Activating agricultural transitions to sustainability **through participatory research and co-innovation**

Stories of change across Africa, Asia and Latin America from the DeSIRA initiative

DeSIRA LIFT

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DISCLAIMER

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PREFACE

Stories of Change
to capture innovation journeys and invisible transformative changes

The DeSIRA Initiative is a portfolio of 80 research and innovation (R&I) projects run in over 65 countries across three continents between 2019 and 2026, supported by a European Union contribution of €340,000,000. DeSIRA aims to enhance the contribution of R&I in addressing complex issues relating to sustainability transitions and agrifood system transformation, towards achieving the Sustainable Development Goals, in low- and middle-income countries[1].

Researchers are supported in DeSIRA as major facilitators of change to enable national agricultural innovation systems (AIS) actors to jointly understand these complex issues, and to co-develop strategies for dealing with them in their specific contexts.

DeSIRA also aims to upgrade the capacities of research organisations, as key actors of agricultural innovation systems, in order to improve governance of the research-innovation-transition continuum at local, national, regional, continental and global levels. But how much of this is achieved? Many would agree that the answer is "not enough". Part of the problem is that research and its outcomes are poorly communicated. Many more would agree that it is hard to prove the extent to which research and researchers have contributed to strengthening agricultural innovation systems.

As such, the collection of stories in this book aims to provide funders, decision-makers, research managers, implementing organisations and project formulators with insights into tangible changes that have occurred as a result of researchers and its partners.

We can distinguish between a) changes in the ways research contributes to innovation and innovation systems; and b) changes in the agrifood systems and transitioning pathways thanks to innovations developed with research.

1. World Bank. World Bank Country and Lending Groups. Available online: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups (accessed on 14 June 2024)

Stories of change across Africa, Asia and Latin America from the DeSIRA initiative

The stories presented in this book address the first type of changes. The portfolio of critical innovations for transitioning pathways is illustrated in the second volume of this collection.

Changing the ways research contributes to innovation is part of the new imperative for systems approaches and transition management, which includes prioritising innovation programmes, providing more intentional support for innovation, and greater inclusiveness and responsiveness thanks to user-centered innovation methodologies. Countries need to have AISs with appropriate governance mechanisms, innovation support services, and enabling policies with the objective to facilitate and accelerate the scaling of innovations that address problems faced by farmers, rural communities and vulnerable members of society, while developing more sustainable agrifood systems.

Stories of Change are a powerful tool to illustrate how research engages in these processes to support systemic thinking and action, and more user-driven innovations toward transitions. The stories narrate not only the changes that have occurred but also the reasons why they have occurred, and the processes leading to these changes at various levels of project intervention. Stories can focus on positive results, but they can also be used to investigate circumstances in which results were not achieved, and derive important lessons about the assumptions underlying the intervention.

The collection assembled in this book has two objectives. The main objective is to enhance the understanding of research as a game changer for agricultural innovation systems and transitions, with a focus on what DeSIRA projects achieved and learnt from their experience. The second objective is to use the Stories of Change as a reflective tool to support learning in DeSIRA projects and in the DeSIRA community. The Stories of Change were developed by project teams through a participatory process coached by the DeSIRA-LIFT facility to help identify processes of change supported by research in different key areas and at different levels. The juxtaposition of all their stories in one book helps illustrate the diversity and complementarities of the research outcomes in DeSIRA.

The collection of stories will walk the reader through the intensive journey of organising, catalysing, promoting and achieving innovation that the DeSIRA project teams went through.

The stories show how research teams had to mobilise multiple capacities and partnerships to be able to act as a facilitator, connector and learner in larger ecosystems of actors working to innovate and create lasting, systems-level changes, within time-limited project approaches.

A Musaceae NAMA*

Photo: TRANSFORMA - INNOVA project, Costa Rica

** Nationally Appropriate Mitigation Action (NAMA in Spanish)*

INTRODUCTION

Agricultural research
for innovation and transitions

Over the past decades, the contributions to innovations and transitions by agricultural research have been challenged. On the one hand, systems thinking has called for a widening of the circle of the actors to be involved (Klerkx et al., 2012), with recognition of multiple system levels to transform (society, economy and innovation systems), leading to a tipping point beyond which more sustainability is achieved (Elsner et al., 2023). Strategic management authors have advocated for attention to the organisation of environments that are conducive to collective action for transitions (Farla et al, 2012; Pigford et al., 2018).

Protocols for interaction, facilitated learning spaces and collaboration arrangements are needed to help the diverse range of organisations share a common vision on aspects requiring change; while aligning their objectives, resources and activities to innovate for transitions (Berthet et al., 2018; Toillier et al., 2019). While systems thinking focuses mainly on horizontal interactions among actors within a broader network of relationships, often in a particular territorial or sectoral setting, management thinking on agricultural innovation helps to identify and bridge both horizontal and vertical ties in innovation networks. Vertical ties are linked to the level of embeddedness of innovation projects into organisations and their managerial processes. They are recognised as being critical to foster the influence of the changes and innovations that are being developed, especially in uncertain environments. Projects over time have become more complex. R&I projects in the agricultural sector are no exception due to the increased complexity of the challenges that are tackled. Agricultural R&I projects are characterized as complex, uncertain, sensitive to political conditions and known for the involvement of a large number of stakeholders. If not addressed well by organisational and managerial strategies, complexity becomes a major source of uncertainty and risks that could affect the R&I projects' contributions to impacts (Bentley et al., 2021).

Building on the cross-fertilisation of these different frameworks for action and reflection, agricultural research for development has endorsed a shift in innovation support from a transfer of technology paradigm to a co-innovation one with end users and society engaged. This is an acknowledgement of the need to fundamentally restructure systems of consumption and production of knowledge by initiating so-called sustainability transitions (Van den Bergh et al., 2011). This calls for genuine systemic changes in research itself, in its various dimensions: new ways of doing research for innovation and coproducing knowledge, new ways of partnering with other innovation actors, new research questions focusing on how innovation happens and how research influences change processes, new timespans combining short-term imperatives and longer-term transformation dynamics, new ways of designing R&I projects; in a nutshell: new research and innovation governance (Wieczorek, 2018; de Boon et al., 2022). The central question is how to move from research projects to innovation projects supported by research?

The DeSIRA Initiative is in itself a model-in-the-making. It provides a huge number of research organisations and their partners the opportunity to invent all these "new ways" of thinking, doing, interacting, and co-innovating for the length of their project.

This collection of Stories of Change is part of the attempt to capture in real time these new models and reveal the why, what and how of agricultural research for innovation and transitions.

Altogether, the Stories of Change cover the novelties in capacities, partnerships and multi-actor collaboration mechanisms that created enabling conditions for co-innovation and transitions in the DeSIRA Initiative. The Stories of Change have been encapsulated into three chapters in order to offer a reading thread in three stages. Each chapter starts with an overview of the current challenges and the ways the DeSIRA projects addressed them.

The first chapter proposes illustrations of the new roles and capacities of researchers to be able to co-innovate with farmers and breeders' groups. The African stories walk us through the heart of the major challenge of adapting staple crop production for food security in the context of climate change.

The second chapter offers examples of different types of partnerships between research and the private sector, civil society and government, and their importance for both scaling innovation and system transformation. Across three continents (Africa, Asia, Latin America), fit-for-purpose partnerships have been developed with the same objectives: eliminate bottlenecks to deploy innovative solutions, learn together and maximise the impacts of projects.

The last chapter delves deeper into the tensions and dilemmas encountered in co-innovation processes. The stories highlight the intensity of efforts and the crucial role of facilitators deployed by researchers to find compromises, deal with trade-offs and handle power imbalances in the journey towards sustainability transitions.

1 PART 1

From innovation piloting to innovation support: new frontiers between researchers and farmers

by Aurélie Toillier

The challenges of co-innovation

Co-innovation is a process in which researchers work together with stakeholders to realise innovations of different kinds, such as combined technological and institutional innovation (Bossink, 2002; Dogliotti et al., 2014; Klerkx et al., 2017). Co-innovation goes beyond participatory and transdisciplinary research in the form of doing joint experiments, given that it is aimed at supporting broader changes in farming systems, sectors, territories and value chains. Co-innovation is about collaboration, knowledge exchange, capacity development, convergence and co-creation of ideas (Lee et al., 2012). The co-innovation approach involves iterative testing with the end users of the innovation, in which capacity development of all the involved actors is a key success factor of the process.

Several co-innovation experiences reported in the literature have demonstrated limited contributions of participants, the end user's unwillingness to share ideas, or impracticality of some ideas suggested (Toillier et al., 2019). Therefore, upgrading capacities for co-innovation is becoming an intrinsic feature of co-innovation approaches. These capacities are of a different nature, ranging from technical to functional, organisational and managerial capacities to enable coordination, resource mobilisation, experimentation, co-creation, negotiation, facilitation or conflict management. These capacities are needed at several levels where the collaborative work is implemented (individual, organisation, community, project) and concern different types of actors depending on the innovation developed (farmers, farmer organisations, researchers, extension workers, service providers, etc.).

Ultimately, upgraded capacities for co-innovation create improved environments conducive to successful innovations for transitions.

R&I projects are recognized as one of the vehicles that can help to develop such capacities across multiple levels in AIS, from the individual to the network, to mobilize and build systemic innovation capacity (Turner et al., 2017).

The co-innovation approach has been extensively used in the DeSIRA projects as an approach to tackle issues in agriculture and natural resource management through the mobilization of resources and capacities within national agricultural innovation systems. Being at the forefront of promoting these approaches, sometimes quite new in their contexts, researchers were in charge of both designing and implementing the approach, and ensuring capacity development at the level of the project and the partnering organisations in order to improve its outcomes.

This first chapter presents a variety of co-innovation approaches and illustrates the multiple contextual factors that can influence how they work. These include: the types of expected innovation outputs (technological or organisational), the degree of novelty brought into the specific context of each country, the expectations of partners, and the (more or less central) roles assumed by researchers in the innovation partnership. In other words, this first chapter gives a first glimpse into what it takes for research to shift from the traditional well-known linear transfer of technology approach, towards the iterative co-innovation journey; one that blurs the boundaries between research activities and innovation activities through collaborative exploratory approaches. The former organises the involvement of each actor in a simple sequenced pathway around technology development and adoption, whereas in the latter knowledge exchange between researchers and other actors and joint learning through iterative non-linear cycles are central.

The four stories reveal typical challenges faced by DeSIRA projects in putting in place co-innovation approaches, such as shifting researchers' roles and capacities (Fair Sahel and SUSTLIVES projects), guiding experimentation (LIPS-Zim project), managing joint learning cycles (SUSTLIVES project), engaging farmers as co-innovators (LIPS-Zim and SUSTLIVES projects) and upgrading partnership capacities for enabling co-innovation (Climate-smart Malawi project).

What have we learnt?

- **Significant investments were made in new capacities**

Co-innovation requires new roles for researchers who may support these processes in different ways: as explorers, experts, facilitators of interactions, designers of solutions and products, trainers, or by monitoring processes and supporting reflection (Wittmayer and Schäpke, 2014; Toillier et al., 2018).

The roles endorsed by researchers may depend on the innovation phases (ideation, prototyping, scaling), on the depth of technical challenges (more or less radical) and on the breadth of stakeholder engagement (more or less extensive). The innovation phase for many projects included a significant investment in developing new capacities to enable researchers to take on new roles.

At the early phase of an innovation project, researchers can play several roles: initiator, designer, project formulator, mobiliser of partners, and conductor of systemic reviews and baseline assessments to position the scope of innovation (LIPS-Zim project). When the time comes to implement iterative experimentation and joint learning, researchers can wear the hat of innovation facilitators and engage in the design and facilitation of multistakeholder innovation platforms (Climate-smart Malawi project). Alternatively, or additionally, they can become an active part of the experimentation process by conducting evaluations of the new technologies under development, and/or joining action-research and knowledge co-production for the use of technology developers. At a later stage in the innovation process, when scaling readiness is there, researchers can help with expertise in different domains in order to validate or shape the financial (IRRINN project), legal, organisational (SUSTENTA e INOVA project, LIDISKI project) and policy (ABRIGUE project) conditions for scaling and sustainability in a broader context.

The way these different types of research contributions are packaged, coordinated and strategically managed by research organisations all along the innovation trajectory defines the different research and innovation models. We identified two distinct models: the "innovation-through-research" model and the "research-in-innovation" model.

In the "innovation-through-research" model, the researcher is in a piloting position for the overall innovation process: the researcher develops the innovation agenda and strategy, and actively engages innovation end users in dedicated experimentation and coordination mechanisms. In general, researchers also play the role of trainers in order to upgrade end-user capacities to engage in such a process and on a very new innovation agenda from their perspective. This is exemplified by two stories: the SUSTLIVES project in the Sahel and the Climate-smart project in Malawi. In these two cases, researchers brought packages of new technologies or new crops, as potential solutions to well-known problems, and piloted their experimentation, making use of participatory approaches. The stories showcase the effort developed by research to ensure buy-in and commitment of farmer communities.

In the "research-in-innovation" model, researchers are called upon to support ongoing innovation process and develop a research agenda based on innovators' needs. This requires researchers to be equipped with new types of tools to guide experimentation led by farmers in ways to ensure scientific results and evidence-based solutions. This is illustrated by two stories, from the Fair Sahel project in Senegal and the LIPS-Zim project in Zimbabwe. In the first one, researchers were equipped with an "ideotyping" tool, serving as a compass to support the exploration journey by a farmer setting up an agroecological farming system. In the second one, researchers developed the "Feed Assessment Tool" to help breeders identify suitable forage and complementary feed ingredients for improving livestock practices. In both cases, farmers were innovators (they also monitored the research agenda and activities during their transformative journey) and the researchers were part of this joint discovery process. Farmers were also invited to participate in coordination and joint learning mechanisms at upper levels, which were put in place by local authorities (such as Ndiop commune in FAIR Sahel project), NGOs or other civil society organisations in charge of mainstreaming the innovation agenda and the transformative vision of agrifood systems.

Embedding these new roles was not always easy, as it challenged skillsets, identities and role perceptions by researchers, as is well illustrated in the stories of Fair Sahel and Climate-smart Malawi.

"Beyond technology development, the project also prioritises capacity building initiatives aimed at enhancing the scientific knowledge and technical skills of agricultural researchers and technicians. Training sessions on experimental design, data collection, analysis and reporting empower participants to conduct rigorous research and contribute to evidence-based decision-making." (Climate Smart Malawi Story of Change)

Crucially, co-innovation also required changes in the roles and capacities on the farmers' side, to enable a true collaboration.

• Engaging farmers as co-innovators enabled them to take on a transformative triple challenge

Innovating for sustainability transitions implies designing new unprecedented farming systems, with a possibly radical transformation of farmers' practices, ways of reasoning and ways of participating in local knowledge production.

Consequently, farmers face a triple transformative challenge, i.e. in doing, thinking and interacting, which is not always fully acknowledged and supported in co-innovation approaches (Lacombe et al., 2018).

This is what "farmers' engagement" is all about across the four stories presented in this chapter. They highlight how researchers supported farmers in ways that enabled change in their ways of doing, thinking or interacting. The LIPS-Zim project trained farmers to conduct on-farm trials, the Fair Sahel project emphasised the need for systems thinking by farmers to develop innovative solutions, and the Climate-smart Malawi project supported farmers' engagement in multi-actor platforms for informed decision-making and collaborative action. Farmers' capacity development is everywhere, embedded into co-innovation.

"Central to the success of the agricultural innovation platform AIP approach is capacity building, which equips stakeholders with the knowledge and skills necessary to actively participate in technology development and evaluation." (Climate Smart Malawi Story of Change)

All the stories demonstrate how important co-innovation frameworks and protocols for interaction are to create new contexts enabling for such behavioural changes in knowledge, attitude and practices. Whether innovation platforms (Climate Smart Malawi story of change), participatory technology development approach (LIPS-Zim story of change), co-design approach (Fair Sahel), or stakeholder forum (SUSTLIVES story of change) – all created new work environments that allowed for new behaviours and thereby new mindsets among researchers, farmers and their other collaborators. Co-innovation frameworks are meant to change work environments and collaboration rules, which are starting points for behavioural change toward new ways of doing, thinking and interacting to address complex sustainability problems. Farmers' engagement is one of the key contributing factors (Ingram et al., 2020). Hence all the details of engagement processes are important and part of the Stories of Change told by the projects. The starting points might differ, but in all the SoCs researchers engaged with farmers through tailored interative learning loops. In the LIPS-Zim project, a problem-solving approach was used, defining the research and innovation agenda as a first step. As a second step, participatory on-farm technology development was used to identify new suitable forage and complementary feed ingredients for goat, sheep and cattle production. In the Climate-smart Malawi project, an opportunity-based approach was adopted, starting with a package of new climate-smart technologies that had to be adapted to local conditions and responsive to farmers' needs. The SUSTLIVES project, which aimed to introduce new species in farming systems for improving nutrition, started from another angle: by co-identifying with many actors the potential at local level for the introduction of the new species, and then doing action-research and participatory varietal selection to support pioneering producers of neglected and underutilised species in real conditions.

In order to effectively change behaviour, it is crucial to consider the target group's circumstances and develop strategies in association with them.

• Capacities and time are two scarce resources

The focus on researchers' and farmers' capacity development outcomes is the very added value of these stories, compared to academic publications resulting from R&I projects. Such changes are rarely reported by researchers who focus their publications only on the new knowledge produced and innovation outputs (Lacombe et al., 2018).

Capacity outcomes are the foundation for the sustainability of the changes once the projects are over. For future replication, it is crucial to understand both the nature of the capacities to be developed and the ways of developing them in real time, while innovating. The stories highlight diverse types of required capacities for both researchers and farmers, i.e. technical, functional and managerial capacities. They also make us understand the non-linear and unique journey that each project team had to take to practice co-innovation, thus showing co-innovation as an "art" rather than a "science" where practitioners' testimonies explain the fundamentals to succeed in each context (Jones, 2018). Such stories can help generate new knowledge, not only on the innovation products themselves, but also on the underlying assumptions and strategies in co-innovation projects for generating changes; this remains an insufficiently explored area in agricultural sciences until now.

The stories also help to understand why co-innovation takes time. In the four cases, the project model allowed for emergent participatory research designs in dynamic innovation processes, but it took them several years before the first innovation outputs appeared. It raises questions about the capacities of implementing organisations to sustain their co-innovation approaches beyond project duration, in order to go beyond the first experiments and engage more actors in the process. Co-innovation requires changes among multiple actors at different levels in agricultural innovation systems to embed these approaches (Nettle et al., 2013; Schut et al., 2016).

The next chapter explores how DeSIRA projects involved other stakeholders in the system to be transformed (private sector, civil society, policy actors) as co-designers, beyond farmers.

STORY 1:

Learning together: Farmers as active researchers, and researchers as active listeners

Fair Sahel project, Senegal

STORY 2:

Nurturing forgotten crops, a journey towards resilient agriculture

SUSTLIVES project, Burkina Faso and Niger

STORY 3:

The resilient journey of livestock transformation

LIPS-Zim project, Zimbabwe

STORY 4:

Sowing innovation among smallholders for climate smart agriculture

Climate-smart innovations project, Malawi

Learning together: Farmers as active researchers, and researchers as active listeners

Fair Sahel project, Senegal

The former *bassin arachidier* (in French) or peanut basin in the central/west of Senegal is heavily marked by the intensification of peanut production that started back in the 1960s. Accompanied by the mechanisation of agriculture, large-scale introduction of peanuts into the cropping system led to deforestation and a decrease in grazing areas. Years of intensive cultivation have depleted the soil of its nutrients. The fallow has disappeared. The livestock – that some think of as a "factory for transforming biomass into organic matter" – needs to be moved to other areas in search of suitable grazing grounds.

In this hostile environment lives old Aldjouma Sarr, affectionately called Pa Aldjouma by the young people in the village. This tenacious octogenarian, like any farmer in the area, experiences a decrease in yields, the consequence of poor soil. The peanut basin area has seen many agronomy research initiatives working with local farmers, but old Aldjouma always had difficulty applying proposed solutions: *"These initiatives often do not take into account our logic of action, much less the realities of our environment"*, he says.

The meeting of collaborators

With the arrival of the Fair Sahel project, aimed at co-construction of agroecological initiatives, Pa Aldjouma was the first volunteer to give up one of his cultivation plots to test the innovations jointly proposed by the participants during a project workshop. The research team still remembers his words:

"As a farmer, and a son of a farmer, and due to my advanced age, I have seen very many projects pass through our zone. Now I really like your approach, which gets us involved in the process of creating knowledge. Taking into account farmers' opinions is essential for the sustainable intensification of local production systems. I am ready to get us out of the underperforming and vulnerable agricultural system".

What Pa Aldjouma was about to test on his plot was the effect of the peanut-cowpea association with or without organic matter (horse manure) on the productivity of peanuts and cowpeas. Combining two nitrogen-fixing legumes was originally practised by women, who in the Sérère region have difficulty accessing land – it allows to overcome the constraint of reduced crop area while maintaining biodiversity. *"Two legumes in association on the same plot? How weird"*, thought Djalika, a young agronomist who joined the Fair Sahel project in the hope of finding herself freed from her laboratory routine. She followed her desire for direct contact with agricultural stakeholders. The courage and determination of Pa Aldjouma impressed her. Their meeting marked the beginning of a promising collaboration.

Immersion in a real environment

Djalika was part of the field team responsible for assisting Pa Aldjouma in setting up his plot in the commune of Ndiob. She had to explain to Pa Aldjouma the requirements of the trial: why his plot had to be divided into several parts (a complete randomised block with three repetitions), that each part (treatment) represented a different cultivation mode, that to avoid bias all the parts (blocks) had to be repeated three times, that it was necessary to leave paths between the blocks to facilitate both circulation and identification of blocks by the participants during the co-evaluation workshops. Finally, together, they were able to set the boundaries for the trial and spread horse manure on it. From sowing to harvest, Aldjouma was there, accompanied by a group of

female helpers, all of them committed and willing. The winter campaign saw a series of co-evaluation workshops, where farmers and researchers exchanged a lot of ideas. All the recommendations and suggestions were discussed and contributed to improving the system.

The synergy of knowledge

After two months of separation during which Djalika had to return to the capital to process and analyse data collected in the field during the winter campaign, the research team and the community of Ndiob met again. The data on yields, reported to farmers during a workshop, revealed that in the case of the peanut and cowpea association without organic matter, as practised by women, the cowpea boosts the yield of peanuts compared to the cultivation of peanut alone. These temporary results were comforting but far from removing the constraints weighing on producers in the peanut basin. A new round of experiments was about to start. But Aldjouma, faithful to his logic of action in managing his plots, refused: *"I cannot continue the same experiment. I practice cereal-legume rotation on my plots. In the coming season, I would rather be interested in experimenting with the legume cultivation methods that you are testing, which are the best to precede millet".*

The research team and other participants found this request relevant. After all, the Fair Sahel project aims to establish spaces for bringing research, extension services and farmers together around the co-design of agroecological innovations, which requires an iterative process. It is about establishing interactions between these different entities that are inseparable in theory and almost disconnected in practice. Here is an example of what such an interaction could bring.

Djalika thought about Pa Aldjouma's words. Indeed, a systemic reflection taking into account several dimensions was necessary if one wanted to make a serious attempt at removing the constraints identified during the in-depth diagnosis of local cultivation systems: decline in soil fertility, free grazing, difficulties in pest management, deforestation, dry spells, low quality and availability of water for market gardening, low quality and availability of seeds, and obsolete agricultural equipment. The challenge was to guide producers towards innovative solutions that would combine local know-how and technical knowledge, research and farmer innovations, to arrive at sustainable cropping systems.

"As a farmer, and a son of a farmer, and due to my advanced age, I have seen very many projects pass through our zone. Now I really like your approach, which gets us involved in the process of creating knowledge. Taking into account farmers' opinions is essential for the sustainable intensification of local production systems. I am ready getting us out of the underperforming and vulnerable agricultural system."

Pa Adiouma in his plot. *Photo: Omar Lo*

New areas of research at the request of farmers

The preparation of the second campaign included a series of workshops aimed at reflecting on how research and stakeholders should approach the transition from the plot approach to the systemic approach in their agricultural operations in the Ndiob region.

During one of the workshops, Djalika went around the working groups listening to the discussions. A blurred vision she used to have about the paradigm shift in agriculture was becoming clearer and taking shape. Producers cited many plant species (wild grasses and trees) of agronomic and/or fodder interest that they would like to introduce into their crop systems. New areas of research were emerging at the request of the client (the producer). At the end of the process, producers, thanks to their endogenous knowledge and the support of research, were able to imagine four innovative sustainable crop systems that they would like to implement over time to be more resilient in the face of climate change. These models of cultivation systems, called ideotypes, would be tested and adapted by farmers taking into account the realities of the environment. Each ideotype had a name, an identity marked by the imprint of its designers. For example, *Baatax*, which in the local language Serer means "abundant production", was characterised by integrating agriculture and livestock through rotary grazing diversification of crops (crop associations, introduction of okra or sorghum in lowland areas), reforestation (assisted natural regeneration and hedgerows) and the introduction of *Maralfalfa* (a forage grass) into the cropping system for fodder.

New directions for agroecological transition were proposed and many farmers, starting with Pa Aldjouma, volunteered to test the different ideotypes.

Paradigm shifts

After the foundations of the systemic approach were put in place in the region by the Fair Sahel project, the continuity of the ideotype process had to be ensured by local authorities, extension agents of the state and members of DyTAEL (a local antenna of a national movement promoting agroecological transition), who participated in the co-design process. DyTAEL, which operates at the departmental level, integrated the ideotyping approach around the issues of land salinisation and soil fertility management into its action plan for the following year. The process would be supported by a co-design co-ordination team.

Djalika listening to producers discussing the results of the Pa Aldjouma plot. *Photo: Isidore Birame Diouf*

Pa Aldjouma and his peers say that the Fair Sahel project allowed them to have a scientific explanation behind their practices such as crop association: *"With the experimental tests, I was able to know that cowpeas and peanuts could fix the nitrogen from the air to return it to the soil. So this improves the fertility of my soil. I also learned that with the appropriate method of associating cowpea and peanut, cowpea could boost my yield of peanut pods. The co-evaluation workshops were also very fruitful. I've learned a lot from my fellow farmers, for example that poorly decomposed manure from working livestock can be a source of striga [a parasitic plant] contamination on my plot, and many other things."* According to Pa Aldjouma, the Fair Sahel project sparked a systemic reflection among farmers leading to changes in the way they farm. However, he underlined the need for support to arrive at successful and truly resilient prototypes.

At the level of local authorities, the municipality of Ndiob has set up a framework for bringing together all partners and projects intervening in the zone called the *CAP Commun* (a collective of friends and partners of the municipality of Ndiob). At the end of the project's field activities, the municipality suggested to the project to produce a report on the results of the ideotyping process, the state of its progress and the next steps necessary for its success. The Deputy Mayor Mr Oumar Ba also suggested that the project organises a workshop bringing together all stakeholders and the municipal team to encourage taking ownership of the results.

As for Djalika, she continued to improve the ideotyping process with her colleagues in other areas (for example Koussanar and Niayes). The ideotyping approach has become the compass that guides her future areas of research to respond to the concerns of farmers. Since participating in the "caravan of DyTAES", a multi-actor partnership bringing together all agroecology actors in Senegal, she has contributed to advocacy and awareness-raising activities promoting agroecology throughout the country.

Mountaga Mboh, a doctoral student who followed the entire process with producers and did his thesis on the subject: *The knowledge of producers is as important as that of agronomists. The farmers in the peanut basin were used to working with researchers who provided them with technical recommendations. During the first workshops, the producers told the research team that it is them, the researchers, who are the experts, so it was up to them to propose solutions. In the beginning, they were just asking many technical questions in order to compare scientific agronomic knowledge with their endogenous knowledge. However, for the co-design process, agronomists and producers must move away from their respective positions to collaborate. In my opinion, over time, the farmers found the co-design approach interesting and innovative compared to other projects. They were not used to having so much freedom of choice in a project, which may have destabilised some of them, but in the end, the majority considered they had learned something.*

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Nurturing forgotten crops, a journey towards resilient agriculture

SUSTLIVES project, Burkina Faso and Niger

Agriculture is the most important sector of the economies of Burkina Faso and Niger. Yet agricultural production is highly sensitive to climate change, including drought and floods, making farmers and rural communities vulnerable: economically, socially and in terms of food security. The dominant staple crops, which do not perform sufficiently in conditions of water scarcity and disruptions in the rainfall regime, do not meet the nutritional needs of local communities. It is essential to support food systems by expanding the choice of resilient crops available on the market.

At the same time, the conditions for the processing and marketing of agri-food products in the two countries are not easy. There is room for improvement in infrastructure, market organisation, producer organisation and access to information. In this context, it is difficult to introduce innovative agricultural products to the market.

Meanwhile, a wide range of local water stress tolerant species exist, but they are often overlooked compared to major staple crops. Unfortunately, research on neglected and underutilised species (NUS) remains limited in Burkina Faso and Niger. The little scientific information that is locally available on NUS does not reach end users or other actors in the value chains due to a lack of interaction between researchers and actors in the professional world.

Bringing researchers and agricultural communities together in a living laboratory

According to the logic that drives the SUSTLIVES project, strengthening the research and innovation capacities of actors in the agricultural knowledge and innovation system, and improving the exchange of knowledge and information on NUS, are central elements to promote the transition towards sustainable agri-food systems in Burkina Faso and Niger that would be resilient to climate change.

A project focused on research for the promotion of NUS in the two countries demands that research organisations engage in co-creation and co-development work with agricultural communities, who will deal with cultivation, direct consumption and/or marketing of crops. The project postulates that only a change in behaviour and practices on the part of the stakeholders can ensure the sustainability of the project outcomes beyond project duration. With this in mind, participatory processes – directly involving stakeholders – are at the heart of SUSTLIVES and aim to increase stakeholder engagement in the project and the sense of ownership among participants. Overall, the project is considered a learning process, a "living laboratory" that allows for a continuous exchange of knowledge (both traditional and scientific/modern) with the objective of increasing resilience in the face of a constantly evolving environment and climate.

Creating a space for exchange to advance innovation

To involve a wide range of actors with different competencies to create a favourable environment for the development of NUS, the SUSTLIVES project facilitated the creation of two stakeholder forums in Burkina Faso

and Niger. The Joseph Ki-Zerbo University (UJKZ) in Ouagadougou (Burkina Faso) and the Abdou Moumouni University (UAM) in Niamey (Niger) are responsible for the creation and animation of these forums which they conduct in a concerted manner with other project partners: the Italian Agency for Development Cooperation (AICS), the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM-Bari), the Bioversity & CIAT Alliance, the National Research Council in Italy (CNR) and the Natural Resources Institute Finland (LUKE).

From the start of the project, the forums served as knowledge hubs and meeting spaces between stakeholders. Through their joint support to the development of the SUSTLIVES project's action plan, the actors contribute to the development of the agri-food sector. The forums fulfil a dual function of being a platform for continuous sharing and exchange of the results of SUSTLIVES between all stakeholders, and a space where the needs and opinions of local stakeholders are being collected to guide the project's actions. For example, in the early phases of the project, once the stakeholder forums were established, consultations with the technical services of the Ministry of Agriculture and other stakeholders led to the selection of the NUS (Table 1) and the villages of intervention.

The analysis of training needs carried out by the universities of Roma Tre, UJKZ and UAM resulted in establishing a training plan for value chain actors on the selected NUS – 12 sessions per country covering various themes. Then, the plan was discussed and validated by the stakeholders. More generally, the two forums made it possible to improve communication on the SUSTLIVES project and the participation of project partners in the events organised by the different organisations and institutions of the forums. Thanks to regular updates between the participating institutions on their activities and the activities of the project, the project can

Table 1. List of NUS selected in Burkina Faso and Niger as part of the SUSTLIVES project

Group	Burkina Faso	Niger
Roots / tubers	Sweet potato *(Ipomoea batatas)* Fabirama *(Solenostemon rotundifolius)*	Sweet potato *(Ipomoea batatas)*
Vegetables	Guinea sorrel *(Hibiscus sabdariffa)* Moringa *(Moringa oleifera)* Amaranth *(Amaranthus sp.)*	Guinea sorrel *(Hibiscus sabdariffa)* Moringa *(Moringa oleifera)* Okra *(Abelmoschus esculentus)*
Legumes	Voandzou *(Vigna subterranea)*	Voandzou *(Vigna subterranea)*

Experimental moringa plot, Faculty of agriculture UAM2.

> *" The opening of the world of higher education to rural development actors not only allows to produce knowledge on NUS and the dynamics that their introduction may provoke in the field, but it also made us work on adapting our training offer (the Agrinovia Master). We will involve stakeholders such as Afrique verte, ACRA and others who promote local practices and knowledge on NUS, in developing the Agrinovia Master's curricula, providing training modules, supervising field internships and disseminating the results of our students' research."*

respond to local development needs and draw on local potential. Continuous dialogue and collaboration stimulated by advances in applied research are sources of motivation for stakeholders.

Managing multi-actor partnerships requires negotiation and listening skills that those working at the interface between research and development must try to develop. *"The Sustlives project has created a multi-actor dynamic which allows our university to initiate and strengthen close partnerships with various partners in the field of NUS (research, non-governmental organisations (NGOs), farmer organisations, the private sector)"*, says Professor Jacques Nanema of Joseph Ki-Zerbo University. *"The opening of the world of higher education to rural development actors not only allows us to produce knowledge on NUS and the dynamics that their introduction may provoke in the field, but it also made us work on adapting our training offer (the Agrinovia Master). We will involve stakeholders such as Afrique verte, ACRA and others who promote local practices and knowledge on NUS, in developing the Agrinovia Master's curricula, providing training modules, supervising field internships and disseminating the results of our students' research"*, Professor Nanema adds.

Professor Lawali Dambo of Abdou Moumouni University states: *"As part of the activities of SUSTLIVES, our team has been in a continuous dialogue with several national and international institutions working on NUS. The discussions held with these stakeholders made it possible to evaluate the potential impact of NUS on the national food and nutrition environment, as well as the role they can play in the empowerment of women and youth."*

Discussions on cassava among forum stakeholders in Niger.

The project has also significantly contributed to strengthening the capacities of agricultural research on NUS through its 4-ha experimental site and its nine farm sites where stakeholders work in a participatory and inclusive manner. The experimental site has become a laboratory for students and their teachers, but also a showcase for sharing experiences with many visitors who leave convinced of the opportunity that the NUS provide for the national agri-food and economic sectors.

Co-creation and co-innovation processes are complex and their results are sometimes uncertain, but they help to achieve concrete impacts. The forums allow the project team to know the concerns and expectations of different users and to use them to guide the action research activities. That in turn leads to results that are adapted to local conditions and meet the needs of beneficiaries. In addition, the involvement of users in the process allows them to better understand the practices that the project wants to promote and to see with their own eyes how these practices perform in the field, facilitating their adoption. This is for example the case of participatory varietal selection – many farmers who participated in the selection process requested the seeds of some high-performance varieties of NUS to sow them during the following season before the researchers finished data analysis and began promoting them through extension services.

Sharing success factors and learning from failures together

Collaborations with the NGO SWISSAID, the Network of Chambers of Agriculture (RECA) in Niger and the World Vegetable Center in Burkina Faso have evolved within the forums from the exchange of information and knowledge to the joint planning and execution of activities, such as participatory varietal selection or support for NUS producers. Mr Mahamane Rabilou Abdou, head of the SWISSAID Niger office, appreciates the evolving collaboration with SUSTLIVES: *"From just sharing our respective results, we have moved on to thinking about possible complementarities. SWISSAID has regularly been invited to all SUSTLIVES activities and vice versa. It's very interesting to see this similarity of approach in our two projects. Success factors can now be shared while failures can help us to learn lessons together. We plan more concrete actions in 2024."*

Ms Natacha Gouba, DeSIRA SafeVeg project manager at the World Vegetable Center, says: *"Together, we have been able to implement initiatives that have helped to increase the efficiency of our operations while preserving our environment and supporting our communities. As examples we can give, among others, the trials of some of our varieties on the experimental fields of SUSTLIVES, the training on good agricultural practices that our team was able to provide, the work sessions between the two teams, etc. Thanks to this collaboration, we had the opportunity to evaluate our varieties and promote them with farmers, thus significantly contributing to reducing undernutrition and improving farmers' incomes."*

Stakeholder forums played an important role in the implementation of the SUSTLIVES project. This is why the project team has already formulated some ideas to make them sustainable even beyond SUSTLIVES. First, the two forums started to be considered as national chapters of a multi-stakeholder platform on NUS in Africa, which is being established by SUSTLIVES. In addition, the forums were included in the governance scheme of the Orph-Crop project on the development of NUS value chains in Burkina Faso and Niger, which will be financed by the Italian Agency for Development Cooperation and should begin by the end of 2024.

Meeting of the forum, May 2022.

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The resilient journey of livestock transformation

LIPS-Zim project, Zimbabwe

Amidst the vast landscapes of Zimbabwe, where livestock is not just a source of income but also a way of life, a transformative journey unfolded through the Livestock Production Systems in Zimbabwe (LIPS-Zim) project.

In a country dominated by small-scale subsistence farming, and in regions IV and V which are inherently prone to droughts and have received the full brunt of climate change in the past decades, the challenges are profound: poor livestock practices, insufficient feed and forage resources, inadequate disease control and a lack of veterinary services, to name a few.

LIPS-Zim endeavoured to rewrite this narrative through a mechanism involving all those affected to jointly design durable solutions. For this purpose, innovation and communication platforms were created, and these became the nexus for the transformation. Innovation and communication platforms have played a crucial role in promoting stakeholder interaction and information flow, linking evidence-based research and upscaling the adoption of state-of-the-art agricultural technologies. Communities got engaged in activities such as identifying, creating, planning, implementing, monitoring and evaluating, and documenting research on climate-smart feeding practices, adaptive breeds and animal management practices.

Several innovation and communication platforms were established to address the full spectrum of problems faced in the communities: prevalence of livestock diseases, lack of veterinary products, limited fodder production, inadequate livestock marketing and problems with governance, in the districts of Buhera, Mutoko, Gokwe North, Binga, Chiredzi, Beitbridge, Gwanda, Nkay and Hwange. These innovation and communication platforms provided a neutral space for farmers, farmer groups, extension services, the private sector, government technicians, non-governmental organisations (NGOs), research institutions, universities and other stakeholders to share experiences, give feedback and collectively find solutions to their challenges, to prioritise and implement research and innovation initiatives, ensuring relevance and resonance with farmers' needs. The co-creation process involved the facilitation of innovation and communication platforms around key value chains, allowing stakeholders to engage and agree on implementation parameters. Good facilitation skills ensured that participants along value chains were invited and encouraged to stay and participate. Equal gender representation was ensured by deliberately including more women.

Buhera livestock officer Basil Musendo describes innovation and communication platforms as a crucial element in spreading innovations and technologies that are being promoted by the LIPS-Zim project: *"We have WhatsApp training, look-and-learn tours, field days, technical learning days and many more, which all work to spread information to farmers while also enabling them to ask questions on issues they do not understand. The goal is to increase adoption and upscaling of climate-relevant technologies".*

Participatory identification of suitable on-farm technologies for innovation

The LIPS-Zim project team conducted participatory on-farm technology development trials to identify suitable forage and complementary feed ingredients for goat, sheep and cattle production. The aim was to improve access to forages, feeds and feed ingredients, the standard of livestock feeding and the quality of livestock products sold in the markets. Using the feed assessment tool developed by the International Livestock Research Institute (ILRI), the project systematically assessed

local feed resource availability and use, consequently generating quantitative information, which was critical in informing the intervention strategies. Using this tool, scientists and selected farmers conducted on-farm trials to test lucerne, velvet bean, cowpea and hyacinth bean, which are climate-smart forage varieties. The farmers were also trained on how to grow drought-tolerant forages, produce hay, make home-based feeds and other technologies that added value to their activities. Over 900 farmers from Beitbridge, Gwanda, Nkayi and Buhera received fodder seed as part of the support. In the quest for resilience, the project expanded its focus to fodder conservation. Fodder processing into hay bales and silage became a skill embraced by farmers, ensuring livestock sustenance during dry seasons. The process required a lot of training; compounding issues were the need for machinery for timely and cost-serving measures for harvesting. The two droughts in the country increased the pace of adoption and recognition of the value of baling.

The project has reached over 9,000 farm households, equipping them with knowledge and skills on feed and fodder production technologies. Monitoring and evaluation assessments in the Buhera and Beitbridge districts, for instance, reveal that more than 67% of farmers experienced an increase in the availability of fodder through LIPS-Zim.

From subsistence to commercial forage and feed production

Helping farmers to improve their productivity and quality is an important first step, but the project is also ensuring that farmers have access to reliable markets and buyers. *"It is envisaged that the forage markets will create opportunities for non-livestock owners to enter this value chain through the production and sale of forage and feeds to livestock farmers. Further improved feed and forage technologies will enhance livestock product quality and customer satisfaction. In the end, this will bring efficiency in the cropping systems, increasing incomes and reducing malnutrition and poverty",* states Dube Sikhalazo, LIPS-Zim project coordinator. Edson Mbedzi of Chamnangana village is one of the 390 project beneficiary farmers in Beitbridge: *"Before the project, I had little knowledge and skills in good forage production, processing, storage and even livestock nutrition. Through the engagement with LIPS-Zim, for the first time in 2022, I harvested 31 bales of velvet bean hay, weighing close to 20 kg each, which I sold at 3 US Dollars per bale. I also produced eight bags of livestock feed from the 2021-22 farming season. With more knowledge and skills in production and processing, and business development training, I have moved from subsistence to commercial hay production. I now produce higher quality hay, which I am selling at 7 US Dollars per bale, a game changer for me and my family".*

Prof. Christopher Gadzirai engaging farmers in the construction of an acaricide cattle footbath in Mangava village, Siakobvu. *Photo: Thandeka Matebesi*

Innovation and communication platforms were created, and these became the nexus for the transformation. Innovation and communication platforms have played a crucial role in promoting stakeholder interaction and information flow, linking evidence-based research and upscaling the adoption of agricultural technologies.

Like Edson, Zondani Sibanda from Beitbridge has transformed from subsistence to commercial forage production. He has secured a contract with a local livestock feed manufacturing company for the supply of five tonnes of velvet bean seed.

Keneti Mutara from Buhera district joined the project in 2021 after observing the improvement in livestock productivity of other farmers who joined the project earlier. And she has no regrets. Mutara had five goats and three cattle when she joined the project. Through continuous learning and engagements at innovation and communication platforms, her knowledge of climate-relevant livestock production practices greatly improved: *"I have acquired knowledge in intercropping velvet bean and maize which enables me to feed both my livestock and family. Through innovation and communication platforms I learned how to make hay bales from velvet bean leaves. I have seen how feeding velvet bean to my goats has made a difference: now they produce a kid every year, instead of every two years",* says Mutara. She is part of a women-led rotational savings group where members buy goats for each other and she has five farmer followers she shares velvet bean seed with.

The pivotal role of extension workers as innovation facilitators

The project ensures capacity building of officials from the Department of Agricultural, Technical and Extension Services (AGRITEX), the largest public rural intervention agency with representatives at the national, provincial, district and village levels. AGRITEX serves as a key link between research teams and farmers, providing key intelligence required to better understand the operating environment and facilitating engagement at local government and site levels. The fact that AGRITEX officers were the facilitators helped to reduce mistrust; they clearly articulated the project's objective and expectations to ensure farmers were put at ease. The project used the local existing structures set by precedent projects and its personnel or those of the partner organisations who had worked in the districts before. Therefore, they were familiar with the approach and had a solid track record, which ensured transparent engagement.

The project established and supported six innovation platforms in six districts through working with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the National University of Science and Technology (NUST). To communicate regularly, the participants use WhatsApp, but in-person meetings are held where participants are encouraged to work in groups or teams and share information to reach those without access to smartphones and the internet. Women have more access to smartphones and share more than men. To date, 13 stakeholder meetings have been held in the nine districts and the inputs from the meetings have helped to align project interventions with the districts' priorities.

Innovative feed formula using locally available materials

To complement forage production, use and conservation of local resources, the project's scientists together with farmers crafted an innovative eight-feed formula using locally available roughage feed materials. These included crop residues, dry grass, hay and dry leaves mixed with produced protein sources from from *Mucuna* (velvet beans), lablab, cowpeas and acacia pods. They used simple feed formulation techniques developed by the Department of Research and Specialist Services (DR&SS) and, in conjunction with the University of Zimbabwe, conducted on-farm livestock feeding experiments. The participating farmers were further trained on ration formulation, utilisation of crop residues, and home-based manufacture of protein, energy and mineral supplements to reduce dependency on expensive commercial stock feeds needed during dry seasons.

Munyaradzi Pashapa, a researcher at DR&SS notes that these new rations using locally available materials turned out to be a breakthrough and success for animal nutrition, especially during the dry seasons. Feeding trials in Buhera showed that the live weight gain was similar for both commercial feed and the new concentrate ration with a 362 g average daily gain. Overall, it was proven that the concentrate ration is a safe diet for the Mashona lactating cows and can be used as a protein supplement during dry spells.

Because the specialised equipment required is expensive (for example, chopper grinders retail for USD 1,300), the farmers have come together to procure it for a fee with support from other farmers. This way they can maintain and procure other vital pieces of equipment.

The success rippled through the community, with farmers reporting improved animal nutrition, enhanced livestock breeds and economic gains through fodder sales. Indeed, farmers who have adopted these technologies and practices have witnessed weight gains as high as 1.2 to 1.4 kg under local conditions, for example in Nkayi, Gwanda and Beitbridge districts.

Disease surveillance and control

The Department of Veterinary Services (DVS) effectively utilised the innovation and communication platforms to reach farmers and build their capacity for disease detection and surveillance. These farmers underwent training in disease detection and control facilitated by postgraduate students. Notably, farmers actively engaged in research activities conducted by the students. To further support the ongoing efforts, training materials tailored to farmers and extension services were developed and spearheaded by ICRISAT.

In 2022, three innovation and communication platforms focused on addressing challenges related to livestock diseases and veterinary drugs in the Binga, Buhera, Gokwe North, Hwange and Mutoko districts. These platforms facilitated collaborative efforts involving 160 participants, comprising farmers, project partners (including researchers), AGRITEX and DVS personnel, local leaders, agro-dealers, NGOs, private-sector representatives and other stakeholders across the districts, with a balanced representation of 70 men and 90 women. The leadership was largely identified through discussions and a vote, mainly based on the lead farmer concept.

PhD and MPhil students are doing research at the University of Zimbabwe to explore the distribution and impact of ticks and tsetse flies that affect livestock health and productivity. A student is working on local knowledge of animal disease control. The research proposals and protocols were presented not only to the project scientists but alongside engagements with 295 farmers and other stakeholders (28% women) through innovation and communication platforms. These interactions not only solicited valuable feedback but also fostered the co-design of research activities, enhancing farmers' understanding of the importance of their active involvement and continued monitoring of the research.

To ensure the relevance and effectiveness of the research tools, questionnaires were rigorously pre-tested with farmers during the innovation and communication platform sessions, reflecting a participatory approach in refining methodologies and ensuring alignment with the needs and perspectives of the farming community. Recent monitoring and evaluation field visits reveal that 92% of farmers in the project target areas acquired capacity for disease detection and surveillance.

As the project unfolded, it was not just about transforming agricultural practices; it was a narrative of empowerment, resilience and community-led change and innovation, through a blend of scientific expertise and local wisdom. It has been an impactful four years: increased livestock productivity, off-take and product quality; improved feed and fodder production; improved knowledge and skills among farmers and extension advisors; improved livestock breeds; improved synergies among different stakeholders.

Group photo of participants at the LIPS-ZIM feedback meeting in Chiredzi. *Photo: Thandeka Matebesi ILRI*

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Sowing innovation among smallholders for Climate-Smart Agriculture

Climate-smart innovations project, Malawi

Agriculture accounts for 30% of Malawi's gross domestic product and is important for the livelihoods of more than 90% of the population. However, the agricultural sector continues to grapple with low productivity, partly due to the slow development of new technologies essential for increasing yields and profitability.

The progressive degradation of natural resources in the country is putting the future of agriculture and food systems at risk. As this situation is aggravated by climate change, science-based strategies to increase resilience of farmers (or rural communities) against climatic shocks are urgently needed, especially to assist smallholder farmers who have fewer resources to manage the ever-increasing risks.

From the lack of co-ordination to co-creation

One serious constraint to the success of research efforts is the limited partnerships and co-ordination among the various players involved in technology generation and dissemination. This lack of co-ordination has led to the development of what we call fragmented technologies, meaning technologies which cannot address efficiently the diversity of challenges faced by farmers, as opposed to integrated technologies.

However, there is good news: the traditional top-down technology transfer paradigm is changing with the realisation that farmers are true innovators and that scientists need to hear their voices, as well as those of other actors in the value chains, to transform agricultural research into a co-creation process that provides usable results.

The project Climate-smart innovations to improve productivity, profitability and sustainability of agriculture and food systems in Malawi, funded by the European Union, aims at developing climate-resilient integrated technological innovations in this country through multidisciplinary action-research. By understanding the opportunities and constraints for uptake of the technologies by farmers, the project also aims to inform policy-makers and partners about the potential of scaling up and out these technologies to contribute to climate resilience and sustainability. This DeSIRA project brings together eight CGIAR centres to develop and evaluate together with the farmers new technologies and practices to increase agricultural productivity in the context of climate change. More importantly, local collaborations with five non-governmental organisations (NGOs), led by Self Help Africa under the already running KULIMA programme, are backstopping farmer field school groups which are the main entry point for participatory field research in the project.

Through close collaboration at various levels (e.g. on-farm participatory research, district innovation platforms, national planning and dissemination workshops and interactions with government departments), the project supports socio-economic assessments alongside technology generation to deliver technology options that are suitable for dissemination to farmers.

In its three years of implementation, the project has produced promising results while pioneering the establishment of district agricultural innovation platforms in three distinct agro-ecological districts: Mulanje, Salima and Mzimba. These agricultural innovation platforms serve as dynamic forums where stakeholders come together to identify, develop, test and validate integrated technology options tailored to local conditions and community needs. By integrating farmers into decision-making processes and fostering knowledge exchange, the agricultural innovation platforms empower local communities to take ownership of the innovation process, thereby increasing the likelihood of successful technology appropriation.

In a co-creation mode, the scientists have developed climate-smart integrated technologies for farmers growing cereals, legumes and sweet potatoes, which are guided by the farmers' needs. Female farmers are active protagonists in these processes as they are frequently the ones who tend small plots and sell the products in local markets. Mrs Belita Ndalapa, one of the 157 farmers who participated in the technology evaluation trials, has been farming on the same 15 acres of land since the 1980s. In recent years, the yield from her farm has been declining due to soil degradation, resulting from ceaseless cultivation without proper soil fertility management practices. *"In my family, we have been growing maize, groundnuts and soybeans for more than 20 years without following any special pattern or arrangement. However, through these on-farm trials, I have learnt how to make proper use of limited land space by intercropping sweet potato with soybean, groundnuts with pigeon pea, and sweet potato with pigeon pea",* said Mrs Ndalapa.

The results of these collaborations are becoming evident: many farmers are now better equipped to manage the risks posed by pest and disease pressures using appropriate management options. Similarly, they have more knowledge about improved post-harvest management techniques that are essential to mitigate the effects of climate change and its related environmental degradation.

An important objective of this project is to promote diet diversity and create awareness of the nutritional benefits of local crops through existing nutritional structures at national, district and community levels, including care groups. To achieve that goal, the project's activities include field days, cooking demonstrations, and the use of print and electronic media. With a considerable diversity of local ingredients, the focus is on enhancing utilisation of different food crops available at household level for improved nutrition.

One of the project strategies is to strengthen local capacities of those who provide technical assistance to the farmers. Master trainers were introduced to a wide range of climate-smart technologies that become a portfolio of options that they can discuss with farmers as choices to deal with, for example, increasing droughts and land degradation.

The integration of agricultural innovation platforms into existing co-ordination mechanisms, such as the District Agriculture Extension Co-ordinating Committee

Field day in Malawi.

(DAECC), underscores the project's commitment to leveraging existing structures and maximising stakeholder engagement. The composition of DAECC reflects a diverse array of actors, including technical staff from line ministries, representatives from NGOs, the private sector, media houses, farmers' co-operatives and civil society groups. This inclusive approach ensures that the voices and concerns of all stakeholders are heard, and that farmers' concerns are addressed throughout the innovation process. Tangible results of these processes are the design and evaluation of more than 17 integrated technological options with a special focus on intercropping systems, soil fertility management, agro-forestry farming systems and aquaculture production.

Central to the success of the agricultural innovation platform approach is capacity building, which equips stakeholders with the knowledge and skills necessary to actively participate in technology development and evaluation. Training programmes, such as those conducted for agricultural innovation platform members on field experimentation and data collection techniques, lay the foundation for informed decision-making and collaborative action. Through hands-on learning experiences and joint technology assessment sessions, stakeholders gain practical insights into the performance and suitability of integrated technologies in local contexts

The important role of science in fostering innovation

A case in point are the project's endeavours to revitalise the banana industry by combating the banana bunchy top virus disease. One of the traditional practices that farmers use to manage the disease is to dig out all the infected mats, therefore starving for three months the aphids that transmit the banana bunchy top virus disease. After this period, they plant new suckers free of the disease. However, the rate of sucker multiplication through this method is low and here is where science met the needs of these farmers: a PhD student from Malawi's Department of Agricultural Research and Services was enrolled in the project to carry out studies on the virus and improve the tissue culture technology to produce many clean planting materials within a short time. It is hoped that the new disease-free germplasm coupled with the traditional cleaning techniques that farmers already used will increase the crops' productivity.

> *" The DeSIRA project has taken a right and acceptable approach for other projects to emulate, like planning together, implementing together and discussing each and every step together. In my view, to be successful in the project implementation, that is the right approach to take. Technology generation requires working together in all steps, planning together, moving together, discussing shortfalls together".*

Trial field overview.

Taking each and every step together – harnessing collective expertise for resilience

The significance of stakeholder engagement and collaboration is evident in the testimonials shared by participants. Mr Lettons Mkandawire, Chair of Mzimba DAECC, commends the agricultural innovation platform approach for its inclusive and participatory nature, emphasising the importance of collective planning and implementation. According to Mr Mkandawire, *"the DeSIRA project has taken a right and acceptable approach for other projects to emulate, like planning together, implementing together and discussing each and every step together. In my view, to be successful in the project implementation, that is the right approach to take. Technology generation requires working together in all steps, planning together, moving together, discussing shortfalls together".*

Similarly, Mr Mfune, an extension methodology officer in Mzimba, lauds the project for its emphasis on partnerships and collaboration: *"The DeSIRA project is a good project. Its activities such as trials are helpful in trying to address production constraints farmers are facing".* He went further to say: *"This is one way of finding solutions to farming issues. Partnerships and collaboration are good as we work hand in hand with community members, extension planning area and district extension officers and other district development/extension actors. We are working as a team at the district and extension planning area level and with community members. Results presented are beautiful. It is a very rare gesture as others just do their way without involving DAECC or the agriculture office. As DeSIRA, with this, you have respected the Mzimba district and DAECC members in giving out/sharing the results of project activities and informing about project progress. Keep it up, all is beautiful indeed",* he said.

District-level dissemination meetings serve as platforms for sharing experiences, lessons learnt and scientific evidence on the performance of integrated technologies. These meetings facilitate dialogue and foster a culture of transparency and accountability in project implementation.

As the project progresses, it continues to identify and validate climate-smart integrated technology options tailored to local conditions and farmers' realities. Beyond technology development, the project also prioritises capacity building initiatives aimed at enhancing the scientific knowledge and technical skills of agricultural researchers and technicians. Training sessions on experimental design, data collection, analysis and reporting empower participants to conduct rigorous research and contribute to evidence-based decision-making. The training equips participants with essential tools for experimental design, data analysis and reporting, enabling more rigorous scientific practices in agricultural research.

Mrs Eliza Alfred, from Thuchira extension planning area, first heard about the project from the government extension officer in 2021. The sweet potato innovative farming system was entirely new in her community. Upon learning about the sweet potato-legume farming system, Mrs Alfred decided to be one of the technology hosting farmers and dedicated a portion of her land to the on-farm trial. Interestingly, she planted the on-farm trial during the market day since her trial site is situated along the road to the Thuchira market. This decision attracted the attention of many passersby who mocked her, claiming that she was wasting land that could have been used for maize or solely for sweet potatoes. *"Today, coincidentally, is market day, and I am delighted to see those very people who mocked me during planting now praising me for the exceptional yield",* explained Mrs Alfred.

In conclusion, the DeSIRA project represents a holistic approach to agricultural innovation, emphasising collaboration, inclusivity and sustainability.

By harnessing the collective expertise and resources of diverse stakeholders, the project aims to empower smallholder farmers, enhance agricultural productivity and build resilience to climate change in Malawi and beyond.

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Photo:
IRRINN project,
Burkina Faso

2 PART 2

Research co-innovating with private sector, civil society and policy-makers

by Ricardo Ramírez

The challenges of inter-organisational partnerships

Bilateral and multistakeholder research partnerships can shorten the delivery of innovations while making them responsive and accessible to unique contextual circumstances. Co-innovation agreements among different stakeholders can shorten feedback loops, and provide spaces and methods for collaborative knowledge production, which in turn enhances ownership of innovations among partners. The inclusion of potential users in the innovation process is thought to be critical to articulate local needs and incentives for innovation adoption (Clark, 2002). Patterns of interaction between different knowledge sources can, for instance, be established through public-private partnerships or innovation platforms (Kilelu et al., 2013). These serve the purpose of enabling dynamic engagement processes for information exchange, knowledge co-creation and joint learning. Such collaboration is not only reflected in the interaction process itself, but also in the joint implementation of the proposed innovation as well as the distribution of benefits and risks (Muraguri, 2010).

This chapter demonstrates how strategic partnerships between researchers and other innovation actors respond to food system transformation challenges. The selected stories illustrate a variety of research partner arrangements with the private sector, NGOs, civil society and government, with reference to the drivers and barriers for researchers to co-innovate with partners.

What have we learnt?

• The benefits of shared expertise

Researchers working towards food system transformation efforts faced the challenge of moving beyond the familiarity of their disciplinary expertise. The notion of inter-disciplinarity means breaking silos: emerging approaches such as biological-based economy, agroecology, “One Health”, “nature-based solutions” all require the integration of multiple fields of knowledge. For researchers this means reaching out to multiple other partners that can bring in their own expertise; beyond that, there is the pressure to show outcomes on the ground, not just on the publishing side. This means more than validating and adapting technology (agroforestry, micro-irrigation, value chains, improving processing, working beyond the farm and farming system to include markets and livelihood, etc.) – to also introducing new collaborative learning approaches, such as the example of the climate field schools (GRAPE project). For instance, in Brazil, the Sustenta & Inova project has been working with farmers, local government, banks, local farm associations and cooperatives, to reduce barriers for market access for açai fruit products.

Combining expertise means building “interfaces”, such as the fit-for-purpose partnerships in Nepal (GRAPE project) that brought together research and development actors. It means finding the right expertise to bring relevant technical inputs and playing new roles in the innovation process. In Costa Rica, the Transforma-Innova Project brought together technical committees (for instance the NAMA Café technical group) with the participation of scientists from the Tropical Agricultural Research and Higher Education Center (CATIE), the German development agency (GIZ), and the United Nations Development Program (UNDP). The committees have gained momentum and developed technical solutions including a monitoring of greenhouse gas emissions reduction registry.

These examples of a multistakeholder research paradigm have roots in participatory technology development. Under participatory technology development, agricultural researchers were compelled to collaborate with others and provide “… information on new technologies; participating in fieldwork during situation analysis and the identification of ‘best-best’ options; advising on design and monitoring of farmers’ trials; carrying out on-station research into field-generated innovations or adaptations or into questions raised by farmers; providing specialist services (e.g. entomology or virology); and using their knowledge of farmers’ situations and questions to influence the national research agenda” (van Veldhuizen et al., 1997a: 10). When one takes a moment to consider the type of training many researchers have had, these additional tasks constitute a tall order that takes time to embrace.

Several challenges have been faced. For starters, scientists and farmers use different time frames. “Scientists’ thinking is often ‘out of time’; in contrast farmers’ experimentation can only occur ‘in time’ as the research informs constant adjustment to management practices. For scientists, replication and comparison are paramount, while for farmers ‘what counts is fitting available resources to changing circumstances well enough to make it through the growing season’” (van Veldhuizen et al, 1997b: 17). It follows that a critical skill is the ability to create interactive situations that allow an integration of rural people’s pragmatism with researchers’ analytical skills of scientists. Transforma-Innova (Costa Rica) integrated these different tasks from the start by establishing a multi-actor coordination group that has brought together more than 80 actors, linking with regional structures, and inviting the technical experts from the Ministry of Agriculture and Livestock. The Costa Rica example makes reference to their efforts to reconcile differing dynamics and agendas among the stakeholders.

Eastwood et al. (2022) found that: “while farmers needed to understand and engage with the design processes, facilitators need to adapt processes to avoid farmer frustration from process-heavy and highly structured methodologies” (p12). Engaging with organisations that can play the intermediary, facilitative roles has been employed by several of the examples in this chapter. Some have invited NGOs as intermediaries (GRAPE in Nepal, IRRINN in Burkina Faso); others have enlisted the help of farmer organisations (Sustenta & Inova in Brazil, Transforma - Innova in Costa Rica). Eastwood et al. (2022) recommend several principles for farmer-centred innovation design that have to a large extent been followed by the four examples in this chapter; most important among them is farmer engagement throughout the process – as was amply illustrated in Chapter 1.

• Fit-for-purpose collaborative arrangements for a variety of objectives

A variety of collaborative structures and approaches and their specific objectives are reported in this chapter. For instance, Transforma-Innova (Costa Rica) engaged with governmental institutions from the start, breaking disciplinary silos and bringing farmers’ voices to national policy discussions. This was done by establishing a multi-institutional consortium that included research organisations, governmental organisations, farmer organisations, the private sector including large cooperatives, multilateral agencies and NGOs.
In other cases, multistakeholder partnerships are a

venue to offer training of trainers – local "promotors" of innovation – and introduce local testing and verification of practices on farmer's fields (Sustenta & Inova in Brazil, or IRRINN in Burkina Faso). These demonstrations engaged local and regional government, while inviting community-based monitoring. In the case of Nepal, the GRAPE example refers to partnerships as an outcome in its own right. A key feature of what happens in these collaborative structures and approaches is knowledge exchange. Reed et al. (2014) emphasise some good practices in knowledge exchange that are illustrated in the examples in this chapter. Carefully designing knowledge exchange into the research process means meeting the needs and priorities of those who are most likely to apply their research in policy and practice. This means that from the start, the systematic representation of the likely users of research and other relevant stakeholders needs attention. The focus is on ensuring that the knowledge generated can feed into real-word decisions and achieve impact. For instance, the GRAPE project in Nepal was able to integrate its climate-resilient agriculture expertise into both university curricula and NGO capacities. Reed et al. (2014) emphasise the value of long-term relationships that may have continuity beyond initial research funding. These authors also underline the importance of allowing time to reflect on how knowledge was generated and shared.

Research also engaged with the private sector, a crucial scaling partner in the development of business models and support services for the end users of the new technology. In Burkina Faso, IRRINN set up a collaboration with private-sector vendors who provide solar pumps to farmers. Moreover, they have integrated a subsidy system with the vendors "… to equip 40 villagers with solar irrigation kits under the financial hire-purchase model, i.e. the producer becomes the owner of the kit at the end of the reimbursements of part of the equipment… If the supplier's monitoring and support service is deemed satisfactory by the producer, the project pays 10% to the supplier after two years and when everything is reimbursed the producer becomes the owner of the equipment." Using the private sector as a vehicle to sustain the provision of inputs beyond the duration of a project is a challenge. This has been done previously in East Africa with the provision of the Purdue improved crop storage (PICS) bags distributed through commercial suppliers (Ramírez et al., 2022). This placed pressure on the project partnership as it meant that both farmers and suppliers needed to experience sufficient financial gains from the technology to make it part of their business plans in the short term.

Both in Brazil and in Costa Rica, the Sustenta & Inova and the Transforma-Innova projects have brought in the financial system as a partner. The Brazil example is worth noting: "Of the activities to promote access to public policies and credit, 16 contracts were signed by community representatives (associations and cooperatives) for public purchases of agro-extractive products with the PAA (Food Acquisition Program), totalling about R$ 6.3 million; and, in partnership with the Conexsus Institute, we provided more than R$ 1 million in credit, from approximately 300 contracts signed by agro-extractivists with the Bank of the Amazon, for the implementation of Manejaí. Another 700 are in line for approval".

These examples show how technology has been made accessible (on-farm training, demonstrations) to farmers (individual farmers, organised groups) in combination with support services (marketing, credit, policy-support) thanks to partnerships between research and other key actors of the agricultural innovation systems, i.e. NGOs, private firms, policy-actors. This is easier said than done, which brings us to celebrate the capacity development experiences included in the examples in this chapter.

• Upgraded capacities to learn together

As already mentioned, in Nepal the GRAPE project has framed partnerships less as a tool and more as an outcome; plus it has shared its know-how with NGOs and universities. These are examples of capacity development to share experiences externally, to other stakeholders that may be able to scale-up or scale-out the process. But there is a prior, internal and ongoing dimension: learning how to learn together. This cannot be taken for granted; it needs dedicated training. While this applies to researchers and farmers, as emphasised in Chapter 1, it affects all other partnering organisations.

Capacity development is central to all the partnership arrangements described. In Costa Rica, the Transforma - Innova project has invested in capacity building for the collaborative process itself: "Capacity building is required that goes beyond the technical ones in all the actors involved, for example, the ability to collaborate, to set priorities, to lead processes and to abandon positions to facilitate consensus".

A complementary feature worth noting are the examples of methodologies for learning together, where participants in a partnership collaborate in a joint inquiry. This is the case of the climate-vulnerability and capacity assessments implemented by the GRAPE project in coordination with the local government and other relevant stakeholders in Nepal. A second one is the "Capacity Works" methodology used in Costa Rica to promote and motivate cooperation in the search for solutions and the achievement of objectives.

These examples are reminiscent of earlier work that emphasises collective learning: "The research methods of agricultural knowledge and information systems assessment have been woven with the research methods of agroecosystems analysis to capture both the learning about the way stakeholders are organised to respond to complex situations and the agroecological aspects…" (Lightfoot et al., 2001: 133). This is consistent with existing approaches in the literature where multiple stakeholders jointly learn to address complex problems and support innovation capacities (Chevalier and Buckles, 2008; Engel and Salomon, 1997; Schut et al., 2015).

• Innovation continuity in question

Looking beyond the stories told by the project teams, we wonder to what extent and how these partnership arrangements could survive beyond project intervention in order to ensure continuity in innovation deployment. For projects working with multistakeholder partnerships there are challenges about the continuity of the host organisation's convening power. The power to convene is enhanced when the coordinating group or organisation enjoys credibility, access to resources and power, and some sense of urgency (Ramírez, 1999). If these factors are diminished, the continuity of partnership arrangements may be affected. For one thing, stakeholder groups are not homogenous and differences within each can be expected to emerge. There may be challenges to partnership continuity from many sources, especially as there are structural conditions and barriers that merit attention (Schut et al. 2015).

For researchers, there may be incentive structures that predated the project that may shape future priorities. These may include, for instance, incentives to continue integrating agronomic research with social science and learning systems research. As illustrated in Chapter 1, these approaches mean substantial changes to researchers' roles, which may be difficult to sustain. Merging disciplines inside siloed organisational structures requires leadership, resources and motivation. When systems transformation is project-based, many research management challenges emerge.

"In developing countries, it is difficult to mobilize funding mechanisms that enable the implementation of medium- and long-term research and development projects that may effectively contribute to impacts. Donors tend to fund short-term projects and expect tangible short-term impacts. The challenge is therefore to develop effective funding mechanisms that enable continuity in the implementation of research and development projects. In a more practical approach, the research community needs to learn how to design or take advantage of clusters of projects embedded in innovation pathways to sustain their activities over a long timeframe. This goal calls for a long-term commitment to certain research themes and stable partnerships. It also requires a monitoring and evaluation system which takes the uncertainty in funding mechanisms into account and is able to provide information to strategically adapt activities accordingly." (Faure et al., 2018: 135)

This chapter shows inspiring examples of multistakeholder research partnerships bringing together researchers with the private sector, NGOs, civil society and government, for the length of a time-bound project. However, the tension between on the one hand the motivation to transform complex food systems and, on the other hand, the combination of institutional inertia and short-term project funding modalities remains unpacked. Questions arise about how to manage this tension to create catalytic effects for larger system transformation during project implementation. In Chapter 3 there is further elaboration on the role of multi-stakeholder platforms as mechanisms for addressing dilemmas. Many DeSIRA projects attempted to support secure access to scarce but common natural resources that are claimed by various actors or stakeholders. Besides promoting effective partnerships in innovation, inclusion, and capacity development, multi-stakeholder platforms can open spaces for dialogue and consideration of governance issues related to the multiple stakes involved and associated social dilemmas.

STORY 5:
Agricultural Innovation Lab: cultivating a greener future

TRANSFORMA-INNOVA project, Costa Rica

STORY 6:
Sustainable land management and native açaizais in the Marajó region of Pará

Sustenta e Inova project, Brazil

STORY 7:
From transactional to transformative partnerships

GRAPE project, Nepal

STORY 8:
An innovative financial model for equipping farmers with small irrigation systems

IRRINN project, Burkina Faso

Agricultural Innovation Lab: cultivating a greener future

TRANSFORMA-INNOVA project, Costa Rica

Costa Rica, with an area of just 51,000 square kilometres, is a natural treasure hosting 6% of the world's biodiversity. The country is recognised as a leading ally of the environment, a global model in nature conservation and climate change adaptation. However, despite its environmental conservation model, Costa Rica still needs to reduce and/or capture its greenhouse gas (GHG) emissions.

This is the context for the TRANSFORMA-INNOVA programme*, which offers opportunities to foster innovative technologies that reduce GHGs and enhance the resilience and sustainability of the agricultural sector. The programme is co-financed by the European Union and the German government through the Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) within their International Climate Initiative.

The project is executed by a consortium including the Tropical Agricultural Research and Higher Education Center (CATIE), Conservation International Costa Rica, the Costa Rica United States Foundation for Cooperation (CRUSA), the Environmental Bank Foundation (FUNBAM) and the United Nations Development Programme (UNDP), under the leadership of the German Development Cooperation (GIZ).

**TRANSFORMA-INNOVA: Transformative low-carbon and climate-resilient routes in Costa Rica. Climate-smart agriculture and value chains*

"We aim to support the Costa Rican government in reducing GHG emissions or enhancing their capture in the agricultural sector, striving for a greater balance, as outlined by the Paris Agreement. The programme focuses on three subsectors: coffee, bananas and livestock. By applying good agricultural practices, these subsectors can reduce emissions and/or increase GHG sequestration, thereby contributing to the National Decarbonisation Plan", stated Alberto Vega, Programme Director for GIZ.

Contributions to the National Decarbonisation Plan

There is strong political commitment to this environmental plan, despite the economic impacts of the Covid-19 pandemic. The government views decarbonisation and climate resilience in agriculture as crucial to recover from the pandemic crisis.

"Since 2012, we have implemented nationally appropriate mitigation actions (NAMAs) in coffee, livestock and bananas. Through these NAMAs, we have initiated actions enabling producers to become more resilient to climate change, providing them with tools for better adaptation, thereby contributing to the National Decarbonisation Plan. Importantly, these farms are also more productive and profitable", said Fernando Vargas, Deputy Minister of Agriculture and Livestock of Costa Rica.

In response to these challenges, the TRANSFORMA-INNOVA programme aims to transform agricultural production systems into more biodiverse, low-carbon and climate-resilient value chains. This will be achieved through innovations, implementation of good agricultural practices and technology transfer, opening new markets for sustainable products that provide better income for producers and facilitating access to financing. It is estimated that these measures will contribute approximately 40,000 tons of carbon dioxide equivalent to Costa Rica's National Decarbonisation Plan by 2026.

Promoting stakeholder collaboration to strengthen governance

To encourage the adoption of these innovative practices, the programme's first step has been to unite various stakeholders, creating conditions for a common agenda to guide all actions aimed at reducing emissions. Since 2021, TRANSFORMA-INNOVA has worked on strengthening existing governance mechanisms, including communities, government representatives, academia, research and private enterprises. To institutionalise agreements, government technicians participate in activities such as tours and discussions. The project has developed a close relationship with the Ministry of Agriculture and Livestock (MAG), the Ministry of Environment and Energy (MINAE) and the National System of Conservation Areas (SINAC). The knowledge generated by the project, through its methodology, technologies and participatory implementation, supports institutionalisation.

"There are always challenges, one being how to reconcile political and scientific perspectives. Scientists provide evidence-based solutions, while politicians must balance these with societal needs, incorporating aspects like social justice to ensure vulnerable groups are not marginalised. Hence, there is a need to align the solutions proposed by science with the problems society needs solved by elected politicians", noted Alberto Vega.

TRANSFORMA-INNOVA has also focused on avoiding the creation of parallel structures by analysing the country's existing organisational framework. For example, the programme has reactivated and strengthened the NAMA Café technical group, involving MAG, the Costa Rican Coffee Institute (ICAFÉ) and several coffee co-operatives. The committee has gained momentum through the participation of CATIE and GIZ scientists developing technical solutions, and UNDP's support in monitoring GHG emission reductions.

Promoting and facilitating collaboration among agricultural sector stakeholders has been a fundamental task of the programme. This has improved co-ordination between technical groups, ensuring that efforts are not isolated but aimed at a common goal. Thanks to this organisational dynamic, technical groups now have greater representation from the agricultural sector and have established a common roadmap for annual actions. Regular follow-up meetings are held to monitor agreements made by consensus. TRANSFORMA-INNOVA

Throughout the process, producers receive the technical advice and support they need to develop their ideas.

uses the GIZ Capacity Works methodology[2] to foster cooperation and achieve objectives, ensuring that scientific foundations and considerations are integrated into technical groups' visions and strategies.

Opportunities for scaling practices through the private sector

The programme runs competitions for non-reimbursable funds where producers and producer associations propose innovative ideas for their production systems and value chains. These competitions encourage the participation of producers in co-creating innovations that contribute to adaptation, mitigation and biodiversity. The availability of resources and means to implement these ideas allows them to develop within their respective value chains.

These competitions aim to identify innovations in coffee, livestock and banana production systems, and reduce GHG emissions. Additionally, they seek to scale successful technologies and practices, replicating them widely," explained Andrés Huebenthal, Climate Finance Adviser for TRANSFORMA-INNOVA.

"A crucial aspect is the support provided by the executing entity, defined in all the competitions we are implementing, which involves local actors with the necessary technical expertise. This ensures that throughout the process, producers receive the technical advice and support they need to develop their ideas," added Huebenthal.

Overcoming challenges and strengthening institutional processes

Despite significant challenges, such as short tenures of focal points and changes in political direction, there is strong receptivity at the local level. *"Producers are eager for proposals that help them produce low-carbon outputs and seek support. Contrary to the belief that people resist change due to economic impacts, they often ask how they can implement these changes,"* said Patricia Ruiz, Technical Adviser for the programme.

2. *https://www.giz.de/akademie/en/html/60520.html*

Producers are eager for proposals that help them produce low-carbon outputs.

5 TRANSFORMA-INNOVA PROJECT, COSTA RICA

> ***"Strengthening institutional processes is a tangible and positive benefit. Robust public institutions are crucial for supporting producers, who ultimately receive institutional services. Having trained human capital greatly enhances all processes."***

MAG also shows strong support for these initiatives. *"The world is moving towards more environmentally friendly, safer products. For developing countries, it is crucial to link primary production with marketing, adding value to national production for international markets,"* noted Vargas.

These processes foster greater awareness of the need for transformation within government structures. *"Within the ministry, we were not familiar with managing projects having this type of governance, which involves more complex interactions than simpler, bilateral projects. It is a significant challenge to reconcile, organise and work together on the programme's main objectives,"* explained Vargas.

Building capacities beyond technical skills in all involved actors is essential, including collaboration, priority setting, process leadership and consensus facilitation. Vargas emphasised the importance of strengthening these processes: *"Strengthening institutional processes is a tangible and positive benefit. Robust public institutions are crucial for supporting producers, who ultimately receive institutional services. Having trained human capital greatly enhances all processes."*

Conclusion

The TRANSFORMA-INNOVA programme exemplifies how Costa Rica is pioneering agricultural innovation for climate resilience and sustainability. By uniting stakeholders, promoting good practices, and enhancing governance and co-ordination, the programme aims to significantly contribute to the country's National Decarbonisation Plan, showcasing a scalable model for global environmental leadership.

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Sustainable land management and native açaizais in the Marajó region of Pará

Sustenta e Inova project, Brazil

Açaí is the most exported fruit in the state of Pará, Brazil. According to the Brazilian Institute of Geography and Statistics (IBGE), around 95% of production is sold to other Brazilian states. Part of the açaí harvest comes from the Marajó region in Pará (1.3 million tonnes a year), of which 90% is extracted by local riverbank dwellers.

Part of this production stems from the contribution of the environmental management research work of the Sustenta e Inova project, funded by the European Union and executed by the Micro and Small Business Support Service (SEBRAE) in Pará, the Amazon Environmental Research Institute (IPAM), the French Agricultural Research Centre for International Development (CIRAD), the Arthur Bernardes Foundation (Funarbe) and the Brazilian Agricultural Research Corporation (Embrapa).

Reversing a context of environmental, economic and social impoverishment

Marajó is the largest river and sea island on the planet, with an area equivalent to that of countries like Switzerland or the Netherlands (approximately 40,000 km²). The forest and savannah ecosystems that still cover Marajó are inhabited by traditional, quilombola and indigenous peoples and communities who derive their livelihoods from these ecosystems. The island's successive development approaches, represented by the rubber, chestnut, timber, palm heart and, more recently, açaí cycles, were mainly based on the extractive exploitation of natural resources and the cheap labour of local communities. These cycles resulted in the degradation of agro-ecosystems and, consequently, limited access to extractive resources, such as fishing, timber and non-timber forest products; the limitation of family activities and crops; and the lowest human development indices in the country.

"Everything is lacking here but what's most lacking is education. The opportunity for us to study, for our sons and daughters to study and develop. The few schools that existed in the interior have closed. Now there are children who have to get up at five in the morning, walk two, three, ten kilometres to a creek to catch a boat to go to a school where there is power. When they get there, everyone gathers in a room to watch a recorded lesson. There's no teacher, there's a television. They only return at night, to start all over again the next day. What chance will these boys and girls have? The same chances I had? I don't want my children to have the same life as I have". (Luane Savelarinho, Muaná, Marajó)

The Sustenta e Inova project seeks to reverse environmental imbalances and the lack of training opportunities by applying innovative sustainable technologies, co-constructed with local populations. These innovations fundamentally seek to take advantage of the biological, cultural and social wealth present in Marajó to promote development on the basis of economic, social, environmental, cultural and political (organisational) sustainability, by inserting these communities into socio-bioeconomic circuits.

Local facilitators trained by the project engage in capacity building activities and provide educational and technical support to agro-extractivists. Currently, the 17 municipalities of Marajó are being served, benefiting around 4,000 families, with the dual aim of establishing new forms of cultivation that respect and restore ecosystems and are resilient to climate change, as well as promoting organisational innovations for managing production and linking it to markets.

Knowledge and skills for inclusive, technical and organisational innovation

Changing local realities is not an easy task. Since the early 2000s, Embrapa researchers, analysts and technicians have been working on sustainable management projects in the region. However, changes in production scenarios combined with the conservation of ecosystems have only begun to be visible from 2020 onwards.

The guidelines for this work were mainly based on the experiences of Bem Diverso, a methodology developed by Embrapa for the socio-productive inclusion of traditional, quilombola and indigenous peoples and communities, and on the Sustainable Territorial Development Plan (PDTS) for the Marajó archipelago, which involves applying regional development strategies throughout the Marajó archipelago.

With more than 35 years of experience working in the Amazon, the Sustenta e Inova project team, co-ordinated by Embrapa in the region, together with a network of local partners, was one of the driving forces behind this change. The team established work targets in five areas: conservation; management and restoration of agro-ecosystems; product processing and agro-industrialisation; commercialisation of products and access to markets; and access to public policies and credit.

The first step to building environmental management in the territories of local communities was to involve those who would benefit most from the idea: the river dwellers. The activities were planned with the aim of ensuring the independence of the communities so that the actions could be replicated in Marajó, taking into account traditional and scientific knowledge, and consolidating and validating this knowledge in the practices of the training processes with facilitators (multiplying agents) and agro-extractivists. Training in the different practices is concentrated in reference centres, training spaces set up and maintained by the communities themselves and organisations working locally. These trainings began with courses and workshops on Manejaí: the minimum impact management of native açaí trees, a sustainable management technology built and tested with Marajó's riverside communities, based on field observations and discussions with agro-extractivists about their native açaí tree management practices.

Manejaí has made it possible to increase the average production of native açaí trees, extend the harvest into the off-season and, by gradually eliminating the tallest açaí trees, increase the safety of harvesting the bunches

Harvesting açaí fruits

and reduce the physical effort of the collectors. In native areas, management involves thinning out the açaí clumps and tillers and some trees to promote the entry of light, without compromising the diversity of species or affecting species of a high biological value. In degraded areas, the reintroduction of these tree species and others of importance for extractivism is promoted to encourage nutrient cycling, diversify production and guarantee more food and income for riverside families.

As well as using native species for sustainable management, it is possible to apply them to another pillar in the process of promoting change in environmental management: productive restoration. To this end, agroforestry systems, productive backyards and bush gardens have been set up. These are production models inspired by the traditional crops of local communities and ecological succession, resembling the regenerative processes in natural ecosystems. In this context, native or exotic fruit trees are grown in association with agricultural crops, vines, forage plants and shrubs, following a predefined spatial and temporal arrangement that promotes a high diversity of species and their interactions.

These initiatives are the basis for the conservation and production of environmental services and the production of food free from pesticides that harm the health of farmers and the general population. The direct benefits of the productive restoration carried out by local agro-extractivists are the conservation of native genetic resources and traditional knowledge associated with their widespread use in food and medicinal culture, such as carás, cassava, *pupunha, tucumã, urucum, vindicá, mastruz, taperebá* and *jambu*, among many other plants. Some of this knowledge is being lost by local populations due to specialisation in one or a few agro-extractive activities.

When choosing one or more restoration approaches, with the aim of favouring the production of environmental services and the establishment and development of plantations, it is crucial to implement initial measures to eliminate or reduce the factors contributing to environmental degradation and plant competition and predation, such as fire and animal grazing, and the action of leaf-cutting ants and other predators. To do this, the project uses technologies such as mowing the land without burning, composting and the formulation of agro-ecological grouts, as well as implementing biodiverse agroforestry systems, adapted to abandoned fallow lands (capoeiras), with plants that attract natural predators or repel predators of plants of agro-extractive interest.

Productivity, fair markets and better food

The end consumer now has the possibility to access healthy, pesticide-free food. For agro-extractivists, there are economic benefits and food security, as they will be able to produce açaí in the off-season and diversify their production. For society, there is a social benefit, because it fulfils at least 11 of the United Nations 17 Sustainable Development Goals (SDGs). In addition, the technologies applied by the Sustenta e Inova project in Marajó serve as an example for other initiatives seeking to boost production while maintaining the functionality of both forest and savannah ecosystems.

Arcindo Moraes, from the municipality of Muaná in Marajó, manages an area of native açaí and began to see results in daily production after participating in the Sustenta e Inova project: *"More than 500 kilos a month are taken from my area all year round. Taking advantage of this productivity can only be done with the appropriate technologies for restoring the area and the good sustainable practices shared by the Sustenta e Inova facilitators".*

In terms of market access, the project is mapping the requirements of institutional and private markets and training these communities to enter these markets. At the same time, the project is making these markets aware of the existence of communities and their products. However, decision-making is informed by the types of market relationships they want to build (how and which ones).

To tackle the financial restrictions and access to public policies, Sustenta e Inova is working with partners, governments and banks to remove barriers and enable communities to access existing public and credit policies. Among the activities to promote access to public policies and credit, 16 contracts were signed by community representatives (associations and co-operatives) for public purchases of agro-extractivist products from the Food Acquisition Programme (PAA), totalling around R$6.3 million; and, in partnership with the Conexsus Institute, the project made more than R$1 million in credit possible, from around 300 contracts signed by agro-extractivists with Banco da Amazônia, for the implementation of Manejaí. Another 700 are in the queue for approval.

Project learning and replicability

One of the main factors that contributed to the positive results achieved by Sustenta e Inova with local production systems was working together with local populations and partner institutions. From planning to execution of activities, the collaborative work has brought unity to the local population. This aspect, inherited by generations of riverside families, was maximised after the arrival of SEBRAE's innovation agents and Embrapa's professionals.

The workshops on the sustainable management of native açaí trees promoted knowledge sharing. The exchange of experiences on the difficulties and successes of production revealed the ability of these agro-extractivists to share and multiply knowledge. Today, they are responsible for attracting other agro-extractivists and developing the training plan set up by the project.

The reference centres, in turn, will guarantee to multiply and sustain the results of all practices developed over the long term. These centres, managed and run by the communities themselves, are qualified to train other agro-extractivists, students and local technicians in the project's lines of action, filling part of the training (education) gap for the agro-extractivists and their children, while also guaranteeing the multiplication of activities inside and outside Marajó. Investing in the development of local capacities is an opportunity for personal and professional fulfilment and independence for these communities.

Community building.

Thus, for the future, the project envisages the independence of local populations in the sustainable management of their territories and sovereignty in the construction of their destinies.

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From Transactional to transformative Partnerships

GRAPE project, Nepal

Nepal is one of the countries that are the most vulnerable to the impacts of climate change. Climate change has intensified extreme weather conditions, threatening the agricultural sector and the millions of people whose livelihoods depend on it. The Green Resilient Agricultural Productive Ecosystems (GRAPE) programme promotes climate resilience in Nepal's western provinces by mobilising the vast experience of various organisations within the agricultural sector.

The International Centre for Integrated Mountain Development (ICIMOD) leads the programme's action research component. Other partners are non-governmental organisations (NGOs) and universities, which have their own areas of responsibility in the project implementation. The leading government organisation is the Ministry of Land Management, Cooperatives and Poverty Alleviation (MoLCPA). The Natural Resources Institute Finland (Luke) supports municipal planning and capacity building focusing on university professionals. As Kamal Aryal, Project Coordinator for GRAPE in ICIMOD explains: *"We believe in establishing fit-for-purpose partnerships, as partnerships provide an interface between research and development, linking science to policy and practice on the ground. We promote partnerships where you and your partner are on the same ship."*

The project set up the GRAPE Partnership Platform, with a focus on collaborative learning, planning and networking. All the implementing partners meet on a regular basis to help ensure mutual understanding of each other's plans and identify synergies, as well as to conduct a partnership health check-up that offers an excellent opportunity to find room for improvement. By leveraging their strengths and implementing targeted improvements, partners aim to enhance the overall effectiveness and sustainability of the partnership, thereby maximising the project's impact.

Joint learning and monitoring visits with the project's partners offer an excellent way to build networks that could be used for the project's benefit. The first such visit took place in May 2023, covering the districts of Surkhet, Dailekh and Bajura. Participants from various GRAPE partner organisations visited action research sites, farmer groups practising climate-resilient agriculture (CRA) and local governments. The visit provided an opportunity to exchange insights and knowledge gathered from diverse backgrounds, foster mutual learning and ultimately improve the programme's implementation. Participants represented government agencies from federal to local level, international NGOs and NGOs with different roles in the project. The diverse academic backgrounds and work experience of the participants allowed critical thinking and various perspectives. By the end of 2023, three joint learning and monitoring visits have been conducted.

Climate Field Schools – to benefit from a wealth of knowledge

One example of how project partners came together is the Climate Field School (CFS). In early August 2023, training on climate-smart technologies was conducted for the farmers in Karnali Province. This training of trainers aimed to equip representatives from farmer groups with knowledge of climate-smart technologies. One facilitator from each of the groups participated in the five-day event. GIZ, the German Agency for International Cooperation, responsible for GRAPE's planning and implementation, was setting the framework for the outcomes of the CFSs and delegating programme execution. GRAPE's partner Finn Church Aid (FCA) identified training needs and, with another GRAPE partner, local NGO Rupantaran, conducted the training at the field level.

The project set up the GRAPE Partnership Platform, with a focus on collaborative learning, planning and networking. All the implementing partners meet on a regular basis to help ensure mutual understanding of each other's plans and identify synergies, as well as to conduct a partnership health check-up that offers an excellent opportunity to find room for improvement. By leveraging their strengths and implementing targeted improvements, partners aim to enhance the overall effectiveness and sustainability of the partnership, thereby maximising the project's impact.

Rupantaran arranged the venue with agricultural and livestock technicians who offered valuable basic knowledge to the facilitators. Meanwhile, FCA focused on the gender perspective and ensured the participation of locally marginalised groups (the criteria of marginalisation included for example race, ethnicity, disability, single parenthood, low income). The field school was implemented in the most vulnerable communities identified through the Climate Vulnerability and Capacity Assessment in co-ordination with the local government and other relevant stakeholders in all three districts. The practical part of the session was held on the research plot of the Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED), a local NGO. CEAPRED's involvement offered farmers a better understanding of the technologies and assured their motivation for the follow-up sessions of the CFS programme. By combining the expertise of these various organisations, GRAPE conducted training sessions that benefited from a wealth of knowledge provided by a diverse group of agriculture professionals. The training succeeded in being an effective learning experience for the farmers. Shanti Gurung, member of the CFS group from Barahatal Municipality Surkhet, says:

Woman harvesting from CRA application field.

"CFS has been very helpful to me as a farmer as now I started to use organic manure/fertilisers called "Jholmol" in my farm which was taught in our sessions. These fertilisers contributed to achieving good yields on my farm. In addition to these, we have been able to learn many CRA practices and techniques useful in our farming."

This collaboration also contributes to the empowerment of youth leadership. Rajani Mijar Roka had just completed her Isc. (Intermediate of Science) in agriculture from the Nepal Polytechnic Institute. She is now working as a local resource person for the GRAPE programme in Chure Rural Municipality, Kailali. Thanks to her work she gets to practise and share what she had learnt: *"Thanks to GRAPE, farmers have now learned about CRA, which is based on simple, affordable, nature-based solutions. It helps to increase people's capacity to adapt to climate change".* In an era where numerous young individuals are turning away from agriculture, Rajani's narrative stands out as a source of motivation for others, showcasing the possibilities of adopting and advocating for climate-resilient agricultural practices within their homes and communities. She concludes: *"The learning journey has been truly enriching."*

Other young leaders are inspired as well, for example Jyoti Mandal, a law student and member of the Youth Sounding Board (a consultative platform for Nepalese youth to exert influence on European Union actions), who remarks: *"Since this project has been executed through collaboration and cooperation among federal, provincial and local governments, establishing a solid foundation of accountability and transparency, it serves as a commendable model".*

Redefining partnerships with non-governmental organisations

The GRAPE programme facilitated the creation of a Community of Practice (CoP) for NGOs interested in strengthening CRA, which was initiated by FCA. CoP provides a space for members to connect, exchange experiences and collectively enhance their expertise within the domain of CRA. A separate forum for female NGO members to develop their leadership capacities through diverse training and coaching modules was created to help promoting women's leadership in CRA. Providing exposure specifically to women and enhancing their technical and leadership skills was motivated by a perceived gap in the representation of female leaders in various platforms.

GRAPE is also fostering connections between NGOs and universities. The initiative involves enhancing the capacity of NGOs and universities to assess CRA technologies. GRAPE integrates CRA into university curricula and strengthens the capabilities of local NGOs in promoting CRA. Additionally, through INGOs, they facilitate the import and export of various CRA technologies between Nepal and other nations, scaling up solutions beyond Nepal's borders.

GRAPE's uniqueness lies in its evolution from viewing partnerships with NGOs as tools for enhancing implementation capacities to making partnership building a primary outcome. GRAPE partners now collaborate through a programme-based approach, investing in building networks and collaborations that can extend well beyond the project's implementation phase. This approach often leads to the development of innovative solutions and sustainable business models that benefit all partners over time.

To achieve lasting improvement in the agricultural sector of Nepal, patient, long-term work is necessary. Putting resources and effort into building partnerships can be particularly beneficial for a robust future of cooperation in the field. Functional partnerships are an excellent basis to build on, not only for the next phase of GRAPE but also for other projects and collaborations in the agriculture sector of Nepal.

GRAPE
Green Resilient Agricultural Productive Ecosystems

Bajura, Nepal

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An innovative financial model for equipping farmers with small irrigation systems

IRRINN project, Burkina Faso

IRRINN – Innovative Irrigation is a research and development project, funded by the European Union under the DeSIRA Initiative, and implemented in Burkina Faso by a consortium of CIRAD, CSIC, ZALF, Practica, 2iE, INERA and APESI.

In the village of Kouzoughin, near the capital Ouagadougou in Burkina Faso, agriculture has for centuries been rain-fed and focused on producing cereals for self-consumption. Since the 1950s, some villagers began using well water to irrigate small gardens where they grew vegetables to sell in the city. Rasmata Kaboré's family is one of these pioneers. For years, Rasmata irrigated a small gardening plot from a 17-meter deep well, dug by her husband, close to the family house. The work is hard - she must draw water by hand and walk around the plots with a watering can. Very few market gardeners have acquired generators and submersible pumps to facilitate water extraction but in the village, water is still drawn manually.

The IRRINN project, which aims to intensify agricultural production using innovative technologies, started around Ouagadougou in 2021. Its objective is to remove the technical, financial, organisational and institutional constraints which limit the development of small-scale irrigation. In its initial phase, the project team, together with local producers, tested a variety of small-scale irrigation equipment and techniques (drip irrigation, sprinkler strips, low-cost drilling, nozzles). Rasmata Kaboré was then selected to test the benefits of a solar pump. Her irrigation kit included a solar pump, solar panels and flexible pipes to water her plots. She installed the system in the family well. The results were remarkable from the first year. Rasmata was able to expand the area she was cultivating, increase yields and produce vegetables throughout the year.

The same year she built a new house and bought a small motorcycle, and, in addition, was able to better provide for her children.

The first testing phase served not only to demonstrate the effects of irrigation but also to improve the design of the irrigation kit thanks to input from users. The innovative farmers had the right to adapt their kits and to add new elements according to their needs. The modifications and comments on their experience as new users of the technology were collected through evaluation questionnaires.

After the test and participatory evaluation phase, the IRRINN project proposed to equip 40 villagers with solar irrigation kits. The solar pump and pipes are worth a little less than 2,000 euros (around 1.2 million FCFA). To test this technological solution on a larger scale, it was necessary to find a financing method accessible to small individual producers, interesting to equipment suppliers, and limiting financial risk for both parties. The project decided to test a financial model based on lease, where the producer becomes the owner of the kit at the end of the repayment period for part of the equipment. This model was suggested by one of IRRINN project partners, Practica, who had already tested a similar solution in other projects. This model was therefore adapted to local conditions by the project team and proposed to the farmers and suppliers.

Following the successful example of Rasmata, in the village of Kouzoughin more than 60 people registered to participate in a draw for around 10 pumps that the project planned to install in this village. Among the lucky ones selected, there were six other women, widows and married women who had a family plot and a well.

The innovation platforms initiated by IRRINN were quickly adopted by local stakeholders. Each platform has a management team that organises meetings and co-ordinates activities. The representatives of IRRINN are present to provide support in animation, if necessary, but now the local actors have become the driving forces behind the platforms' activities.

Normally, solutions using solar energy are not accessible to individual small-scale producers, due to the high cost and lack of financing options. The model proposed and tested in the IRRINN project made it possible to bring producers and suppliers closer together.

The principle of acquiring the kits is guaranteed by a direct private contract between the producer and the supplier. After an initial payment of 7% by the producer to the supplier and the payment of a first instalment of the subsidy (60%) by the project, the producer pays the remaining 23% of the total value of the kit according to a schedule agreed upon with the supplier. Thanks to the close relationship between producers and suppliers facilitated by the project, repayment schedules took into account the specific situations of families; for example, deadlines were set not to coincide with the start of the school year, when families have bigger expenses, etc.

Project partner APESI, a local non-profit association active in the field of entrepreneurship and irrigation, that supplies the irrigation kits, closely monitors the agricultural activities of the project beneficiaries to provide advice on the use of the system and assures its maintenance.

If the producer is satisfied with the supplier's monitoring and support service, the project pays 10% to the supplier after two years and when the cost of equipment is reimbursed, the producer becomes the owner. If the producer suspends their reimbursements, the supplier has the right to collect the equipment. One year after the installation of 40 pumps in four villages, the farmers have repaid 100% of the instalments and all the pumps have been operating normally.

At the same time, APESI continued to improve the technical solution. The project team observed in the field that the beneficiaries were not using all pipes simultaneously and thus it was possible to reduce the number of pipes in a kit. This allowed the cost to be reduced by 40%, making it more bearable for producers. A new phase of the project was accepted unconditionally by the supplier to equip 20 new producers in two villages, this time with a subsidy of 50% instead of the 70% used in the previous phase. With this approach, the subsidy made it possible to reduce the risk incurred by the supplier. However, the idea was to gradually reduce the subsidy until it is eliminated.

The reflection on how to continue providing the solution without granting subsidies is carried out within the innovation platforms focused on small private irrigation that operate in two of the municipalities where the IRRINN project intervenes: Tanghin-Dassouri and Komsilga. The innovation platforms initiated by IRRINN were quickly adopted by local stakeholders. Each platform has a management team that organises meetings and co-ordinates activities. The representatives of IRRINN are present to provide support in animation, if necessary, but now the local actors have become the driving forces behind the platforms' activities. Regular meetings are hosted by the municipalities. The composition of the platforms is dynamic; different actors participate depending on the subject covered. Private actors, perceived by the project as part of the innovation support services, have been involved from the start. Meetings within the platforms make it possible to create a climate of trust between these services and the smallholder producers to achieve a win-win partnership: setting up guarantee and security conditions for suppliers while facilitating the acquisition of solutions for farmers. Microfinance companies were included in the platforms to contribute to the co-construction of solutions. The platform members are currently considering a configuration where microfinance companies could serve as a guarantee to reassure suppliers. The conditions created by the IRRINN project made it possible to develop and test a solution, both technical and organisational, that would be sufficiently interesting for the private sector, so that the private actors keep implementing it after the project finishes.

Convinced by the benefits of meeting within the innovation platforms, their members are advocating to obtain sources of financing independent of the IRRINN project. Their goal is to sustain these structures beyond the project's duration, so that other projects or state actors could also rely on them to develop small-scale private irrigation.

Irrigated plot with solar kit.

Petite Irrigation Innovante au Burkina Faso

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Participants of the ReSI-Noc Project in Cameroon.
Photo: ReSI-Noc

3 PART 3

Facing tensions and dilemmas through multi-stakeholdercollaboration

by Marlene Roefs

The challenges of collective solutions to to collective problems

Innovation increasingly is a response to challenges that cannot be dealt with by researchers, entrepreneurs, farmers, or other agri-food system actors on their own. Rising water, energy, and food consumption levels put high pressure on the natural environment. Many agree that threatened agri-food systems form a collective problem, which requires collective solutions[3].Research and development agencies utilize multi-stakeholder and value chain approaches to innovation in which effective collaboration, interaction and knowledge sharing becomes central (Klerkx, van Mierlo, and Leeuwis, 2012).

The stories from Cameroon, Ethiopia, Nigeria, and Colombia presented in this chapter illustrate the diverse multi-actor innovation alliances and platforms into which research and innovation actors work together[4].

3. See for instance the United Nations Framework Convention on Climate Change, and many other global initiatives calling for collective action, such as the SDGs. Many cases are published too, see for instance Anderson, Brushett, and Gray (2014) with examples of alternative cooperative Food Systems, or Pachoud, Labeyrie, and Polge (2019) on collective action among Serrano cheese producers' association in the Campos de Cima da Serra/Brazil.

4. As was noted in chapter 2, there are various connotations and definitions of collaboration through multi-actor or -stakeholder platforms. These platforms are generally understood as more or less formal engagements "bringing together a wide range of stakeholders around broad, general topics within a certain region or country, working across traditional sectors, scales and integrating cross-cutting themes" (Rappoldt, 2016).

The LIDISKI project tried to curb the threat of animal diseases to livestock communities in northern Nigeria. LIDISKI is a very clear example of how multi-actor collaboration is necessary to come up with effective, sustainable and scalable animal health innovations. Researchers contribute to provide insight and legitimacy to potential solutions/innovations through participatory research and developing monitoring mechanisms. Veterinarians are key in sharing knowledge and skills with community animal health workers (CAHW) and farmers. The government creates opportunities for linking actors through a large network of CAHWs, provides training facilities, and sets and controls standards. The private sector develops and provides vaccinations and tests, responding to emerging market opportunities with possible economy of scale thanks to proof of concept validated by the research and innovation process.

The other three projects, ReSI-NoC, ABRIGUE and Yayu, share experiences of multi-actor engagements where different groups of people are competing to access scarce natural resources. The ReSI-NoC initiative in the north of Cameroon has the mission to "strengthen the region's agro-silvo-pastoral innovation systems, promoting sustainable use of natural resources and thus improve the living conditions of populations while reducing conflicts in the region". One of the project's objectives is to test the rural resource centre approach with a wide variety of actors in Bawan, a small village located on the edge of the Bénoué National Park. Researchers have teamed up with nature conservation organisations and a local cooperative representing different types of smallholder farmers in the area.

The ABRIGUE project has set up fisheries, vanilla, cocoa, coconut and palm tree platforms in several territories in Colombia, including Andean, Amazon and Pacific Ocean areas. It aims to promote innovation in agroecology, circular bioeconomy and artisanal marine fishing. Researchers together with government and local producers' organisations seek to promote biodiversity, peace and sustainable livelihoods. The ABRIGUE partners try to "reverse the dynamics of deforestation and land degradation and consolidate actions that lead to peace in the territories and with nature". Their ambition is to change the way "in which innovation and agri-environmental investments are conceived and implemented in the territories".

Their motto is "from value chains to value networks with a circular bioeconomy approach".

Yayu Coffee focuses on conservation of the United Nations Educational, Scientific and Cultural Organization (UNESCO)-registered Yayu Coffee Forest Biosphere Reserve in Ethiopia which is home to coffee farmers and many other agricultural livelihoods. Expansion of farming, firewood collection, settlements and infrastructure development have put pressure on their forest. As Bekele Haile, the project leader from the NGO Hanns R. Neumann Stiftung, explains: "The project tackles complex issues within the UNESCO-registered biosphere reserve, with different zoning such as "core", "buffer" and "transition", that reflect different management principles, agroecological characteristics and biological diversities. There are also socio-cultural complexities: societies of different cultures and norms, religious mixture, languages, ethnic groups, different lifestyles and farming systems". The project promotes multi-actor efforts with different local communities, policy-makers and research institutions.

Clearly, managing zoonosis and scarce natural resources in these generally poorly resourced rural areas requires different actors to work together. Finding relevant, affordable and sustainable solutions to their challenges in the agricultural system always requires collaboration. However, the ways this collaboration is organised, managed or governed may vary according to the kinds of issues at stake.

What have we learnt?

• Building alliances in competitive contexts

The stories from West and East Africa evolve around collaboration in changing the agricultural system affecting different actors, who have various and, in some cases, even competing stakes. Many DeSIRA projects facilitate and strengthen networks, partnerships or "platforms" that support the organisation or facilitation of such collaboration. Some are oriented at linking various actors within a sector to address sectoral issues and others on issues across sectors, such as deforestation, land use, or water quality and access. The former are often structured through public-private or multi-actor partnerships. The latter typically involve engagement of cross-sectoral

actors with competing stakes. In this context, it makes sense to talk about multistakeholder arrangements. As Brouwer et al. (2015) note, multistakeholder collaboration or platforms generally attempt to achieve goals, tackle challenges or address complex issues that affect the broader society and a diversity of actors within that society.

LIDISKI provides an example of a public-private partnership. Collective action by the CAHWs and veterinarians in curbing zoonosis in Nigeria involves a multi-actor partnership arrangement managed by CIRAD and the National Veterinary Research Institute. The latter also contributed to research and vaccine distribution. The arrangement seems to have evolved from a loose collaboration between the government and CAHWs to a formal partnership that is facilitated by researchers and supported by veterinarians and an international company providing vaccines and testing materials. The overall partnership is focused on working together to deal with various animal diseases threatening the livestock sector.

Another arrangement applies to ABRIGUE, where the actors seem to be experiencing more competing stakes both within and across sectors. The ABRIGUE story speaks of "allies" at various levels who collaborate within smaller platforms and the overarching one. Several sectoral platforms were set up, including, for instance, the *Coco Innovación* Ancestral platform in Bahía Solano, the Fishing Innovation and Sovereignty platform, and the platform Participatory Sustainable Development Techniques of San José de Fragua in Caquetá, that focuses on cocoa production and commercialisation. In some areas, actors are mobilised and facilitated by local councils, in others local cooperatives or producers' organisations are in the lead. The overarching "extended territorial AEBE platform" links these smaller platforms. It connects the various allies and facilitates sharing of various insights into how to promote agroecology and bioeconomy (AEBE). The ABRIGUE leader organisation, SINCHI, promotes the AEBE strategy, linking research with policy formulation.

The other two stories have a stronger focus on overall natural resource management and less on specific sectoral issues. This is apparent in the Yayu and ReSI-NoC stories where the structure of the collaboration seems to be best served by multistakeholder platforms. While Yayu is focused on coffee farmers, it operates through existing community groups such as farmer field schools, participatory forest management cooperatives, multisectoral integration platforms (called task forces), village health committees, as well as coffee cooperatives. ReSI-NoC involves a pilot in setting up a rural resource centre nursery for various types of commodities. The rural resource centre, managed by a local community organisation, serves both as an innovation hub or platform for experimentation, training and dissemination of innovations of all kinds; and as a space where different stakeholders come together to discuss local challenges. In both cases, local communities are supported in facilitating multistakeholder dialogues related to land use by different types of farming households and other land users.

• Drawing on collaboration and pluralistic knowledge to solve dilemmas

All four stories in this chapter tell us about the tensions related to sharing common goods such as healthy livestock, soil, forests. They reveal social dilemmas: situations in which self-interest is at odds with collective interests. A famous example is that of fishermen fishing from a common pool. Each wants to catch as many fish as possible. However, if all would make that same (instinctive (short-term, individual) choice, the fish population would shrink and the ecosystem be destroyed. This in turn would harm the collective longer-term interest of having access to fish and a healthy ecosystem to sustain the fishermen's livelihoods. The DeSIRA stories talk about situations in which short-term individual gains, such as no vaccination costs, use of pesticides, extracting natural resources, are competing with collective longer-term interests, like healthy herds, soil quality and conserved resources. The partnerships and platforms presented in the stories aim to find collective solutions to these dilemmas, e.g. in Yayu Coffee, "the platforms, the members foster a more comprehensive understanding of the complex challenges facing the three zones of the Yayu Coffee Forest Biosphere Reserve".

It is interesting to see how collaboration in this social dilemma context is being coordinated and how researchers contribute to this. In many DeSIRA projects, researchers have taken up the role of facilitating these platforms, at least in the beginning. Their roles have changed from solely supporting technical solutions and structures that can support innovation towards finding ways of facilitating innovation processes. Researchers have had to learn to think and work in an inter-disciplinary and even trans-disciplinary way. ABRIGUE partners state that they need "to acquire skills, knowledge and attitudes to think, plan and act in a 'transdisciplinary and multi-actor' way," and "assuming leadership to be able to promote this functional capacity in local innovation platforms." Their colleagues in the Yayu project experience the same needs, as they "unite stakeholders from the local communities, research, government agencies, and NGOs with varied expertise and knowledge". They also "facilitate the replication and adaptation of successful models and solutions across different regions, sectors and contexts."

The changing role of researchers is confirmed in academic literature on multistakeholder platforms and cross-sectional collaboration. Sseguya et al. (2012), for instance, remark that in agricultural innovation systems various value chain actors assume new information and communication roles in rural development. In order to pursue the new roles, actors need to adapt and use tacit and explicit knowledge which requires pluralistic involvement of actors and "new forms" of interaction in the agricultural innovation system (Sseguya et al., 2012).

The stories show that finding solutions in the contexts of agricultural innovation systems requires stakeholders to understand how value chain actors interact and how they interact with their context. What are their own interests and how do they relate to those of others, how to make choices, how to find compromises, how to deal with trade-offs and how to handle power imbalances? These are the key issues in multistakeholder platform dialogues as well as in governing or coordinating a multistakeholder platforms that try to foster collaboration among stakeholders. The multistakeholder platform facilitators, and the multistakeholder platforms as a whole, seek to support these processes by motivating various actors to join and collaborate, create opportunities to collaborate, and enable and strengthen those who need it. Showing how open innovation can lead to success in livelihood improvements, as ReSI-NoC does, is a key motivator for instance. ReSI-NoC also provides a good example of the instrumental character of the rural resource centre in providing a space, a platform for interaction and reducing barriers for collaboration. As is also mentioned in Chapter 2, multistakeholder platforms assist in developing various capacities, such as participatory research, systems thinking and design, and social skills.

• Moving from dialogue to governed collective action

Looking beyond one's own backyard and participating in dialogues with other stakeholders is an important first step towards redesigning the agri-food system.

The implementation structure of the ABRIGUE consortium seems to be an attempt at scaling and influencing policies. It "includes the high-level forum at the policy level, the strategic management team of implementing partners at the (middle) project level, the senior technical team to respond to the emerging issues and the field technical team. The roles and responsibilities are well defined, both for individual and joint action, and regular meetings ensure communication". According to the ABRIGUE story, "the recommendations obtained indicate, as a whole, that a redirection of the way in which innovation and agri-environmental investments are conceived and implemented in the territories is necessary". But what is needed for this to happen? How to support such transformative change?

Building on principles for effective food governance arrangements developed by Termeer et al. (2018), Herens et al. (2022) assessed the role of multistakeholder platforms in influencing the food system governance in Nigeria, Vietnam, Bangladesh and Ethiopia. They concluded that while multistakeholder platforms hold much potential, the ability of existing multistakeholder platforms to play a relevant role in food system governance arrangements depends on their functionality (i.e. policy influencing, knowledge development, capacity development, etc.) and their ability to effectively bring together actors for collaborative action. Having an overarching policy and strong or powerful partners, aligned with the transformative vision towatd the SDG goals, in or in support of the multistakeholder platforms will help. In addition, trust between individuals and organisations is important, as well as their interconnectedness and relation to other networks and decision-makers. Using the same assessment framework, Pittore and Debons (2023) found in a study of a multisectoral food lab in Uganda that a local level multistakeholder platform is especially useful in bringing together different stakeholders in local food systems and to promote inclusiveness. These insights are confirmed by many of the DeSIRA stories.

STORY 9:
Growing opportunities, the impact of The Bawan Rural Resource Center (RRC)
ReSI-NoC project, Cameroon

STORY 10:
Unleashing alliances for resilient farmers in forest coffee ecosystems
Yayu Coffee project, Ethiopia

STORY 11:
Elevating livestock health through innovative multi-stakeholder collaboration
LIDISKI project, Nigeria

STORY 12:
Flavors of jungle and sea
ABRIGUE project, Colombia

Growing opportunities, the impact of The Bawan Rural Resource Center (RRC)

ReSI-NoC project, Cameroon

From the wooded savanna to the Sahel desert, from the Rocky Mountains of Mokolo to the lowlands of the Adamawa region, the northern regions of Cameroon are of exceptional beauty and of capital importance for the development of the country. The North region in particular: three national parks, a breathtaking landscape and its beautiful capital city Garoua.

However, this region, being the most populated and underdeveloped in the country, faces several challenges. Almost half of its territory is occupied by protected areas, zones of hunting interest or hunting zones, which considerably reduces the space dedicated to agriculture and livestock, and puts increased pressure on natural resources. This region is also severely affected by climate change, leading to land degradation. There are tensions related to access to land: clashes between farmers and transhumant herders, clashes between populations living around national parks and nature conservation services. All this represents a big challenge for the sustainable management of the territory.

In response to these difficulties, the ReSI-NoC initiative aims to strengthen the region's agro-sylvo-pastoral innovation systems, promote sustainable use of natural resources and thus improve the living conditions of populations while reducing conflicts in the region.
One of the mechanisms put in place by this initiative since it began in 2020 has been the rural resource centre (RRC), an innovative approach to extension, which facilitates learning new practices and techniques by producers and breeders. *"A Rural Resource Centre is a place that can be used to demonstrate techniques, for training and dissemination of innovations in the agro-sylvo-pastoral field. An RRC is always based in a rural environment and managed by a local community organisation (either a local non-governmental organisation or a farmer organisation). Depending on the context, actors belonging to any socio-professional category can meet in an RRC – farmers, breeders, women, young people, minorities – because unlike any other meeting place in the village (such as a school or a church, or the village chief's place), the RRC is a neutral place which belongs to the entire community"*, explains Ann Degrande, ReSI-NoC Project Coordinator. This innovation put in place by the project adapts well to the social, economic and environmental context of the North region.

The RRC concept was developed around 15 years ago in the southern part of the country. It has also been tested and adapted to the Sahelian context, particularly in Mali and Burkina Faso, with interesting results. This is how the model was integrated into the ReSI-NoC project – it met the objective of creating synergies between stakeholders around the co-creation/adaptation of new practices.
Even if the strategy was the same as in other known cases, the topic around which the activities of the centres would evolve was new – the RRC approach had not yet been tested in the zones near protected areas, with a wide diversity of actors. In Bawan, a small village located on the edge of the Bénoué National Park, the problems around nature conservation and the pressure on natural resources created a new context.

A RRC was installed in Bawan in 2021, at the dawn of the project. At first it was just a fenced off area, as RRCs typically develop gradually. The fenced space made it possible to install a nursery and demonstration fields for learning new techniques for planting and regenerating trees, and to test new varieties. Thanks to the interest of the local population and their dynamism, other elements were added to the RRC: a water source and a training room.

Many training and coaching sessions were proposed, for example on farmer-managed natural regeneration, fruit tree cultivation, food and nutritional security, rural entrepreneurship, RRC management and conflict management. An important element in strengthening the community's capacity to manage the RRC autonomously is the structuring of the management committee with its subcommittees and the legalisation of the structure. All this was facilitated by the ReSI-NoC project.

For two years, the members of this RRC have harvested more than 1,000 tonnes of corn, millet and groundnuts, as well as bags of *bracharia* (fodder plant for livestock). Their activity in the centre helped each member to obtain an additional income of around 30,000 FCFA per month (around 45 euros).

When it comes to nature conservation in the area, the benefits are even more significant. The Bawan RRC gave nature conservation services an opportunity to meet the local population in their environment, in a neutral space, and to discuss with them in a friendly manner. The meetings were first facilitated by the project which invited the main conservator and his collaborators to attend certain meetings and activities. Now the park team goes there freely, without intermediation from ReSI-NoC. *"Before the creation of the Bawan RRC, we were not even in touch with the forest guards and park officials. We thought they were not there for our good,"* says François Mammigue, President of Scoop Narral Bawan, the co-operative created to manage the Bawan RRC.
There has also been an evolution in the relationship between researchers and nature conservation actors, especially for the national research institute IRAD, which had never worked in close collaboration with conservation organisations before.

Good interaction between different stakeholders facilitated by the Bawan RRC has contributed to achieving the objectives of several projects operating in the area. This was the case for the ECONORCAM project which asked the RRC to provide 35,000 plants to reforest the wildlife corridors connecting the Bénoué and Faro national parks. This action, in addition to the income that the nursery is generating, not only contributes to the protection of the fragile ecosystem but also serves as an awareness tool for the community.

"If today we work in synergy with other structures, it is thanks to the rural resource centre", says François Mamigue, and he adds: *"We know that once we walked, but today we run. We have worked with IUCN, WCS (ECONORCAM project) and now INBAR. Our collaboration with this last organisation allowed the RRC to have the first bamboo nursery in the region".*

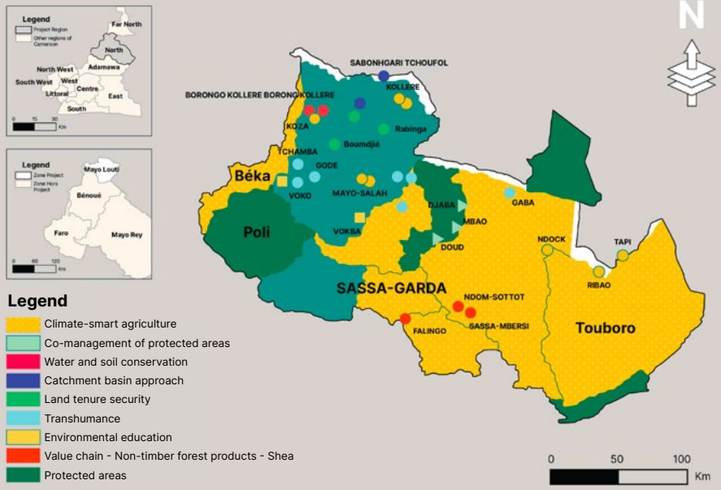
Undoubtedly, the Bawan RRC has had various impacts on the lives of the communities living around it. Through their involvement in the work of the RRC, some people went from farmers to presidents, others from housewives to community leaders. In societies in northern Cameroon, the weight of tradition is still very heavy. Women are generally considered inferior to men and their natural place is seen within the household. Restricted to the roles of wives and mothers, they are often deprived of opportunities for education, employment and

ReSI-NoC Project in Cameroon.

participation in public life. It is in this context that ReSI-NoC, through Bawan RRC, has been actively working to give local women a voice. Today, women play a major role in the Bawan RRC. Of the 60 members involved in the RRC, around 50 are women. They are the majority within the executive committee and actively participate in the implementation of all activities, be it awareness raising, mobilisation, nursery maintenance, grafting or seed production.

Céline Varkang, a migrant in the region, is a living example of the success of this rural resource centre. Despite her low level of education and thanks to her dynamism, she became the chairwoman of the Bawan RRC women's group. As a leader, she represents the women of her community at various meetings at the municipal, departmental and even regional level. She has gained respect in the community but also in her household – her husband, initially reluctant to her involvement in the community activities, now offers her his full support. The women, who make up 80% of the members of the Bawan RRC, were able to learn, among other things, how to vary foods to have a more balanced diet and how to multiply trees through grafting and layering. *"RRCs allow to meet the basic aspirations and needs of a family which explains why women are keen to be actively involved in them. It helps to avoid hunger, supports the education of children, helps with agriculture activities typically run by women, such as small livestock breeding, vegetable production or the creation of home gardens, to name just a few"*, explains Hervé Boukoua, Innovation Facilitator within the ReSI-NoC project. *"Women find in the RRCs the solutions to improve the living conditions of their families,"* he concludes.

A RRC provides infrastructure and organisation conducive to experimentation, training and dissemination of innovations of all kinds. It is intended to be used by all those who want to introduce innovations or new knowledge into the area. RRCs can also be used as gathering points for populations as part of awareness and information campaigns, and even to organise consultations between different stakeholders. The hope is that government services will also use them, thus contributing to their functioning, without removing the management from the hands of the communities themselves.



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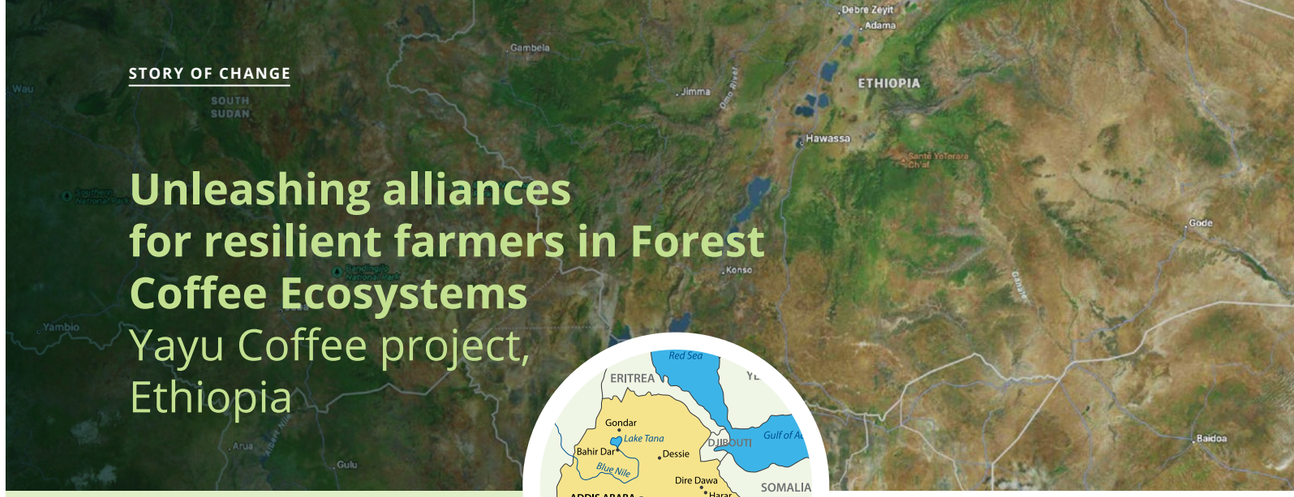
(Map) source: The Innovation Niches approach in the ReSI-NoC project - factsheet. www.cifor-icraf.org



STORY OF CHANGE

Unleashing alliances for resilient farmers in Forest Coffee Ecosystems

Yayu Coffee project, Ethiopia

Imagine a cup of coffee that not only tantalises your taste buds but also supports sustainable practices, empowers communities and safeguards biodiversity. The European Union-funded Yayu Coffee project is contributing to that ideal cup of coffee.

Coffee is not just a drink in Ethiopia; it is also a deeply ingrained cultural and lifestyle element. The coffee sector contributes to about 5% of Ethiopia's gross domestic product (GDP). The country is home to a diversely rich gene pool of the Arabica coffee variety of extreme global significance. There are five to six thousand naturally occurring varieties of coffee in the country that the Yayu Coffee project aims to conserve in their place of origin, where they can be explored and appreciated.

Nestled within the United Nations Educational, Scientific and Cultural Organization (UNESCO)-registered Yayu Coffee Forest Biosphere Reserve of 167,000 hectares, the project focuses on improving the lives of 8,500 small coffee producers, including 30% women, who rely on forest-based and garden coffee systems. Facing low productivity, inefficient public extension services and market volatility, these farmers require innovative solutions. In the region, around 150,000 people are dependent on agriculture for their income. However, the expansion of farming, firewood collection, settlements and infrastructure development have put pressure on the forest. As Bekele Haile, the project leader, explains: *"The project tackles complex issues within the UNESCO-registered biosphere reserve, with different zoning such as "core", "buffer" and "transition", that reflect different management principles, agroecological characteristics and biological diversities".* As he further points out, the complexity extends to the other realities of the coffee system: *"There are also socio-cultural complexities: societies of different cultures and norms, religious mixture, languages, ethnic groups, different lifestyles and farming systems".*

Addressing these deep-rooted challenges requires strategies that build on local knowledge and farmers' capacities. It also requires joining efforts with research organisations to embark on a co-creation process to develop and adapt practices and technologies that the farmers can use. This can only be obtained through constant efforts over time and the adequate allocation of resources.

The project is organised in a way that considers that partnerships are critical for facilitating co-innovation, as they allow to overcome limited institutional capacities and the usual lack of collaboration.The project promotes multi-stakeholder effort with local communities, policy-makers, research institutions, non-governmental organisations (NGOs) and private entities. It is implemented by a consortium consisting of the international NGO Hanns R. Neumann Stiftung (leader), the Ethiopian Coffee and Tea Authority (a public organisation) and Jimma Agricultural Research Center (represented by the Ethiopian Institute of Agricultural Research, EIAR). Two national NGOs complement these efforts: the Population, Health and Environment Ethiopia Consortium, and the Environment and Coffee Forest Forum. The overall project objective is to contribute to improved environmental resilience and food security through the application of research-oriented and climate-relevant landscape management systems in six *woredas* (districts) located in the Yayu Coffee Forest Biosphere Reserve in the regional state of Oromia.

As the Yayu Coffee project consortium comprises six organisations with different backgrounds, structures and work ethics, working smoothly in co-ordination to align reporting mechanisms and ensure timely delivery can be challenging. The implementation structure of the consortium is stretched down and reaches the target

communities. It includes the high-level forum at the policy level, the strategic management team of implementing partners at the (middle) project level, the senior technical team to respond to emerging issues and the field technical team. The roles and responsibilities are well-defined, both for individual and joint action, and regular meetings ensure communication.

Exploring the potential at the community level

At the community level, the project hired development agents who are trusted community members. They function as site experts to promote local innovation and co-creation, assuring connection with local farmers. Thanks to this novel way of working, farmers see that their contributions are valued and are motivated to work together towards nature-based innovative solutions. They know the goal is to make their systems and themselves more resilient, and to adapt better to climate change.

The project is not creating new structures at community level. Instead, it facilitates peer-to-peer learning and knowledge exchanges through existing community groups such as farmer field schools (FFS), participatory forest management co-operatives, multi-sectoral integration platforms (called task forces), village health committees and coffee co-operatives. The community of farmers comes together in these groups to test and adapt different technologies and practices. Often not only the leaders but also other members of these groups play facilitation roles and directly reach out to the community. As Tilahun Deresa, a development agent in Chora Woreda, says: *"These structures pave the way for seamless community access and help us discover the power of innovation".*

Promoting heterogenous expertise and enhancing knowledge exchange

The multi-stakeholder mechanism implemented by Yayu Coffee has various advantages. The platforms unite stakeholders from local communities, research, government agencies and NGOs with varied expertise and knowledge to foster a more comprehensive understanding of the complex challenges facing the three zones of the Yayu Coffee Forest Biosphere Reserve. In the platforms, members have a chance to discuss the nature of the challenges they face, and find opportunities and encouragement to jointly work in the generation of innovative solutions for their conditions. For instance, they have tested the use of shade trees, agroforestry arrangements, and techniques for soil and water conservation or for maintaining soil health. Researchers propose the technologies; the community implements them, adapting what is necessary to their local conditions. These multi-actor mechanisms strengthen open dialogue and learning, enabling male and female farmers to share their insights, experiences, knowledge and research findings. For example, by building on FFS that already exist and are based on long trusting relationships, the project is promoting knowledge exchanges that drive the co-creation of new knowledge and the development of innovative solutions. Mohammednur Adem, a coffee farmer and FFS facilitator in Chora Woreda, says: *"The FFS demo plot provides us with the necessary tools to carry out independent research and enhance our production. Furthermore, FFS acts as a platform that brings us together to discuss societal matters. By going through this process, we are nurturing our future".* The FFS consists of teams who voluntarily work and learn from each other through practical experiences in the field. The multi-actor mechanism provides a neutral space, helping to build trust, foster shared understanding and encourage joint decision-making, enabling partners to align their actions and execute projects successfully.

Cross-sectoral cooperation for better achievements, scaling and dissemination

These mechanisms bring together partners, not only from the agriculture sector but also from trade, population and health, and planning and development, providing a neutral space to align their objectives and collaborate. This cross-sectoral collaboration brings diverse perspectives, resources and capabilities to tackle the project's very complex issues. Aiming at co-innovating requires financial, human and infrastructural resources. Multi-actor mechanisms and partnerships in the project help mobilise these resources by leveraging the strengths of each partner. Thus, EIAR provides scientific expertise and facilities; each researcher contributes their talents to carry out joint experimentation with farmers, in response to their needs. The ECFF develops strategies for the conservation and sustainable use of the coffee forests, through thematic research on conservation planning, education and pilot implementation of research findings, complementing EIAR's research. ECTA identifies opportunities to increase the country's exports, information that is vital for decision-making to assist farmers in selling and obtaining better prices for their coffee.

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Peer-to-peer learning at a community of farmers.

The multi-actor mechanism provides a neutral space, helping to build trust, foster shared understanding and encourage joint decision-making, enabling partners to align their actions and execute projects successfully.

Sheleme Demissie, a landscape specialist and project focal person at ECFF, emphasises: *"The current achievements have been possible due to effective strategic management, synergistic collaborations and transparent communication among implementing partners".*

The Yayu Coffee multi-stakeholder mechanisms can facilitate the replication and adaptation of successful models and solutions across different regions, sectors and contexts. For example, ECTA has picked up the project's FFS methodologies and started introducing them to all coffee-growing regions of the country. The potential for local innovations to be scaled up and out is thus magnified. In addition, the project aims to compensate smallholder families for their invaluable ecological services to support reforestation by certifying forest coffees, an underway effort.

Fekadu Deferes, chief executive at ECTA, believes that *"farmer field schools are a valuable repository of knowledge and a voluntary innovative extension approach that should be adapted and expanded for coffee farmers. Thus, ECTA renamed these as coffee farmer field schools, to extend this innovative approach and methodology to coffee-growing regions nationwide. This policy element in the coffee sector is paramount and set to receive top priority for scaling up by the government".*

The project has initiated a shift in attitudes by targeting training of development agents in soft skills, including building consensus, promoting collaboration, and fostering an environment of mutual respect and trust, needed to foster joint learning through the co-creation approach with farmers. As a result, the project has achieved considerable success in motivating hundreds of farmers to implement good agricultural practices within the woredas where the project operates.

Mohamedzin Yesuf, FFS group facilitator in Alge Sachi Woreda, shares that "by implementing innovative good agricultural practices, we have left behind traditional backward practices". At the social/family level, the project is making strides in gender equity by fostering a gender household approach through sensitisation, home visits and seminars for couples. Many couples are now practising making mutual decisions, for example by opening joint bank accounts.

The development agents have been instrumental in achieving many of these positive advancements. Collaborating with local communities of different ethnic, religious and economic backgrounds to tackle complex challenges related to diverse agroecological systems is a new and unique experience within the Yayu Coffee platform.

The Yayu Coffee project is more than just about coffee, it is a ray of hope that shows how collaboration can revolutionise agriculture through local innovation, empowering communities and preserving the precious Yayu Coffee forest ecosystem for future generations.

YAYU COFFEE FOREST BIOSPHERE RESERVE ETHIOPIA

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Elevating Livestock Health through Innovative Multi-Stakeholder Collaboration

LIDISKI project, Nigeria

Yakubu Pamguang is a livestock farmer in Plateau State, Nigeria. Yakubu's family and many Nigerian households are heavily reliant on livestock, which is a source of both animal protein and income, and represents critical assets to cope with shocks:

"Keeping these animals is very important to the family because when we face challenges like sickness in the family and we don't have money, we take some goats or chickens to sell and pay the medical bills".

Livestock is of utmost importance to poor rural and peri-urban farmers, with over 20 million Nigerian households relying on their livestock for nutrition. In Nigeria, women are key stakeholders in poultry and small ruminant value chains. Supporting the livestock sector therefore contributes to food security, improves the quality of life, notably for the country's smallholders, and empowers women.

The challenge of livestock diseases

However, livestock diseases and their related management costs are a threat to the livelihoods of livestock owners. Peste des petits ruminants (PPR) in small ruminants and Newcastle disease (ND) in chickens are among the most devastating diseases capable of wiping out entire flocks and exposing farmers to devastating economic shocks. *"We normally put some kind of plants or wild fruit in their water to prevent them from dying",* say farmers in Kabwir in Plateau State, *"though we do not know the name of the disease, we know that seasonally, almost all the birds in the village will die due to mura, zawo, whitish and greenish stool, bori/madness and cycling. The chickens become sleepy, thirsty and die suddenly".* Farmers have little or no knowledge of the diseases, their causes, proper handling and mitigation strategies. Exposure of animals to high-risk areas of disease circulation such as animal markets contributes to high morbidity and mortality rates. With increasing climate variability and change, livestock migration becomes common, which exposes the animals to transboundary diseases, and creates a need for strengthening disease surveillance and control systems in the concerned countries. The European Union-funded Livestock Disease Surveillance Knowledge Integration (LIDISKI) project aims to reinforce PPR and ND surveillance and control systems in the Bauchi (North East), Plateau (North Central) and Kano (North West) states of Nigeria, through the development of tools and guidelines specific to the context, to improve food security and increase the revenue of smallholder livestock farmers. This relies on three main outcomes: improving the understanding of the socio-economic and epidemiological context of the two diseases, strengthening the human and material capacities of national partners, and improving the engagement of local stakeholders in vaccination and disease reporting.

Implementing partners engage farmers through the CAHW network

To improve the engagement of local stakeholders in vaccination and disease reporting, the project created a network of community animal health workers (CAHWs). To put this network in place and make it functional, the LIDISKI project's implementation partners work in collaboration with actors including the state, statutory bodies, veterinary pharmaceutical companies, vet retailers/distributors and farmers. Some 138 CAHWs from various states were trained by the Veterinary Council of Nigeria (VCN)'s certified trainers, recruited among veterinarians and specially trained.

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Organised by Ikore International Development, in collaboration with the VCN, who designed the curriculum for the CAHW training with inputs from the National Veterinary Research Institute (NVRI) and the French Agricultural Research Centre for International Development (CIRAD), the CAHW programme was established to train CAHWs on the basics of disease identification and management with a focus on PPR and ND, vaccination, animal handling and disease reporting. The role of veterinarians did not end with the training. They play supervisory roles to the CAHWs, handling disease cases that are beyond the CAHWs' abilities, and guiding them in administering treatments. Their trainer certification allows them to strengthen the capacities of more CAHWs beyond the project duration. CAHWs are introduced in their communities and formally endorsed by the project. They are involved in communication campaigns implemented at the community level to raise awareness of the importance of reporting PPR and ND cases, and of requesting animal health services. They educate farmers on the importance of seasonal vaccination and implementing biosecurity measures.

Understanding the disease context through participatory approaches

To make sure that awareness campaigns are well-suited to the context, the NVRI, CIRAD and Ahmadu Bello University work with communities using participatory approaches. These approaches include field data collection to understand the epidemiological aspect of the diseases and pinpoint the socio-economic impact on local communities. Marion Bordier, an epidemiologist at CIRAD states: *"We are sampling animals to better understand the occurrence of the disease, their geographical distributions as well as the strains in circulation. We are also implementing some questionnaires with farmer households to better understand their socio-economic conditions and how they get resilient to shocks".* Findings from the analysis of collected data inform the feedback given to farmers as best practices to prevent disease entry into their farms, for disease control and eradication. The information gathered is used to better tailor the contents of communication materials to drive behaviour change for vaccine adoption and consistent engagement with animal health workers.

Bridging the knowledge gap for farmers

Farmers in Plateau State recall the lessons learned from their CAHW: *"We learned about the importance of seasonal vaccination for all our livestock. She [the CAHW] taught us to keep the animal sheds and surrounding areas very clean and take care of all the spaces in which the animals stay. To always separate sick animals from healthy ones and not to put back unsold animals that were taken to the market with the ones left at home. She told us to try and always confine our animals."* Through the CAHWs' engagement with farmers, they can build trust and facilitate behaviour change for the adoption of vaccination and livestock farming best practices.

CAHWs are also trained to report suspected cases of ND and PPR through the open data kit. The reporting is done using an electronic-based form accessible on smartphones. Each CAHW submits data of each farmer to whom they provide their service. The implementing partners organise participatory sessions and develop tools to integrate CAHWs's reports into the animal disease surveillance system. The reports are sent to the State Department of Veterinary Services and the NVRI which co-ordinates the investigation of disease outbreaks.

Some teething problems in the implementation

The CAHW network faced some implementation challenges. The biggest one was that vaccines were unavailable locally. As Abdulkadir, a CAHW from Bauchi State, explained: *"It used to take us 40 km to access vaccines of good quality and after getting their vaccine, farmers complained about its enormous cost due to the cost of transport".* The farmers began to accept and adopt vaccination but had to wait till demand was aggregated before a vaccine purchase was made. Other challenges include the unstable mobile networks they have in rural communities which hampers disease reporting. Some CAHWs do not have smartphones to access the new data collection tool.

Newcastle disease virus pathotyping tests. *Photo: LIDISKI project*

" We learned about the importance of seasonal vaccination for all our livestock. She [the CAHW] taught us to keep the animal sheds and surrounding areas very clean and take care of all the spaces in which the animals stay. To always separate sick animals from healthy ones and not to put back unsold animals that were taken to the market with the ones left at home. She told us to try and always confine our animals."

Chicks vaccination. *Photo: LIDISKI project*

To overcome these challenges, linkages had to be made with private-sector actors. Ikore linked the CAHWs with agro-vet distributors registered with the NVRI – a major vaccine producer. The institute prioritises these distributors who ensure that the CAHWs are supplied. Some of the CAHWs also serve as retailers for vaccines and other agriproducts within their communities. Also, the open data kit functions offline and online. Thanks to this, the CAHWs can enter the details of their engagements with farmers offline and the report will be uploaded when the network is available. The project made smartphones available to those who could not afford them.

Improving access to vaccines and disease diagnostic services

The NVRI and the Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe), an Italian public health institute, jointly developed guidelines to improve ND vaccine efficacy. The commercial vaccines produced at the NVRI were evaluated on their effectiveness against the ND strains circulating across the West African region. CIRAD and the IZSVe trained the institute's staff and provided equipment and guidelines to increase vaccine production, and maintain the cold chain in the delivery of PPR and ND vaccines to geographically isolated areas. The LIDISKI project facilitated the installation of solar panels as a solution to the frequent electricity shortages, allowing for better storage and delivery of diagnostic samples and vaccines. The solar panels were installed at the headquarters and five other outstations. It also allowed for computerised data collection on suspected diseases in the field.

The IZSVe and the NVRI worked on a study to address the need for a rapid and updated molecular test to identify virulent and avirulent viruses, putatively of any current genotype. The rapid recognition of an ND case is of utmost importance so that health authorities may establish timely control measures to prevent the spread of the disease. This new test was developed and validated. The new test can detect and diagnose all tested avian paramyxovirus-1 (APMV-1) genotypes (which cause ND) and is suitable for routine use in clinical samples. Isabella Monne, a researcher at the IZSVe, says: *"To improve the ability of the entire veterinary diagnostic community to identify and diagnose ND, the new molecular test has been published open access in an international journal (Journal of Virological Methods, Volume 322, December 2023, 114813 – Elsevier)".*

From research to sustainable innovation

The newly developed protocol for rapid ND diagnosis will have a remarkable impact on the surveillance system beyond the project's duration. Following the impact of solar panels on the NVRI's capacity to provide services in vaccine delivery and disease investigation, solar panels have been installed in 11 additional outstations, paving the way to scale-up these innovative solutions for animal disease control and surveillance. In the same vein, the engagement of CAHWs with farmers over the project period has empowered some of them financially to establish businesses and purchase solar-powered fridges. These results will serve as motivation for continuous disease reporting from the CAHWs. Subsequently, the disease reporting system will be handed over to the state for direct management of CAHWs and disease reports. The three states will plan their state-wide vaccination strategies based on investigations of diseases reported. After the end of the project, opportunities for retraining will be extended to the CAHWs, with some virtual technical support from Ikore where needed. The reporting system will be integrated into the current surveillance system by the State Department of Veterinary Services who will be trained in the tool usage. The project team will work with the Federal Ministry of Agriculture and Rural Development to integrate the tool with the national animal disease information system. Based on the knowledge gathered throughout the project and shared with stakeholders, guidelines are being co-constructed for project scale-up and adoption at the national and regional level.

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Flavors of jungle and sea
ABRIGUE project, Colombia

Colombia is a country known for the richness of the biodiversity of its ecosystems and the cultures of its inhabitants, where a variety of severe socio-environmental conflicts and violence has emerged prominently over the last seven decades. In Meta and Caquetá, a transition zone between the Andes and the Amazon, peasant settlers derive their income from cattle ranching.

It is home to the main centres of active deforestation in the Amazon rainforest, which contribute to about 37% of the greenhouse gas (GHG) emissions of the agriculture, forestry and other land use (AFOLU) sector in the country. The prevalence of coca cultivation generates an illegal economy controlled by armed groups. In Chocó, on the Pacific Ocean coast, Afro-Colombian settlers are dedicated to artisanal marine fishing, and coconut and vanilla cultivation. Two armed groups are fighting for control of the territory's economy generated by the illegal extraction and commercialisation of timber, mining and the transport of coca paste.

Due to the strategic importance of these territories rich in biodiversity, since the 1990s, the Colombian state has promoted practices for sustainable cattle farming and the sustainable use of the forest, which include species to generate bio-based products for incorporation into the value chain. In that way, it has sought to reduce the dependence of peasants and Afro-Colombian communities on illegal economies and extractive activities. The goal is to reverse deforestation and degradation, and consolidate actions that lead to peace.

After 30 years of efforts and investment, several local family ventures or small producer groups have been created. The change in the model has been gradual due to the trust that has been established between communities, the institutional framework and cooperation.

Thus, there is now some perceptible progress in reversing low quality of life indices, food dependence on other regions, illegal economies, deforestation rates, land degradation and high GHG emissions in the AFOLU sector.

Strengthening capacities

Mid-2021, the ABRIGUE project took on the challenge of demonstrating that strengthening territorial capacities for innovation in agroecology and circular bioeconomy, and marine artisanal fisheries, in a favourable policy and governance context, can generate solid foundations for communities to transition towards sovereign, profitable and resilient agri-food systems. ABRIGUE is a partnership between the Amazonian Institute for Scientific Research (SINCHI), the Colombian Corporation for Agricultural Research (AGROSAVIA), the Ministry of Science, Technology and Innovation, the Technological University of Chocó and the French Agricultural Research Centre for International Development (CIRAD). From the outset, the implementation of ABRIGUE allowed the partners to realise that capacity building was needed for the proposed changes, which had not been systematically thought of in the territories. In this way, beyond the transfer of knowledge and technical skills in the traditionally used methods, the researchers faced, in a novel way, the need to acquire skills, knowledge and attitudes to think, plan and act in a transdisciplinary and multi-actor way, and to assume leadership to promote functional capacities in local innovation platforms.

"It took us 10 months to start the actual implementation in the territories. Digesting the conceptual and methodological aspects necessary to think in a "Common Framework" mode and having the capacity to adapt it to territorial circumstances took us long days of reading and training with allies. Aware of the advantages, we realised

that, in order to be able to support capacities, we must first strengthen our own capacity and grow as a team. We don't calculate that assumption in the formulation", says Carlos Hernando Rodríguez León, ABRIGUE coordinator. The experience and accompaniment of CIRAD, the support of DeSIRA-LIFT and the sectoral strengths of each partner organisation have been fundamental to advance in developing this internal capacity.

From the outset, the implementation of ABRIGUE allowed the partners to realise that capacity building was needed for the proposed changes, which had not been systematically thought of in the territories. In this way, beyond the transfer of knowledge and technical skills in the traditionally used methods, the researchers faced, in a novel way, the need to acquire skills, knowledge and attitudes to think, plan and act in a transdisciplinary and multi-actor way, and to assume leadership to promote functional capacities in local innovation platforms.

The concern was focused on the acceptance by communities of the new ways of working and that turned out to be precisely what was expected: *"that way of working is very beautiful. We rehearse all the time, but they don't listen to us. Now, we participate in the elaboration of the remedy; we don't get the remedy already prescribed",* says Ferney Vaquero of the ACBA Association of the Sabores de la Mono platform in Belén de los Andaquies (a municipality in the department of Caquetá), highlighting that this way of working fits well with their expectations. *"They used to visit us; now farmers - as local experts - have been trained to work as technicians",* he says about the adjustments to enhance the contribution of local knowledge and empowerment of innovation. In Chocó, the platforms decided to participate with local agroecology and circular bioeconomy innovation promoters and an expanded community monitoring; where implementing families participate in the generation of information to evaluate innovative agroecological practices.

Networks of trust: A fabric of the future

"On the platforms you know how other people are doing things, if it's working for them, you can do it too or do it better", says Alcidez Ramón of Piloto Canangucha, ASMUCOCA. *"People are very distrustful of community businesses because there are always people who take advantage of others; that's why we prefer to work independently. But we have managed to establish an agreement to take advantage of the investments jointly, while maintaining our independence. If it works for us, we will take the next step to organise ourselves for commercialisation"*, states Yasmi Oliveros of the Coco Ancestral Innovation platform in Bahía Solano, Chocó. Once the platforms were up and running and consolidated, researchers have been marked by their dynamics. It is a new path being travelled and it is necessary to assume an availability to learn the same process and to be able to adapt to the continuous and unexpected demands, which sometimes exceed the possibilities of the project. The researchers learned that change is complex and cannot be planned in a static way, so they developed new skills to properly understand the relationships generated on the platforms and to promote consensual relationships and decisions with the actors.

Producers and their organisations have had to grow in their relationships of trust to share the secrets of success and failure, special skills and knowledge from the experience of transformation and marketing of species. Individualism and mistrust fuelled the proliferation of small, isolated enterprises at the local level. However, in the innovation platforms, producers have been "weaving" networks of trust and understood that they can establish agreements with processors and marketers until they achieve community processing plants, while progress is made in participatory certification systems.

In the Coco Ancestral Innovation platform, producers were sensitized by traditional community authorities to encourage family businesses to invest in innovative equipment for collective use. The vanilla producers in the Vanilla, North Pacific Aroma platform, of the local community council of Rio Valle, in Bahía Solano, who manage a stable production process and primary transformation, "wove" networks of trust with producers of the El Cedro local council and articulated to innovate their vanilla ripening processes through a geodesic dome type solar dryer and community-based monitoring of innovations on pilot farms. On the Sabores de la Mono platform in Caquetá, chain agreements with secondary processors and marketers have resulted in higher revenues for producers through the production of cupuaçu butter for cosmetic companies.

The transformative power of agroecology and circular bioeconomy

"For a conventional farmer, it is more difficult to learn about alternative agriculture; to teach them, you have to show them results", says Luis Salcedo, from coffee producers' organisation CAFEMASU, during the development of the innovation platform in Mesetas, Meta. On the other hand, Ferney Vaquero, Sabores de la Mono platform, says: *"The dream we have with these ways of working the field and what we do in the transformation plant is that we can improve incomes and thus stop cutting down the mountain and secondary forests".*
From development projects by the production chain financed by state resources, we moved on to the integration of multiple actors, embracing the complexity, interests and knowledge of producers and their organisations and researchers. This has identified a powerful new way to reduce GHG emissions, improve food security, consolidate a biodiversity-based economy and reverse land degradation. Improving the income of peasant families is the success factor for the sustainability and scaling of innovations.

Innovations in the bioeconomy are the motivation to convene new actors in the local and territorial niches. New transformation products, or the solution of constraints for improving existing ones, give a perspective of income and job creation in accordance with the interests of the producers and the purposes of the institutionality. ABRIGUE has incorporated the slogan "from value chains to value networks with a circular bioeconomy approach" – a concept that identifies the complementarity flows of inputs and services between platforms and the reduction of dependence on external inputs.

Innovations in almond drying to improve the quality of cupuaçu butter as a raw material for cosmetic products is a preview of the Flavors of Monkey platform. Before, the cupuaçu cakota was discarded, now, using a bioreactor, composting is done and organic fertilisers are produced for the associates. Members of the Cananguchitas platform improved the quality of cananguchа palm oil and now use pulping residues to make cakes.

In Chocó, the Vanilla, North Pacific Aroma platform incorporates innovations in the vanilla curing and drying process, to improve the sensory quality and volatile profile that will have a better impact on the quality and price of vanilla. One of the bottlenecks is fertilisation, which is solved with organic fertiliser supplied by the Coconut Ancestral Innovation platform, made from residues of the coconut shell during processing for the extraction of oils and food by-products.

The key players, the conquest of the allies

"We can already begin to show results: we are no longer knocking down and we are restoring; the organisation is improving the products. We show that if they listen to us, things turn out better. Before, we went and they didn't attend to us; now they're looking for us. So it's beautiful", says José Armando Rodríguez, a cocoa farmer from the ASOACASAN association in the municipality of San José de Fragua, Caquetá.

The response of value chain actors to the ABRIGUE call has had differentiated achievements in the three

Coconut growers in the Colombian Pacific discussing the co-design of innovations for managing crop pests.
Photo: Valentina Ruiz

territories. The forms of community organisation, the cultural roots and the degree of linkage in the formulation phase have been the determining factors in the impact of the innovation platforms. In Chocó, the researchers' challenge has been related to skills to negotiate with Afro-Colombian communities, the scenarios of innovation platforms within the framework of solid community structures. There, the community councils, as a major community organisational form, have been empowered to lead the cohesion of agroecology and circular bioeconomy innovation with the ethno-development plans and projections of the groups of coconut and vanilla producers, and of artisanal marine fishing. These factors facilitated the call, since the key territorial actors were already linked to community processes and are an obligatory step to act.

In Meta and Caquetá, peasant communities are grouped into small producer associations that form productive guilds, which in turn are grouped into production chains. In these territories, in the prior consultation phase, ABRIGUE was linked to ongoing organisational processes, with which the implementing institutions had different degrees of knowledge and previous work. In this scenario, each organisation manages independently. The progress of the platforms has shown that strengthening leadership capacities to co-ordinate, convene and agree are decisive factors in the process; even from the formulation stage, identifying key organisations that facilitate the convening of key actors and the horizontal scaling of results is important.

The researchers learned that platforms strengthen leadership capacities in a better way, because the communities themselves assume a positive attitude to politically manage their interests and thus manage to bring together multiple local actors. Initially, regional actors were invited by institutions to the platforms. In their intermediate stage, the platforms progressively assume a greater role in the management of calls for activities. In Caquetá, for example, the participation of the National Apprenticeship Service, the official entity in charge of job training in Colombia, is structuring processes for the recognition of labour skills demanded by producers on the platforms. The National Authority of Aquaculture and Fisheries (AUNAP), which participates in the Fishing, Innovation and Sovereignty platform, has co-ordinated with the General Maritime Directorate in Colombia (DIMAR) the concession process required to establish artisanal fishing aggregation devices demanded by fishermen in Bahía Solano, Chocó.

A strategy not anticipated in the formulation of the project but implemented later, is the inclusion of a territorial governance instance called the expanded territorial agroecology and circular bioeconomy platform. About 55 institutional and union actors meet in Caquetá every six months where they present progress and obtain inputs for the redirection of processes. In this way, the guilds and actors of the regional agricultural and environmental system reference the process and its learnings.

Family with a graphic model of a pilot farm for the implementation and evaluation of agroecological innovations co-designed in the Sabores de la Mono platform; nativity scene of the Andaquies, Caquetá.
Photo: Valentina Ruiz

From local to territorial and national political decisions, a transition of life

"This way of working is effective and the interest of the actors in the platforms is noticeable, but replication of experiences in nationally funded projects is very limited; the system demands a solution to the problem in advance and not to co-design it with the communities", says Darío Garzón, delegate of the Secretary of Agriculture of Caquetá to the innovation platforms. This points to a challenge in the financing of innovation in the country and the need for comprehensive transformations at the national level that promote the scaling of the experiences obtained with the ABRIGUE innovation platforms.

From on-the-ground successes to policies

ABRIGUE has goals in the design of enabling instruments and proposals for policy and governance aimed at promoting a favourable context for agroecology and circular bioeconomy innovation and its scaling in the territories. The management of the impact on agroecology and circular bioeconomy national policies under construction by the current national government has emerged as a positive conjunctural strategic factor. There are examples of the exercises carried out: the agroecology bill that is currently before Congress; the public policy on agroecology led by the Ministry of Agriculture and Rural Development, in partnership with the Food and Agriculture Organization of the United Nations (FAO); the impact on the "Human Right to Food Mission" of the Ministry of Science, Technology and Innovation; and peasant criteria for a reindustrialisation policy, especially those for local public procurement of food and the participatory guarantee systems of the Ministry of Trade, Industry and Tourism. ABRIGUE has taken advantage of these opportunities to insert the agroecological discourse into policies and public actors at the national level.

On the other hand, the Participatory Techniques for Sustainable Development of San José de Fragua in Caquetá platform has integrated the results of research on GHG in livestock in the Departmental Livestock Board of Caquetá, generating new territorial public policy agendas for the livestock sector. Likewise, due to the interest of the ASMUCOCA and Ayakuna Women's associations, the Cananguchitas platform is influencing environmental governance bodies to improve access to and use of non-timber resources in the Amazon forest; this is a normative aspect that does not facilitate the development of biodiversity-based economies. Recently, in an executive governance committee of ABRIGUE, the Ministry of Agriculture requested a proposal to strengthen information on the contribution to the reduction of GHG emissions with agroecology and circular bioeconomy innovations and their scaling, as part of its action plan to stop deforestation in the country.

Representatives of ABRIGUE's platforms participated with significant contributions to EcoVida 2023, one of the largest events on agroecology in Colombia. The call for actors with experience in territorial agroecology and bioeconomy policies demonstrates the importance of the territorialisation of agroecology in local politics. Peasants from the platforms of Caquetá and Meta presented their experiences. In addition, actors from the instances of territorial governance in innovation were convened to learn about the agroecological and bioeconomic agenda of social organisations. Thus, it has sought to generate changes in various actors with an impact on public policy. It is expected that ABRIGUE will be able, in its final stage, to provide solid information to contribute to the design of incentives to the agroecology and circular bioeconomy, adjust or redesign regulatory and financing instruments that favour the scaling of agroecological and bioeconomic transitions, as a structural basis for the reversal of the main socio-environmental conflicts in which the forest and maritime border areas of Colombia are immersed.

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CONCLUSION

Participatory research, **the new normal for innovation and sustainability transitions?**

The collection of stories of changes presented in this book illustrates how DeSIRA project teams, researchers and their partners, navigated complexity, emergence and uncertainty to innovate towards sustainability transitions. Innovations are everywhere: in the new solutions for tackling sustainability issues, in the ways of developing these new solutions, in the institutional and business environments of innovators to create conditions more conducive to the scaling of new solutions.

DeSIRA projects acted as vehicles for exploring pathways, guiding and orchestrating collaboration and embarking newcomers whenever necessary. These were not research projects, rather they were innovation projects supported by research, which de facto led to the establishment of participatory and open co-innovation mechanisms in which researchers played mainly a role as actors of change.

In telling these stories of how solutions were codeveloped by researchers together with key AIS actors with a stake in the problems to be addressed, a shift is illustrated in their traditional role of technology provider to one that is much more proactive in designing and even managing transformative processes. The stories explain how researchers deployed a multitude of "participatory actions" at many levels, in order to make innovation as transformative as possible for activating sustainability transitions. We see the emergence of a diverse set of "agricultural research for innovation and sustainability transitions" practices, rooted in community needs, geared toward societal missions, guided by common principles of systemic thinking, joint learning and discovery, plurality of knowledge and transdisciplinary. Multi-actor facilities, mechanisms or platforms, play the critical roles of orchestrating, catalysing and accelerating collective action for innovation and transitions. These facilities open the necessary spaces beyond the boundaries of existing organizations, to make trade-offs, share resources, include all of those affected by the problems to be addressed, and engage key actors of change. In DeSIRA, researchers play an important role in designing and facilitating them.

These new research practices further contribute to capacity building for a multitude of actors in agricultural innovation systems, and avoid the non-viability of solutions, as observed in technology transfer. The new capacities developed by DeSIRA projects included the following: individual capacities for genuine engagement, capacities for collective solutions of groups, facilitation capacities for creating transformative spaces, capacities for co-creation and adapted solutions, improved decision-making capacities through better information and knowledge, improved organizational capacities for more effective strategy processes when engaging in multi-actor innovation approaches, enhanced policy capacities to create more enabling environments for innovators. Research-facilitated participatory processes also contribute to shape innovation agendas that are co-owned by multiple actors and targeted toward missions, or 'societal challenges', from which each actor expects to see the creation of shared environmental and/or social values.

More fundamentally, "agricultural research for innovation and sustainability transitions" seems to contribute to a democratization process of innovation (Spies, 2014; Hassanein, 2018) where participatory, collaborative and actor-centred approaches are necessary to respond to the particular issues of transitions in their contexts, given the existing resources, capacities and emergencies. In this sense, we could consider that the way research and innovation was operationalized in DeSIRA embodies the paradigm shift from technology transfer to co-innovation and brings with it many new questions and concerns about all the changes that are necessary and should be continued beyond DeSIRA projects' duration, at the level of organizations. These changes range from how to effectively conduct multi-actor and participatory innovation projects, to adjusting the roles and objectives of the organizations in order to be able to engage in multi-actor participatory innovation processes within a shared common perspective of transforming agrifood systems toward more sustainability. In other words, it is now a matter of integrating and institutionalizing these new participatory research practices for innovation and transitions in organizations so that they become a new standard. However, this will be accompanied by new questions related to innovation management processes, and in particular to decision-making processes, given the diversity of views on how different forms of innovations should be bundled and harnessed for food system transformation (Barrett et al., 2020).

Stories of change across Africa, Asia and Latin America from the DeSIRA initiative

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COLOPHON

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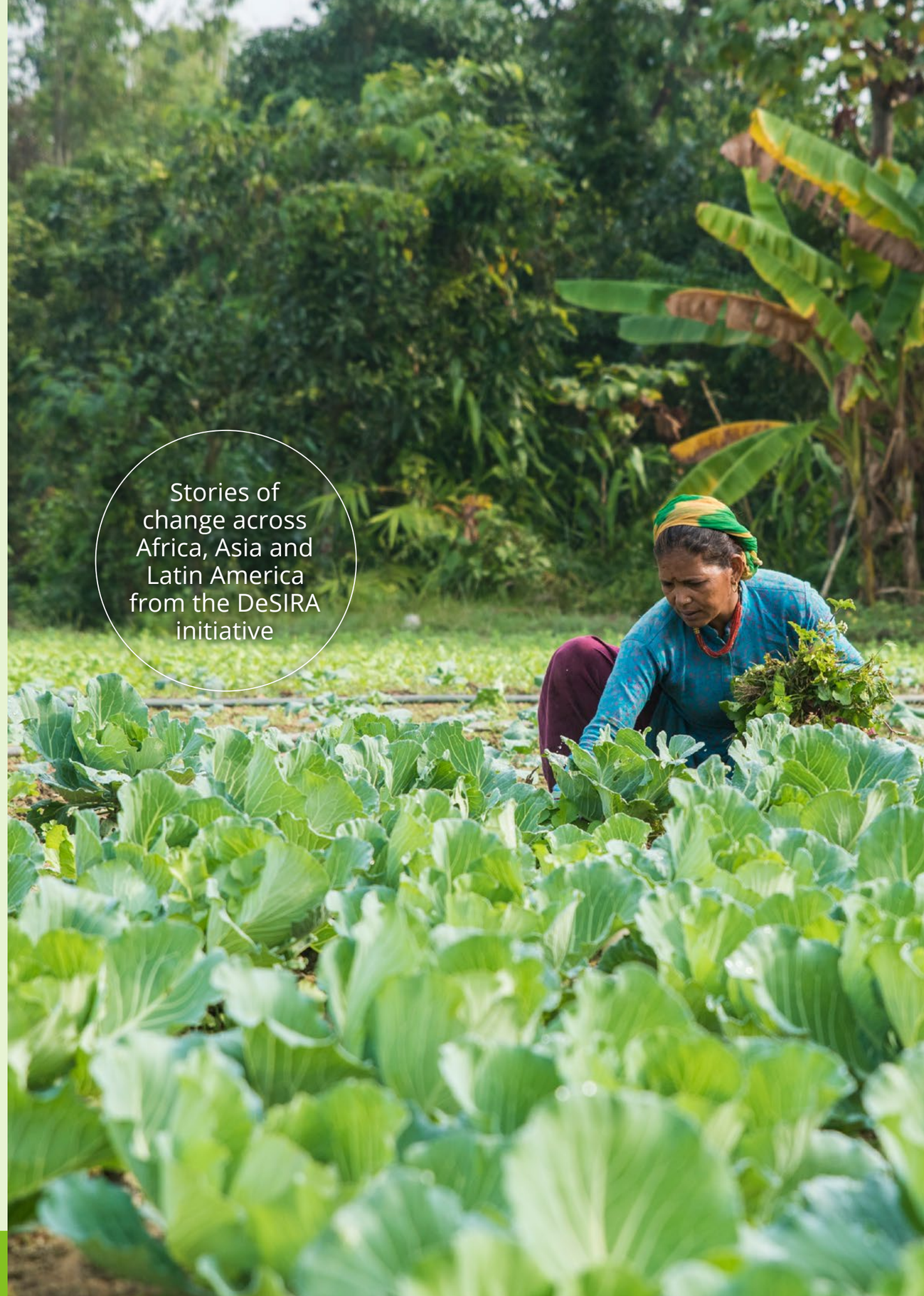

Stories of change across Africa, Asia and Latin America from the DeSIRA initiative

DeSIRA LIFT

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