientific research, with its tools, methods and concepts, fits into all these processes. It serves to elucidate the complexity of food systems and analyse their performance and resilience, in order to preserve them. It works with the entire range of stakeholders to transform them. The problem is not so much a lack of investment as our capacity to renew how we address issues and to take a systemic approach. The aim is also to work hand in hand with the many actors involved in the changes that research must help to orchestrate, to address issues that may not previously have been clearly spelled out, and to formulate research questions that make sense in a real theory of change. In addition to producing knowledge and technology, research must fuel debate, by setting out the compromises to be struck between conflicting objectives. Lastly, it must work with the various players to build their skills and their capacity for innovation, and present a range of possible scenarios and the potential and risks associated with them. ■

What are the priorities for CIRAD's work to transform food systems?

CIRAD has been working on food systems in the global South for many years, with significant results in several fields. It intends to continue its efforts, while taking a fresh look at how it tackles the issues at stake, from an interdisciplinary, systemic perspective. It intends to focus on the following priorities:

- **Working with its partners and the various stakeholders in food systems to develop and roll out innovative agricultural production** and food processing technology and practices. That technology will be built into systemic proposals articulated with value chains and consumers, and will take account of the need for an agroecological transition and territorial integration. Particular care will be taken to make food systems more efficient, by means of innovations in terms of production, storage and processing conditions, logistics, and distribution, in order to reduce losses and save energy. CIRAD is in favour of a circular economy [(https://ur-recyclage-risque.cirad.fr/en)], enabling recycling, since the resulting by-products are a factor for territorial sustainability.
- **Improving food nutritional quality through research, to promote food diversity and access for all.** In particular, natural biodiversity will be exploited and consumer and user preferences taken into account in identifying production and processing innovations worthy of promotion. CIRAD is thus committed to a paradigm shift in terms of varietal breeding [(https://rtbfoods.cirad.fr/)]. The aim is to make better use of the available agro-biodiversity in order to offer a wider range of varieties, decentralize breeding operations so as to respond better to the variety of agrosystems and production objectives, and involve beneficiaries and local organizations in defining selection criteria and making decisions. CIRAD also pledges to work with stakeholders to design innovative cropping and production systems built on a broad range of crop and animal species, and to assess the associated food outputs and environmental externalities on a variety of scales.
- **Developing novel methodological approaches.** These approaches will necessarily be systemic, in order to analyse the complexity of food systems, understand how they operate, and assess the sustainability of their various components using multi-criteria methods (rapid food system diagnoses, life cycle assessment, analyses of how added value is distributed, environmental footprint, etc.).
- **Characterizing and promoting food systems** that help to ensure a satisfactory social, economic and health situation for the social groups that build them and the webs into which they fit. This is particularly important in view of the intertwined rationales on which food systems are founded (artisan and industrial, formal and informal, rural and urban, local and regional, governed by commons-, market- or State-centred ideologies, etc.).
- **Fostering multi-stakeholder governance** on a territory level with a view to producing an appropriate road map that will be supported on both a local and a global level (FAO, CFS, UN Food Systems Summit, etc.). That governance must facilitate the structural change required. It will mean building knowledge and expertise and forging action and advocacy alliances at the science-policy interface.

In its work, CIRAD strives to build upon the knowledge and skills of stakeholders and on local innovation systems, and to work with them to produce diagnoses, assessment methods, technical and organizational solutions, and policies. In particular, it relies on:

– **partnerships encompassing** players from food systems and territories, working with them to map out transformation pathways built on sound knowledge, shared experiences and group exercises using "serious games" to construct a theory of change, pinpoint research topics, etc. [(https://impress-impact-recherche.cirad.fr/)];

– **strengthening the capacities** of the various players in innovation systems, by means of joint projects and specific activities, for instance within its platforms in partnership for research and training [(https://www.cirad.fr/en/our-research/platforms-in-partnership-for-research-and-training)]. CIRAD provides diploma-based and vocational training for a wide range of beneficiaries;

– **foresight exercises and tools** (modelling, participatory territorial foresight exercises, etc.) that allow scientists from a range of fields to work with local development agencies to design food system transformation pathways that respect the interests of the various stakeholders, are inclusive, and whose resilience is founded on a continuous participatory process used to resolve trade-offs. ■

Platforms in partnership for research and training concerned

Public policy and governance in Africa - GovInn
http://governanceinnovation.org/

Information for food security - ISA
https://www.dp-isa.org/

Public policy and rural development in Latin America - PP-AL
https://www.pp-al.org/en

Sustainable food systems for cities in Asia - MALICA
http://www.malica.org/

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CIRAD has set up a team to prepare for and monitor the United Nations Food Systems Summit.

It comprises the following experts: Arlène Alpha, François Bousquet, Patrick Caron, Marie De Lattre-Gasquet, Sandrine Dury, Etienne Hainzelin, Emilie Klander, Eric Malézieux, Paule Moustier, Dominique Pallet, and Nadine Zakhia-Rozis, who participated in drafting this position paper.

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