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CONTROVERSIES & DEBATES WORKING PAPERS

AGROECOLOGY AT THE HEART OF JUST ECOLOGICAL TRANSITION

With the support of

COMMUNAUTÉS RÉSILIENTES - RESILIENT COMMUNITIES - COMUNIDADES RESILIENTES

Secours Catholique Caritas France
ENSEMBLE CONSTRUIRE UN MONDE JUSTE ET FRATERNEL

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EDITORIAL

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This very first issue of Controversies & Debates Working Papers inaugurates a **series of contributions on the *just ecological transition*.** The aim of these papers is to go beyond the controversy that characterises the scientific method to debates that are affecting society through a non-hierarchical approach, by bringing together the knowledge of both stakeholders and researchers.

For almost two years, GEMDEV has been providing scientific support to *Secours Catholique - Caritas France* (SCCF) in its efforts to promote a just ecological transition. As part of a multi-year partnership agreement with *Agence Française de Développement* (AFD) and the Ministry for Europe and Foreign Affairs, to be signed in 2021, the SC-CF's long-standing partners are working to implement and defend ways of life, production methods, consumption patterns and principles of justice that foster convergence between two embedded imperatives: the ecological imperative and the social imperative. They do this by supporting local projects.

23 partners from 18 countries in Africa (Benin, Mauritania, Senegal, Togo, Burkina Faso, Mali and Niger (the last three countries not financed by AFD), Eastern Europe and Asia (Armenia, Bangladesh, Myanmar, India, Vietnam), Latin America (Bolivia, Brazil, Colombia, Peru), the Middle East (Palestine) and France have formed a collective within a programme called Resilient Communities (CoRe). **This collective seeks to promote solutions on a daily basis to move towards a just ecological transition, considering that this requires placing the voices of the most vulnerable at the centre of the sought-after transformations**. Not only because they matter as much as others, but also, and perhaps above all, because they reflect, much better than others, the injustice of dominant models that degrade the environment and deplete resources.

These voices are based on diverse experiences in the field, in agroecology, in supporting fair and sustainable cities, in defending the land rights of the most vulnerable and in protecting environmental migrants. They propose **avenues for transformation and know-how** that can only be mobilised if their "power to act" is enhanced.

EDITORIAL

A number of projects within the CoRe programme are developing agroecological solutions in support of a central idea: a form of agriculture that rewards farmers fairly while protecting the environment. This is why this first issue of C&D Working Papers is dedicated to the role of agroecology in a just ecological transition, what many authors refer to as the Just Agroecological Transition (JAT).

The following summaries provide an account of specific actions and initiatives promoting JAT within the CoRe programme, their results, the constraints encountered, the questions that remain, the contradictions, and sometimes the deadlocks, that characterise these collective endeavours.

These summaries are the product of research initiatives on the subject of JAT led by IRAM colleagues **Aurélie Chevrillon-Dupleix and Claire-Isabelle Rousseau**, and action research coordinated by colleagues from AgroParisTech who are members of the Prodig Joint Research Unit (UMR), **Nadège Garambois and Samir El Ouaamari**, and co-produced by AgroParisTech students **Rachel Amouroux, Héloïse Faivre, Marianne Fraysse, Jean-Baptiste Le Hen and Thaïse Moizeau** as part of their final year dissertations.

The summaries were presented and discussed at a study day organised in September 2023 at the Condorcet Campus (Aubervilliers, France) prior to a meeting of the CoRe programme's Scientific Committee. On this occasion, different visions of the role that the agroecological transition can play in a just ecological transition were analysed and discussed.

Agroecology and Just Ecological Transition" study day at the Condorcet Campus (Aubervilliers), 28 September 2023

This publication presents the main conclusions of the joint work carried out by the programme partners:

"The Agroecological Transition, A Political Challenge First and Foremost: 3 Approaches" by Aurélie Chevrillon- Dupleix, Claire-Isabelle Rousseau (IRAM) and François Doligez (Iram-Prodig) ;

"Transformations and the Specialisation of Family Farming in the Global South: What Place for Agroecology?
by Nadège Garambois and Samir El Ouaamari (AgroParisTech, UMR Prodig).

It concludes with an analysis of the various existing prospective studies on the transformation of food systems through agroecology:

"Foresight Processes for the Transformation of Food Systems through Agroecology by Marie de Lattre-Gasquet, Fatma Zahra Rostom, and Théophane Hazoumé (UMR ART- Dev, CIRAD)

Therefore, far from seeking to put an end to the controversies and debates on the transformative capacity of agroecology, this issue of C&D proposes to extend its scope, drawing on the experiences of SCCF partners, without seeking to erase the difficulties encountered and the contradictions they face; difficulties and contradictions that are all the more acute when the initiatives are carried out by actors or communities that are invisible or subaltern.

Raphaëlle Chevrillon-Guibert and **Alain Piveteau**, scientific coordinators of the support provided by the GEMDEV research federation.

THE ECOLOGICAL TRANSITION: A POLITICAL CHALLENGE

KEY LESSONS FROM THREE AGROECOLOGICAL TRANSITION EXPERIMENTS WITHIN THE CORE PROGRAMME

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IRAM, in association with GEMDEV, hosted a scientific workshop involving partners of the SCCF programme on the theme of agroecology. This initiative formed part of ongoing efforts to develop a shared vision of ecological transition and its model of justice. The aim was to encourage original scientific reflection on the theme of "agroecology and just ecological transition" by comparing the state of scientific knowledge with that of the CoRe programme players on the subject, based on their experience in the field.

This meeting of minds, organised in two stages, provides the material for this summary. The first stage, the scientific workshop itself, was largely based on the collective initiatives carried out as part of the CoRe programme following a call for expressions of interest. Three cases illustrate the variety of contexts in which initiatives promoting agroecology are implemented. The discussions, in the form of focus groups led by IRAM, were organised around two potential drivers of change, considered *a priori* to be at the heart of agroecology's contribution to a just transition:

- The sustainability of territorial governance
- The degree of "agroecologisation" of the region

The second stage took place during the agroecology study day. **The debate on the facts and lessons learned from the focus groups** highlighted the richness and determination of the initiatives carried out in the field by the CoRe programme partners, as well as the fact that they are constantly under pressure. In the end, the actual results of these initiatives depend on the **logic of stakeholders** and decisions that are often external to internal dynamics.

In these adverse conditions, where the incompatibilities of agrarian models can slow down or even nullify the changes promoted by the agroecological transition, scaling up presupposes, over and above the exemplarity and effectiveness of best practices which are all too often niche in nature, the development and organisation of broad **coalitions of stakeholders** with the requisite power and **capacity to influence public policies**.

Agroecological transition is not only a social and technical challenge, it is also a political one, ranging from the protection of community rights to the formation of just transition coalitions.

This is the main shared lesson emerging from the scientific work carried out by IRAM, whether it concerns the necessary transformation of existing agrarian systems or the defence of existing agrarian systems when they already proving to be virtuous.

Method and approach

Based on a proposal for voluntary participation made to the CoRe programme partners, **three geographical areas of different sizes were targeted** for participation in the support programme :

- Alikadam sub-district (*upazila*) in the Chittagong Hills Tracts region of **Bangladesh**, where Caritas Bangladesh is active;
- The departments of Chuquisaca and Tarija in **Bolivia** in which the local NGO ACLO operates;
- A group of **West African** countries (Mali, Mauritania, Niger, Senegal, Togo, Burkina Faso and Benin) where the Sahel Agroecology Programme (PAES) is being implemented by various national partners in the SCCF network.

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Discussions prior to the first stage enabled the method to be adjusted to the work areas, the available documentation to be shared and the focus group sessions to be scheduled.
Based on the three study sites, IRAM- GEMDEV's task was to **facilitate a collective reflection process on the nature of the agroecological experiences in** each area, based mainly, but not exclusively, on the **Agroecology Criteria Tool** (ACT) **evaluation method** developed by the Biovision foundation. [1]

Figure 1. Levels of agroecological transition (Source: Biovision, based on the work of S. Gliessman)

This method provides a structured and graphically intuitive tool (Figure 1) for **characterising the agroecological approach of an intervention**, whatever its nature.

It is based on Gliessman's analytical framework, which establishes 5 **levels of change** for a food system and draws on the 10 elements of agroecological transition identified by the FAO. Discussions in the focus groups centred on these levels of intervention.

In the case of **Bolivia** and **Bangladesh**, the 2 focus groups were organised in a similar manner:

- An **initial diagnostic focus group** provided an opportunity to discuss the specific context of the project (socioeconomic conditions, environment, farming system), followed by a discussion of the experience of agroecological transition in the area, using the ACT methodology.

- the **second focus group** enabled the work **on the** ACT **methodology** to be completed as well as time to discuss the prospects for these support initiatives. The discussion centred on the question "What are the internal and external factors affecting the dynamics of transition to an agroecological system in the region?

- **In the case of the Sahel, it was decided to organise a single focus group** at the time of the regional meetings of another project, the *Sahel Agroecology Programme* (PAES), and to use the diagnostic work carried out in this area by a consultant, Magloire Oteyami. However, it should be noted that this meant that in this first phase we focused solely on Togo, where the meetings were held and where the diagnostic work was carried out in the intervention zone of the Togolese partners (CARTO, JARC, OCDI), i.e. in the Savanes region.

The workshop brought together all the participants from the seven PAES countries, which meant that the discussion was approached differently to those held with the Bangladeshi or Bolivian partners. Three questions emerged from the sub-group discussions. They focused on the obstacles and levers with regard to the development of agroecology:

- In the countries where you work, what are the obstacles and levers impacting the development of agro-ecology in public policy?
- What are the obstacles and levers supporting agro-ecology in your projects?
- What are the obstacles and levers with regard to adopting and changing farming practices in your territories?

[1] https://www.agroecology -pool.org/methodology

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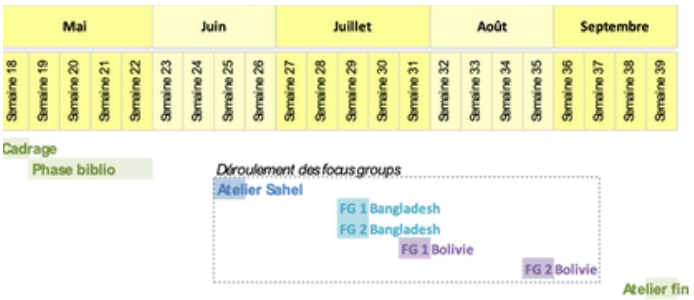

Figure 2 IRAM's support programme

For each site, this work provides a rapid, contextualised diagnosis of the situation and outlines possible future trajectories. The final workshop was held on 28 September 2023, bringing together researchers, project teams (remotely) and the SCCF.

Summaries of the work carried out in each field were presented by: Claire Isabelle Rousseau (IRAM) & Dr. Arook Toppo (Manager-Ecological Conservation and Food Security - Caritas Bangladesh) for Bangladesh; Lionel Ransinangue (IRAM) and Raúl Fernando Espinoza Trujillo (Territorial Development Coordinator - Fundación ACLO - Direccion General) for Bolivia.
Claire-Isabelle Rousseau (IRAM) and Martin Adjaho (Technical Adviser in Agricultural Entrepreneurship, Monitoring, Evaluation and Planning - Programme Director at OCDI Caritas Togo) for PAES/Sahel.

The discussions and debates that followed, combining the viewpoints of stakeholders and researchers, helped to put the lessons learned from the three case studies into perspective, with the help of workshop participant François Doligez, an IRAM researcher. [2]

The Chittagong Hill Tracts (Bangladesh): defending agroecological practices

The Chittagong Hill Tracts (CHT), the area of intervention of the local SCCF-Caritas Bangladesh partner, is a mountainous region on the border with India and Myanmar. The population of the Chittagong Hill Tracts is composed of a diversity of ethnic groups (+13 ethnic communities, most of which belong to the Pahari group), with a multiplicity of languages, religions and cultures represented. [3]

Figure 3 Location map of Alikadam sub-district, Bandarban district

The geographical isolation of the area is combined with the socioeconomic isolation of the indigenous populations: access to public services is limited. In addition, the Chittagong Hill Tracts are a **traditional area of resistance**, linked to land defence movements within a complex land tenure system superimposing customary, communal and state rights.

Colonial and postcolonial policies in the Chittagong Hill Tracts have led to the emergence of a dichotomous situation between the populations of the plains,

[2] All the supporting documents https://www.gemdev.org/wp-content/uploads/2024/01/Atelier-IRAMGEMDEV_VF.pdf presentations and discussions https://youtu.be/ehXg4GH1yAw?si=C8BcdqZbEA5Ea9IV can be accessed on the GEMDEV website https://www.gemdev.org/32700

[3] UDDIN, N. 2012. Politics of Cultural Difference: Identity and Marginality in the Chittagong Hill Tracts of Bangladesh. South Asian Survey.

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mainly Bengali, and those from the hills, mainly Pahari, marginalised as a result of their cultural specificities.

Farming is traditionally based on slash-and-burn (jhum) and the diversity of agroecosystems, linked in particular to the terrain, resulting in a diversity of practices in the area.

Local populations derive many services from natural areas and, in return, **provide protection for these areas.** This transaction is deeply rooted in beliefs that establish, for example, a relationship of balance and interdependence with the forest: "if the forest survives, we survive". In line with this approach to protecting natural areas, local people have for a long time implemented practices that are similar to agro-ecology in hilly areas: limited use of chemical inputs, practices that combine the conservation of natural resources and agriculture, collective use of land, etc.

However, these practices and uses are threatened by various internal factors (problems of access to water, population growth threatening the balance of the slash-and-burn farming system) and external factors (land grabbing or privatisation, public sector takeover of forest areas, development of contract farming of tobacco in the plains since the 1970s). External threats are particularly acute in the region, due to the economic interests of tobacco growing in the fertile lands of northern Upazila (to the detriment of food crops such as rice) and the development of tourist infrastructure in hilly forest areas.

The problems encountered in the Chittagong Hill Tracts relate more to preserving the rights of local communities to access land and preserve their traditional practices, while working to maintain soil fertility and combat erosion in increasingly densely populated areas.

Caritas Bangladesh is seeking to address these challenges at a number of different levels. At the macro level, from Dhaka, Caritas Bangladesh continues to carry out advocacy work in support of local populations, and information campaigns designed to facilitate their inclusion.

The aim is to inform the local population of their rights (through discussions at village meetings), raise awareness of environmental protection issues, and help people obtain their civil status so that they can access their rights. Specific training for women is also organised.

On a technical level, Caritas Bangladesh is seeking to address the lack of agricultural services in the area by supporting the operation of *Community Agriculture Learning Centres* in each village, run on a voluntary basis by a member of the community trained by Caritas in a variety of technical subjects. Due to their remote location, the villages have very little access to the market, which means that they have to organise group sales and make contact with intermediaries and wholesalers. Various forms of technical support and capacity-building are provided, mainly on the subjects of fertility and erosion control (compost, vermicomposting, mulching, etc.), but also on pest control (manufacture of biopesticides), water-use efficiency (drip irrigation, mulching) and the use of local varieties.

The situation in Alikadam Upazila demonstrates the agroecological nature of certain local traditional practices and the role of indigenous communities in preserving natural resources.

As in many forest areas occupied by indigenous peoples, economic initiatives (development of tourism and coffee growing) and environmental initiatives (protection of forest areas) are threatening the existence of these agrarian systems.

The support for agroecology offered by Caritas cannot therefore be limited to technical aspects and has integrated issues of advocacy, defence of indigenous rights and networking for technical training purposes.

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Changing voices: the ecological transition according to the Loyola Cultural Foundation (Bolivia).

Caritas' Bolivian partner is the Acción Cultural Loyola Foundation (ACLO). Created in 1966 by the Society of Jesus, its primary purpose is to **help the** most deprived **and marginalised rural populations** in the south of the country. Initially, it focused on education as a means of transforming social and socioeconomic structures. At the same time, it undertook advocacy work and put rural populations in touch with each other in order to strengthen their organisations in Bolivian society. ACLO has set up local radio stations and advocacy initiatives to help farmers make their voices heard and assert their rights. ACLO's activities are concentrated in the southern regions (departamentos) of the country: Chuquisaca, Tarija, Potosi and el Chaco.

As part of the **"just ecological transition and environmental protection" project**, the work carried out by ACLO mainly concerns rural populations in the protected areas of the Tariquia Nature Reserve in the Tarija region, the El Palmar National Park, the Iñao Nature Reserve in the Chuquisaca region and vulnerable peri-urban populations in the city of Sucre.

Figure 4 Location map of the departments of Chuquisaca and Tarija (Bolivia)

The "just ecological transition and environmental protection" project is part of a regional development programme for the southern region of Bolivia.
As part of the support, two focus groups were conducted on ACLO's actions in protected areas. Since the initiatives undertaken with the peri-urban population of Sucre do not directly concern agricultural activities, these were not taken into consideration in the context of the study.

An economic and political context unfavourable to agroecology

In general terms, the Just Ecological Transition and environmental protection project aims to improve the living conditions of indigenous rural populations in protected areas by seeking development alternatives linked to natural resources, agriculture and environmental protection.

The project thus aims to address the contextual challenges of these regions, which are characterised by the "predominance of a single globalised model that increases socioenvironmental degradation based an extractivist logic and intensive consumption of energy from unsustainable sources, and that prioritises profit over local territorial visions, food sovereignty and a dignified life".

In these regions, extractive activities (hydrocarbons in particular, but also gas and minerals) are highly developed. The two intervention regions rank among the country's top 4 hydrocarbon producers.

Extractive industries therefore make up the majority of their economic and fiscal resources, which means that they wield a great deal of power. The importance of the export sector on a national scale reinforces this position of power. According to the latest data from the National Institute of Statistics, in 2021, "the activities with the greatest weight in GDP are public administration (18%); agriculture, forestry, hunting and fishing (13%); manufacturing (11%); mining and hydrocarbon extraction (10.5%) and the financial, insurance, real estate and business services sector (10%).

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In terms of the export sector, between January and November 2022, manufacturing was the main export item (50.9%), followed by oil and gas exports (21.9%) and mining (21.5%). [4]

This strong regional dependence on extractive activities is encouraging governments and companies to launch exploratory campaigns in search of new deposits, even in protected areas that had previously been relatively unspoilt.
The proximity of the Argentinian border and the capital, Sucre, **also contributes to the development of intensive farming and stockbreeding systems** (potatoes, maize and cattle in particular) in plains and valleys around the protected areas, which had previously been relatively unspoilt. This **pressure** is contributing to the expansion of the agricultural frontier and in turn places increasing pressure on protected forest areas (illegal deforestation by slash-and-burn [5] for agriculture or illegal logging). This leads to **pollution** problems, and production factors such as water and land enter into **competition with each other**; competition that is all the more intense because the decline in rainfall over the last ten years or so has reduced the quantity and quality of available resources. Water is regularly in short supply. The increase in the duration and frequency of these periods of shortage poses an additional threat to the people living in the protected areas and to the farming systems in place.

Family farming predominates in these areas. The main crops are potatoes, groundnuts, maize, market gardening and agroforestry. In recent years, citrus fruit cultivation has grown significantly, as has honey production, representing diversified food and economic resources for the populations supported by ACLO.

However, **the maintenance and consolidation of these agrarian systems are directly challenged and ultimately contested by the many incentives for the development of intensive agricultural and livestock systems on the periphery of protected areas.**

[4] www.tresor.economie.gouv.fr/Pays/BO/conjoncture-https://economic
[5] *Chaqueo*, or slash and burn, is traditionally practised by indigenous populations to cultivate new land. In the past, the reduced pressure on the land meant that these plots could be regenerated to some extent after 3 or 4 agricultural campaigns over a period of around ten years, but this is now becoming virtually impossible with the increased demand for agricultural land and, in particular, the expansion of the agricultural frontier.

Once again, this competition between systems for increasingly scarce resources is contributing to the expansion of the agricultural frontier to the limits of protected areas, and even within these limits.

The **lack of investment and public policies supporting agrarian systems** and local populations in "deprotected" areas - lack access to basic services (health, education, drinking water) and to agricultural markets (little or no road infrastructure) - combined with the contexts mentioned above, is creating a major **social, economic and political crisis**.

Residents are becoming politicised, and the **polarisation between developers, large-scale farmers and environmentalists is growing.** This confrontation is evident even within rural communities in protected areas. The growing demand for farmland from individual agricultural entrepreneurs is leading some indigenous family owners to rent out part of their land, the most suitable for farming, which they often end up selling a few years later.

This phenomenon is leading to **a gradual and apparently negotiated takeover of reserve land by agricultural entrepreneurs to the detriment of the indigenous populations**. The development of mechanised production systems that are intensive in phytosanitary products is taking place at the expense of protected areas.

ACLO does not work with these agricultural producers and its efforts are limited to the indigenous rural populations of the protected areas. Its work to promote agro-ecological transition is therefore limited and does not act on the necessary adaptation of production systems outside the increasingly contested boundaries of protected areas.

In this sociopolitical and economic context, which is hostile to a just agroecological transition, **ACLO is taking action at several levels to restore a greater place and a greater role to the indigenous communities, whose evident contribution to a fair ecological transition is confronted with major challenges,** and while representing a potential a driver of economic and social development, is threatened by the extension of intensive and industrial agriculture.

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▫ Supporting the transition through advocacy and the promotion of indigenous knowledge and know-how

ACLO, through its communications network (radio, press), works to **bring together people living in the reserves and to promote their traditional** knowledge of agriculture, nature, environmental protection and gastronomy. It organises local and regional fairs to showcase and promote the agro-ecological produce of family farmers in protected areas (vegetables, fruit, jam and honey). The health and taste quality of the products (produced without the use of chemical plant protection products) is highlighted to consumers. At the same time, ACLO **supports and strengthens farmers' organisations to defend their interests at regional and national levels.** At national level, ACLO is participating the preparation of a bill to regulate the use of plant protection products in protected areas.

Another of these initiatives is aimed at **raising awareness and informing indigenous populations of their rights**, in particular so that they are systematically consulted and involved in territorial development projects in connection with development, farming or agricultural projects in their territories, and so that these communities can guarantee conditions of sustainability through better management of territorial natural resources.

▫ Promoting local products and disseminating agro-ecological practices to support the agroecological transition

To support the agroecological transition and the dissemination of more virtuous practices, ACLO has set up activities to **strengthen the network of leading producers** in localities located in the 3 protected areas in the intervention zones. Through these **relay farmers** appointed by the indigenous communities, this helps to raise awareness and inform these communities about agricultural production practices and techniques in addition to livestock farming (poultry and goats).

ACLO also relies **on technical and practical dissemination mechanisms, with "field schools"** involving technicians, exchanges between farmers and the appointment of environmental promoters to raise awareness of the importance of managing and "taking care" of forest areas, in particular positive ecosystem relations and heritage of local forest and animal species. ACLO makes use of its communications network (radio) to **spread information and messages to remote areas that are difficult to access**.

In addition, as part of the project, ACLO has set up **mass production activities for local seeds** (for food production or forestry purposes) at community level, in order to share and encourage the replanting of local species in order to **maintain and even improve the varietal diversity of local wood resources and crops**. This is done by means of farmers involved in seed multiplication initiatives and nursery gardeners who contribute to enriching a seed bank and improving the availability of seedlings at community level.

▫ Support for production, diversification of agro-pastoral activities and environmental protection and preservation

With the project, as support for the agroecological transition in a protected area appears inseparable from initiatives to preserve natural resources, ACLO has stepped up its intervention to support agricultural production, in particular by providing technical support to farmers through training and advice on their plots. This support **focuses on diversifying production through crop associations and rotations** (to reduce pest attacks), **improving management, reproduction and storage of local seeds, recycling waste and crop residues** (rather than burning them) **and organic matter** (vermiculture using crop residues to recover worm humus).

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At the same time, **support for agroforestry** (introduction of citrus trees) **and reforestation** (local species) is a priority in protected areas. Support is provided through technical advice and the establishment of local nurseries. **The idea is to make the most of local knowledge in this area and to disseminate it** through the aforementioned actions.

Regarding livestock farming, although this activity is less developed, **specific support is being provided to better integrate goat and sheep farming into rural production systems**. The aim is to **improve animal management and make better use of livestock/farming interactions** (rangeland management and regenerative pastoralism) as an additional source of household income or food.

Finally, in a context of climate change and increased pressure on water availability, the project **is implementing water conservation methods and techniques at household level** by developing and/or installing rainwater collection and/or storage tanks capable of reducing water shortages in the dry season.

▫ Potential for agroecological transition in protected areas in southern Bolivia

The southern regions of Bolivia, particularly in the protected areas, offer **real potential** for agroecological transitions in terms of flora and fauna resources and the presence of endemic, or even introduced and adapted, species that are emblematic of the Andean region. However, **the necessary protection and enhancement of this biodiversity, in conjunction with the development of green tourism, for example, has yet to be achieved**. Coupled with the human resources, knowledge and indigenous knowledge that are based on a strong social community and cultural organisation, this offers opportunities for a real enhancement of the territories' heritage and, ultimately, greater protection and harmonious development of these territories.

The situation in ACLO's area intervention area demonstrates the tensions that can exist between agroecological transition, conservation issues in and around protected areas, the development of tourism and the development of extractive activities of major economic interest to the country.

ACLO's approach focuses on the indigenous populations of protected areas, defending their rights and promoting sustainable agricultural practices.

However, there are limits to this targeted approach.

An agroecological path that is compatible with the main principles of the agroecological transition is being developed and implemented every day. However, the knowledge accumulated in the day-to-day lives of ordinary people has been weakened and is struggling to make itself heard in the face of the dominant logic at work. This manifest inability directly calls into question a targeted intervention model which, while working to ensure that the agroecological voice of the poor is heard, does not work to transform contrary agricultural practices, which are nonetheless very much in evidence, on the periphery of protected areas (agricultural and livestock fronts) and in major extraction projects in protected areas.

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In West Africa: agro-ecological transitions based on the technical challenges of agriculture, but inconsistent public policies

The seven West African countries (**Mali, Mauritania, Niger, Senegal, Togo, Burkina Faso and Benin**) brought together under the SCCF's Sahel Agroecological Programme (PAES) represent a vast area encompassing a wide diversity of agroecosystems and farming systems. It was therefore decided to take advantage of this scale for exchanges rather than focusing on contextualised agroecological practices involving a variety of support methods from the different partners. **The focus group therefore concentrated on the macroscopic dimension of the transitions** and more specifically on the place of the agroecological transition within the **public policies** of the countries concerned and, conversely, on the place of public policies in the just ecological transition.

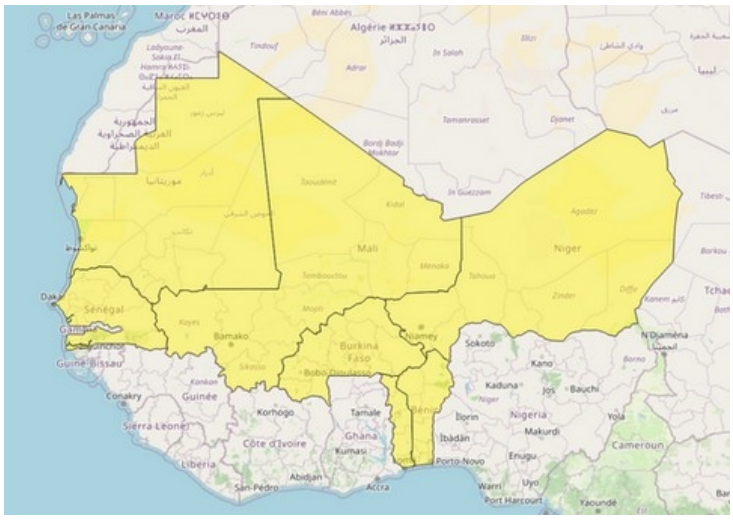

Figure 5 Member countries of the "Sahel Agroecology Programme" (PAES)

Public policies focused on food safety

To date, the policies of the PAES countries have prioritised the objective of increasing agricultural production in order to address the challenges of food security combined with the economic issues represented by export crops. Following periods of structural adjustment plans, with waves of liberalisation of state structures dedicated to production and the regulation of commodity markets, the model adopted by the PAES countries was that of the Green Revolution and the development of cash crops.

In terms of public policy, subsidies have encouraged the purchase of imported chemical inputs to support increases in productivity and production quantities, as part of a more general drive to 'modernise' the sector. Benin still provides substantial subsidies to stabilise the sale prices of chemical inputs (SPP superphosphate fertiliser, NPK, herbicides, insecticides). In 2023, this public contribution will amount to more than FCFA 30 billion. These prices are set independently of production (food crops or cotton). [6]

In Niger, the sale of crop protection inputs is administered by the Agricultural Input & Equipment Supply Centre (CAIMA) using reference prices, with the exception of fertilisers, the sale of which has been liberalised since the fertiliser reform adopted in 2018 and implemented since 2022. [7] The reform of the fertiliser sector was aimed in particular at increasing the availability and accessibility of fertilisers, with supply now provided by the private sector.

However, family farming remains the predominant agricultural model in the seven countries and the main source of food for the population. These policies, which are most often designed cash crops and export production, can benefit family farmers, who have adopted the use of chemical inputs with varying degrees of intensity and systematicity.

Several PAES countries are now looking for solutions to the health challenges posed by the use of unapproved chemical inputs, such as combating fraudulent labelling or smuggled products. However, these actions are not linked to alternative measures to reduce the use of chemicals in agriculture.

[6] https://sgg.gouv.bj/cm/2023-06-14 #:~:text=Le%20Conseil%20des%20Ministres%20s,'%C3%89tat%2C% 20Chef%20du%20Gouvernement.&text=I%2D1.,et%20approbation% 20de%20ses%20statuts

[7] https://www.rfi.fr/fr/podcasts/afrique%C3%A9conomie/20220116-le-niger-lib%C3%A9ralise-the-fertiliser-sector

[8] https://www.cirad.fr/espace-presse/communiques-de-press/2020/agroecology-senegal-public-policies

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In particular, the reform of the fertiliser sector was aimed increasing the availability and accessibility of fertilisers, with supply now provided by the private sector.

Family farming remains the predominant agricultural model in the seven countries and the main source of food for the population. These policies, which are most often designed for cash crops and export production, can benefit family farmers, who have adopted the use of chemical inputs with varying degrees of intensity and systematicity.

However, several PAES countries are now looking for solutions to the health challenges posed by the use unregistered chemical inputs, such as combating fraudulent labelling or smuggled products. However, these actions are not linked to alternative measures to reduce the use of chemicals in agriculture.

Agroecology sometimes finds a place in public policies that remain contradictory overall

Several countries have adopted specific agroecology policies or strategies. Senegal, with its Green Emerging Senegal Plan (known as the 'PSE Vert'), is one of the most emblematic examples: as part of the PSE Vert, a plan has been launched to reforest the country, raise awareness of environmental risks, and recycle and combat waste. The agroecological transition is one of the five major initiatives in the Priority Action Plan for the second phase of the Emerging Senegal Plan (2019-2024).

The strength of this political approach lies in the fact that it is accompanied by initiatives led by civil society, such as DyTAES (Dynamic for the Agroecological Transition in Senegal), which has set up an "agroecology caravan" [9] and published the concept note "Contribution to national policies for the agroecological transition in Senegal"" in 2020. Another example is the Multi-Stakeholder Task Force for the Promotion of Agroecology in Senegal (TaFAé) and the Alliance for Agroecology in West Africa(3AO).

However, the system of state subsidies for inputs persists. "Almost all horticulturalists in Senegal and irrigators in the Senegal valley use these products to control weeds and pests (insects, diseases, etc.)" (DyTAES, 2020).

"Of the 300 specialities on the market, only 189 were authorised by the Interstate Committee for Drought Control in the Sahel(CILSS) in June 2002" (Ba et al., 2016).

Nevertheless, at the end of 2021, the government launched a process to structure and strengthen the PSE Vert. Among the objectives identified for the agricultural sector are a 30% reduction in the use of chemical inputs and an increase in bio-inputs by 2035, the coverage of 30% of agricultural land by agroecological practices by 2030, and the restoration of degraded ecosystems (Milhorance, 2023). There is also talk of introducing subsidies for organic inputs. [10]

These new initiatives reflect a growing awareness of inefficiency of measures regarding food security as well as the need to reduce imports and the cost of input subsidies, not to mention the environmental impact of these chemical inputs.

The agroecological transitions underway come first and foremost from local stakeholders facing technical challenges

At the end of the discussions, the stakeholders present stressed that it is impossible to talk about the agroecological transition without examining its implementation from the bottom up. Simply including a priority and dedicated resources in a national policy is not enough.

[9] https://www.rfi.fr/fr/podcasts/reportage-afrique/20220309- s %C3%A9n%C3%A9gal-a-caravan-for-raising-awareness-%C3%A0- l- agro%C3%A9cology-%C3%A0-cross-country

[10] https://www.lemonde.fr/afrique/article/2023/05/18/face-a-la-penurie-d-chemical-fertilizers-senegal-grows-green-alternatives_6173894_3212.html

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Bringing coherence to the various levels of public policy must be based on, and accompanied by, the transformation of production systems (at farm level) and agro-ecosystems (at the level of small agricultural regions) by those working on the ground. [11]

The network's Togolese partner, OCDI Caritas Togo, is developing initiatives to transform practices, starting at the plot level. This involves training farmers in a range of agroecological practices (agroforestry, production and use of pesticides and natural fertilisers, composting techniques in the field, integrating agriculture and livestock farming, managing water, pests and soil fertility, etc.). These training courses are based on an action research approach involving producers, universities and trainees from agricultural training centres.

At this scale of agroecological transformation, it is above all technical and practical constraints that are evident:

- A lack of solutions to the additional cost of labour, which leads some growers to turn to herbicides, particularly for clearing and weeding;
- A lack of agroecological solutions to control crop pests: growers do not consider biopesticide-based solutions to be accessible (availability, price of raw materials);
- A lack of outlets on local markets for agroecological products at a fair price, taking into account the different production costs and labour intensity; local markets are regulated by prices that are too low for conventional farming;
- Loss of productivity in the agroecological transition period, during the first agricultural seasons. This loss of productivity would require the introduction of financing and/or insurance tailored to the specific risks of converting to agro-ecology, tools that are lacking in Togo despite the direction taken by public policy.

The example of OCDI Togo shows that agro-ecological practices adapted to specific contexts, designed from the bottom up from the plot level and using an action research approach, continue to face major technical and economic limitations that still prevent them from being widely disseminated. While networks for training and disseminating good practice are in place, more systemic approaches are needed to overcome these constraints. More specifically, value chain approaches and the introduction of appropriate financing and risk cover instruments are mentioned.
Unlike our partners in Bangladesh and Bolivia, our advocacy activities in promoting agroecology are limited and still under construction. However, they now appear to be all the more useful as the dynamics of Sahelian civil society are being deployed to place the agroecological transition on the agenda of coherent public policies.

[11] For example, issues access to land (for certain long-term investments such as perennial plantations, but also to secure certain practices of more vulnerable groups of users), or securing transhumance (particularly across borders), which is crucial to the transport and renewal of organic matter in the Sahel.

THE ECOLOGICAL TRANSITION: A POLITICAL CHALLENGE

The cross-disciplinary lessons discussed following the cross-presentations

The shared experiences of the CoRe programme partners in the field of agroecological transition demonstrate a diversity of interpretations and visions of the concept of agro-ecology, and even more so of the scales and forms of action to be taken.

- Given this diversity, the just agro-ecological transition is successively associated with the preservation of the environment and natural resources, the defence of indigenous rights and populations, the evolution of current agricultural practices and/or the preservation and consolidation of agrarian systems, according to combinations specific to the contexts, the paths of action and the capacities for action of the stakeholders.

- It would be interesting to have the means and the opportunity to compare these different combinations, which combine in different ways the development of agroecological techniques, raising awareness of environmental protection and the dissemination of agroecological farming practices.

- The hypothesis is that the village scale makes it possible to reach all groups of people (young people, women, vulnerable populations) and to encompass the various themes that often overlap with the issues of the AE transition (food/nutrition, sustainable use of natural resources and conservation, etc.).

Common issues are emerging that could be the subject of specific research activities:

1. **Market connectivity** remains a challenge for all types of agro-ecological production, given the lack of specific standards and the consequent difficulty of obtaining a remunerative price for agroecological products. Possible avenues are being explored through public procurement (following the example of Senegal, which has made Senegalese rice the norm in public procurement, would it be possible to move towards 100% agroecological public procurement?) or through sales to company canteens.

2. **The effects of economic diversification and its limits**: some of the cases presented involve basing the economics of agroecological production on a broader system of activities, including ecotourism or direct sales, for example. Is diversification a way of maintaining the attractiveness of the agricultural sector while diversifying sources of income or, on the contrary, does it present a risk in terms of other induced nuisances (overtourism, pollution, etc.)?

3. **The scaling up of farming practices** still seems to be limited, whatever the situation, by certain major technical constraints encountered by agro-ecological producers.

4. **The connection between levels of intervention,** when different levels of promotion agroecology exist at micro, meso and macro levels: do these dynamics coexist at the different levels or are there cases of transformative dynamics in certain territories?

THE ECOLOGICAL TRANSITION: A POLITICAL CHALLENGE

Summary of the intervention by François Dolige z (IRAM-PRODI G)

Continuing to open up the field of possibilities: what research agenda for the right ecological transition?

Comparing the three experiences is difficult, and may even lead to pessimism, given the differences in context and scale between them:

- In West Africa, the issue raised relates to support policies and the targeting of regional and national agricultural policies, such as, for example, the question of support for the production of bio-inputs versus support for the purchase of synthetic fertilisers. This theme, or 'transformational' scale of action (such as land tenure in Bangladesh or the management of protected areas in Bolivia), raises many questions about policies to support the agro-ecological transition (AET) and their results. Like, for example, the explosion in glyphosate imports across the West African sub-region or, at a territorial level, the coherence of certain 'green' policies, such as green grabbing in the Ferlo where, as part of the The "PSE Vert" programme would promote carbon finance offsetting investments.

- In Bolivia, the focus is more on the departmental level. The aim is to support the "greening" of farming practices linked to biodiversity in protected areas, which are also threatened by extractivism. The question arises of the recognition and remuneration of environmental services in the context of the AET thus promoted at the level of agricultural activities.

Can the "double intensification" (agricultural and ecological) be financed by taxes on other activities linked to conservation, such as tourism?

- In Bangladesh, the actions taken are more in the form of resistance, at village level, where indigenous communities are relegated to the slopes in terms of land ownership. On the plains, the farming practices of small-scale producers are heavily regulated by contract tobacco farming and the use of pesticides that this entails. In this context, it is the social relations of production, both territorial land tenure and relations of production and exchange in the contracts, that are proving to be decisive for AET.

- Finally, in all three experiences, the cross-cutting nature of gender in AET is not very visible or highlighted, but it is essential, particularly through the prism of the link between AET and food and nutrition, as demonstrated by other experiences (the case of Fouta Djalon in Guinea, where women are concerned about the consequences for reproductive health and fertility of the dangerous pesticides used in intensive market gardening).

This raises a number of issues - both obstacles and levers - for the agroecological transition, depending on the scale of analysis or the dimensions considered.

- Is it possible support these just transition processes in contexts where agricultural or agrarian transformations are not necessarily moving in the same direction?
- Isn't there a risk, given the multiple issues mentioned above, of observing an accumulation of handicaps for farming communities impoverished by the processes of agricultural modernisation, dispossessed of land, exploited in their production relationships and poisoned by the pesticides used?

THE ECOLOGICAL TRANSITION: A POLITICAL CHALLENGE

- Isn't AET confronted with contexts where the accumulation of policies and the multiplication of projects no longer make it possible to establish a stable vision, with clearly defined and implemented guidelines,[12] where the segmentation of territories is increased according to specialisations (protected areas, productive basins or agropoles, indigenous territories and marginalised farmers) and where **the coexistence of agricultural models** ends up being threatened?

From a research perspective, this risk, or these questions, can be broken down into several areas:

- Firstly, we need to **continue to question the socio-technical efficiency of the production systems that are being promoted, as well as their social, economic and ecological sustainability**, in changing contexts that are sometimes exacerbated by climate change. In particular, there is the question of **fair remuneration for** agricultural **work** in AET (and the inequalities involved in production systems, as developed in the presentations by Nadège Garembois and Samir El Ouaamari), not just in the conversion (transition) phases, but on a long-term basis. In many contexts, other agrochemical solutions, such as the use of glyphosate, remain more effective **as long as the ecological service provided by AET is not recognised and remunerated** (environmental externalities). Certain innovations, originating from the very players involved in AET (the use of nicotine as a repellent, for example), are also being called into question, and the processes undertaken by these AETs need to be closely linked with rigorous observation and analysis of ongoing experiments. Nevertheless, **many innovations** emerging at stakeholder level, some of them collective (in terms agricultural equipment, or systems such as pheromone trapping of fruit flies, to give just one example), and there are more and more capacities and partnerships, between professional organisations and research institutions for example, to bring about changes in farming and livestock practices.

- In addition, **it is necessary that, within the same political arena, the different AET currents, whether incremental or transformational, practical or political, federate and structure themselves,** following the example of DyTAES in Senegal, **into civil coalitions capable of influencing their socioeconomic environment** (food consumption, prices, trade rules, institutional markets, etc.).Otherwise, AET risks remaining a "niche" approach linked to certain social networks (short circuits, etc.) or, worse still, linked to international actors in the field of international solidarity. But this structuring movement raises a number of questions, such as the ability of subaltern actors with no political "voice" (voicelessness) to make themselves heard or the existing differences, in West Africa for example, between CSOs and POs, the latter investing other models such as agropoles in their dialogue with the public authorities.

- Lastly, in order to take action, these coalitions must be able to **question the processes by which the AET is politicised.** [13] How can it be placed on the public policy agenda, and how can the range of public policies that can encourage it (including trade rules, biosecurity, land management, financial regulations, etc.) really support large-scale changes in practices or, rather, an 'ecological and just' transformation of agricultural models? However, in many fragmented and crisis-stricken contexts such as West Africa (and perhaps more broadly, in many decolonial societies such as Brazil and Bolivia), how are the processes of public policymaking, particularly regional policy, which have a major impact on agricultural models (including trade rules and the CET, biosecurity, the future of the FCFA, etc.) being restructured?

[12]We are in the grey areas described by Béatrice Hibou in her work on the bureaucratisation of public policy.

[13]See the CIRAD paper on Senegal.

TRANSFORMATIONS AND SPECIALISATION IN FAMILY FARMING IN THE GLOBAL SOUTH: WHAT PLACE FOR AGROECOLOGY?

KEY LESSONS FROM THE ACTION RESEARCH PROJECT ON THE ROLE OF AGROECOLOGY IN TRANSFORMING FAMILY FARMING IN THE SOUTHERN HEMISPHERE

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AS-PTA agricultura familiar e agroecologia

CIPCA

CARITAS-KAOLACK

Introduction

How can agroecology be considered in a context where many farmers have limited access to resources, where agriculture is still a key employment sector, and where the challenge of increasing agricultural production often remains central to preserving or strengthening countries' food security and sovereignty? What form of agriculture, what public policy measures and what development initiatives should be promoted to reconcile viable agricultural employment, food security issues and the sustainable management of ecosystems?

As part of the 'green revolutions' supported by certain governments to boost agricultural production, farming in the Global South has seen the widespread use of synthetic inputs, often combined with seeds selected for their high yield potential, and a process of specialisation, sometimes as early as the 1960s. While significant gains in labour productivity have often been achieved, sometimes supported by the use of motorised machinery, these forms of agriculture are nevertheless encountering an increasing array of vulnerabilities (producers' heavy dependence on increasingly expensive inputs, harmful effects on ecosystems and human health).

Conversely, within these farming systems, agroecology - without necessarily having been named as such - may have been an adaptive strategy in the face of unfavourable agricultural price trends and, in the absence of a dedicated agricultural policy, difficulties in accessing synthetic inputs (low household cash flow, poor availability due to isolation, prohibitive costs, etc.).

These farmers have seemingly never stopped "practising agroecology", taking care to maintain or even increase the diversity of rotations and associations, the role of legumes and the links between crops and livestock, but without always managing to avoid poverty due to a lack of access to resources (land, livestock, irrigation water, etc.).

Altieri M.A. (1987). Agroecology, Scientific basis for alternative agriculture, Westview Press, 227 p.
Gliessman S.R. (2016). Transforming food systems with agroecology. Agroecology and Sustainable Food Systems 40(3): 187-189.

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This research is part of a broader conception of agroecology (Altieri, 1987; Gliessman, 2016), i.e. where the search for agricultural production methods that make the best possible use of the biological processes of ecosystems is conducted to promote the efficiency and economic viability of farms and the resilience of rural societies.

The aim of this work was to understand how family farms and their practices are changing, and how agroecology can be used to strengthen them.

Comparative and collaborative research

This research consisted of a **comparative study of three regions where family farming predominates**, and where local partners in the CoRe programme, promoting concrete approaches to encourage the use of agroecology, wanted to gain a better understanding of the agrarian processes underway in the regions where they were involved. Three study areas were selected in consultation with AS-PTA in Brazil, CIPCA in Bolivia and Caritas Kaolack in Senegal.

In-depth fieldwork was carried out in three small agricultural regions chosen by the partners, with 70 to 80 interviews conducted with producers in each of them. Using a Comparative Agriculture approach (Cochet, 2015), the aim was to **understand how the farming systems in these regions had evolved**, both in terms of farming practices and social differentiation, to characterise them today (diversity of agricultural production systems involved, analysis of their technical functioning and economic results), and to identify the development issues and the role that agroecology could play in promoting their sustainability.

1/ The Rio Blanco region (State of Paraná, south-west Brazil)

INVERNADA, RIO AZUL, PARANÁ, BRAZIL

The work was carried out in the municipalities of Invernada, Faxinal Sao Pedro and Rio Azul de Soares. In this ancient region of mixed rainforest with a humid subtropical climate at an altitude of around 900 m, originally populated by indigenous peoples, agrarian colonisation by European migrants began at the start of the 20th century (relatively late in Paraná's history). Once a maté-gathering and livestock-raising region, combined with food crops (beans, maize and rice), this motorised andmechanised agriculture is now marked by the growing importance of commercial tobacco and soya production.

2/ The Torotoro region (Norte Potosi, Bolivia)

SUCUSUMA, TOROTORO, NORTE POTOSI, BOLIVIA

This region is located in an inter-Andean valley of the Cordillera Oriental, the Caine. The lower slopes of this river are structured by secondary valleys that have formed alluvial terraces highly suitable for the development of strip-irrigated crops. Over approximately the past twenty years, family farmers in the region have gradually replaced the annual crops that used to be grown on these terraces (maize and groundnuts in particular) with highly profitable lemon orchards. The steep slopes of these secondary valleys are little used today, except by small goat herds.

3/ The Ndrame Escale region (Kaolak, Senegal)

NDRAMÉ ESCALE, KAOLACK, SENEGAL

CARITAS-KAOLACK

The Ndramé Escale region is located in the south of the Senegalese groundnut basin, 60 km from the Gambia River, and has a hot semi-arid climate, with an average rainfall of 700 mm per year spread over a five-month rainy season. The region was gradually populated from the early 20th century, under the influence of the groundnut boom promoted by colonial France. Today, this type of agriculture, combining draught power and hand tools, is centred primarily on millet and groundnuts, but also maize and rice, in addition to market gardening, combined with ruminant rearing.

TRANSFORMATIONS AND SPECIALISATION IN FAMILY FARMING IN THE GLOBAL SOUTH: WHAT PLACE FOR AGROECOLOGY?

Three small regions where family farming, often specialised, predominates

Rio Azul (Brazil): disparities in specialisation and profound land inequalities

Small farm specialising in tobacco production.

Tobacco growing has gradually developed in the Rio Azul region since the 1970s. Highly labour-intensive, it now offers the highest added value per hectare in the region.

Increasingly limited in terms of land availability as estates are divided, the smallest family farms (2 to 6 ha) are now specialising in tobacco production. For the smallest (< 4 ha), tobacco has even become the sole crop grown.

Family-run mixed crop and livestock farm.

Many family farms have become less specialised in tobacco growing. Although tobacco can account for up to half of their summer cropping area, these farms of between 6 and 20 hectares still grow a wide range of crops. They combine food crops, cash crops (tobacco, soya) and smallholdings of dairy cattle, pigs and poultry, fed by their surplus maize and the land they can set aside for pasture.

Vast plot on a large farm.

In the Rio Azul region, there have always been large farms, both family-run and owner-managed, bolstered by the regular arrival of farmers from neighbouring states (Santa Catarina, Rio Grande do Sul) with the capital to buy land. Formerly focused on maté production and livestock farming, they now specialise in arable farming (particularly soya) and cow-calf cattle rearing over vast areas (100 to 350 ha), and feature a high level of equipment including their own combine harvester.

Torotoro (Bolivia): a gradient of specialisation in lemon production determined access to land and irrigation

The development of lemon growing has resulted in a new agricultural dynamism in the Torotoro communities on the banks of the Caine River, which until now had been heavily affected by outward migration to nearby towns (Cochabamba) or the agricultural colonisation fronts of the Oriente (Chaparé, Santa Cruz). In fact, this production offers a highly profitable outlet and enables the cultivable land and labour force to be put to good use all year round, unlike other crops grown at these altitudes (groundnuts, sweet potatoes, maize).

However, this process of specialisation has accentuated the differentiation of the local peasantry, which had already begun in the 1960s and 1970s, when the region's former hacienda workers made unequal use of the opportunities to gain access to land offered the Agrarian Reform. As a result, today production units with marked disparities in terms access to land and irrigation coexist. The latter relies on surface water diverted from the rivers that flow into the Caine, with most farmers connected to a collective network. Although water rights (duration of the water cycle) are a priori distributed by and between users in proportion to the area cultivated, there are currently discrepancies at this level, as these rights are not always linked to those concerning the land. Furthermore, the relative place occupied in the hydraulic network determines disparate flow rates depending on the state of the infrastructure, which is generally more degraded downstream (earthen canals) than upstream (canals lined, or even replaced, by PVC pipes).

Farmers with a substantial land base for the region (3 to 6 ha) and whose land is located upstream from the irrigation can develop high-density orchards (400 trees/ha) covering at least one hectare, using capital-intensive practices that generate very high added value and income per worker, spread throughout the year.

Other farmers have smaller areas (0.5-1 ha), located further downstream from the irrigation network, and therefore served by lower flows. This limits the density of lemon trees on their plots, leading them to allocate a larger proportion of their area (three quarters) to annual crops, which are much less lucrative per unit area, but are intended for family consumption. Investment in orchards has sometimes been made possible by off-farm income earned by some of the family members (working on a road construction site, for example).

Finally, some farmers do not have access irrigation and some do not own land. For the former, the small areas available are cultivated as food crops (maize/groundnut rotation) and provide part of the household diet, which mainly depends on modest outside sources of income (insecure work or benefits for the elderly). Among those who do not own land, some have been able to develop small herds of goats that make the most of the steepest parts of the terrain.

Large orchard of high-density lemon trees on an alluvial terrace.

TRANSFORMATIONS AND SPECIALISATION IN FAMILY FARMING IN THE GLOBAL SOUTH: WHAT PLACE FOR AGROECOLOGY?

Ndramé **Escale (Senegal): mixed cropping and livestock farming with limited social heterogeneity**

Farming at Ndramé Escale is characterised by less marked specialisation than in our Brazilian and Bolivian study areas. Groundnuts still play an important role in crop rotation (up to 50% of the surface area). Previously purchased by the Senegalese government, the outlets for groundnuts produced at Ndramé Escale have changed over approximately the past twenty years: they have increasingly focused on local markets and small-scale oil mills, and in recent years have also been directed towards Chinese traders who export groundnuts to China. However, food cereals (millet, maize), intended for home consumption or the domestic market, still account for at least half of the land cultivated by farmers.

From one family to another, the farmed area can vary by a factor of one to ten, but the farmed area per family worker in the region only varies by a factor of one to three (compared with a factor of 100, for example, in our Brazilian study area), because the largest farms are also those with the most family workers, brought together in extended families, i.e. involving several nuclear households from the same sibling group. All farms have at least one cultivator and one draught animal, and the range of harnessing equipment expands as the size of the farm increases.

Medium-sized and large farms (10 to 20 ha) have all the equipment needed for harnessing (cultivator, seed drill, cart), sometimes in several units. They have built up enough stock to keep large cattle, which they are also able to feed in the dry season thanks to their substantial crop residues (groundnut haulms) and their cash flow (purchase of feed). In addition to groundnuts, they can market surplus food crops (maize). Small farms (2 to 5 ha), which do not always have the three key pieces of harness equipment, seek to intensify their capital and/or labour inputs to compensate for slightly less favourable access to land (more groundnuts or maize for sale in the crop rotation, market gardening).

Small farms (2 to 5 ha), which do not always have the three key pieces of equipment for harness work, aim to intensify their capital and/or labour inputs to compensate for slightly less favourable access to land (more groundnuts or maize for sale in the crop rotation, market gardening).

Groundnut and millet crops

Cultivating the soil with a cultivator using draught power

The limits of development based on specialisation and inputs

In the Rio Azul region (Brazil): tobacco and soya, cash crops highly dependent on synthetic inputs

Tobacco growing in the Rio Azul region is highly labour-intensive, and appears to be a response to the very small acreage available to an increasing number of growers. Tobacco is grown in summer. When the leaves can be harvested early enough (which depends on the nature of the soil and therefore the location of the plots), it can alternate with a crop that can also be grown in winter (winter maize, winter beans followed by a cover crop). Otherwise, it always alternates with a cover crop or very short-term temporary grassland. The use of these cover crops plays a significant agronomic role (limiting erosion, trapping mineral elements, reconstituting soil organic matter, limiting the development of weeds). Tobacco growing is nonetheless extremely input-intensive, and relies in particular on numerous phytosanitary treatments: 18 applications during the nursery period, followed by 8 to 10 treatments in the field. These highly standardised technical itineraries are promoted by the tobacco harvesting companies, which provide technical support and sell inputs. In addition to growers' heavy dependence on purchased inputs, the levels of protection provided by these applications remain limited, which also raises health issues for tobacco growers.

Tobacco nursery (left) and transplanting of seedlings in nurseries (right)

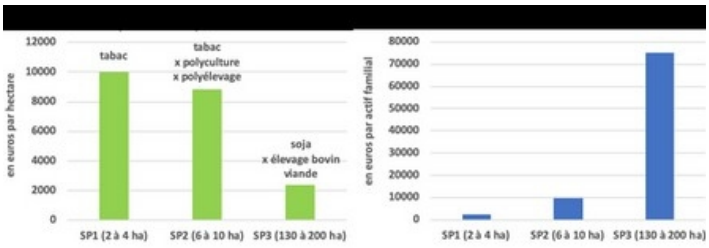
Introduced to the Rio Azul region in the 1980s, soya began to be grown mainly in the 2000s. Soya is grown mainly on large farms (both family-run and owner-managed) in the region. The crop is also grown on smaller family farms measuring at least 20 hectares. The varieties used are glyphosate-resistant transgenic soya. Here too, soya is grown as part of rotations that ensure continuous occupation of the soil: followed by beans on small farms, and a cover crop or temporary grassland on large farms.

However, this crop is also grown using a high level of plant protection products (4 fungicides and 3 to 4 insecticides), supplemented by two passes of glyphosate-based herbicide during the crop cycle, and another herbicide after harvest to eliminate soybean regrowth. This dynamic gives rise to a paradox, including in terms of the landscape: on the same plots of land, soya and Paraná pine of the Araucaria genus, an endemic species in southern Brazil considered to be in danger of extinction and protected since 1992, are grown side by side, yet here they are subjected to repeated applications of glyphosate-based herbicide applied to the soya.

A cover crop preceding the soya crop, on a vast plot of land under an open park in Araucarias.

TRANSFORMATIONS AND SPECIALISATION IN FAMILY FARMING IN THE GLOBAL SOUTH: WHAT PLACE FOR AGROECOLOGY?

The boom in these two crops - tobacco and soya - in the Rio Azul region makes this agriculture an emblematic example of agricultural development centred on a high dependence on synthetic inputs for a large number of farms. However, for small farms, specialisation in tobacco, a crop with very high added value [1] per hectare, is not enough to compensate for the profound inequalities in land ownership and access to capital. There is a 30-fold difference in income per family worker between the region's smallest farms specialising in tobacco (SP1) and large farms specialising in soya and fattening livestock (SP3).



In Torotoro (Bolivia): specialisation, abandonment of livestock farming, intensification of inputs, water and inequalities

Specialisation in the production of lemons has led to an intensification of farming, with external inputs being purchased and increasing pressure on water resources. The renewal of soil fertility relies on large quantities of composted manure, which is an organic fertiliser, but is sourced from the Cochabamba dairy basin, so is totally external to the region and dependent on long-distance transport. Paradoxically, the development of lemon growing has gone hand in hand with a decline in local livestock farming (mainly goats), which used to be an integral part of production systems and enabled fertility to be transferred between the saltus on the steep slopes and the cultivated plots.

From the 1990s and early2000s, under the impetus of farmers who began specialising at an early stage, damage caused by goats to orchards was severely penalised by fines.

[1] Net Value Added, which measures the wealth created, is obtained by subtracting from Gross Product (which corresponds to the value of agricultural production) all intermediate consumption (goods and services consumed during year) and average annual consumption of fixed capital (economic depreciation linked to wear and tear on equipment and buildings).

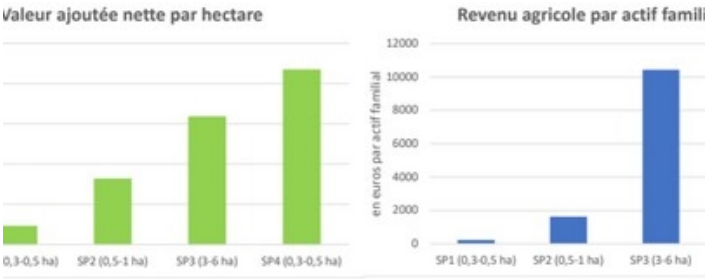
The extra work that would have been required to keep a constant eye on the herds while ensuring the smooth running of other farming activities has led to gradual abandonment of this type of farming, except among some of those who do not have arable land (see above).

Furthermore, with orchards covering a growing proportion of cultivated land, farmers are seeing increasing pressure from pests and diseases affecting lemon trees: mealybugs, whitefly and alternaria. As a result, pesticides are being applied more and more frequently, causing health problems. They reduce pollinator populations, with an impact on yields observed by farmers. In this respect, it should be remembered that in the recent past, papaya, also a monoculture crop, virtually disappeared from the Torotoro landscape over a period of around ten years, due to a disease that has not yet been identified.

Lastly, farmers are noticing a reduction in the low-water flow of the streams that feed the collective networks used to grow lemons. Identified as a possible technical lever for optimising the use available water, localised irrigation is the prerogative of farmers with the means to equip themselves (reservoirs, pipes and micro-sprinklers), and/or served by pressurised pipes, often located upstream of the network. It enables these farmers to irrigate a larger number of lemon trees for a given flow rate and duration of water turn than if they were to use strip irrigation , and is therefore an additional factor in terms of farm differentiation.

Tank for more flexible water tower management and pressurisation

The feasibility of high-density lemon-growing systems thus depends on farmers' ability to irrigate (access to water and means of optimising its use), to finance the purchase of inputs (composted manure imported into the area and crop protection products) and, above a certain area threshold, to pay day labourers for harvesting. The resulting differences in farm income per family worker are considerable. Among lemon-producing farms, they reach a factor of 7 between the largest with well-irrigated orchards (SP3) and the smallest (SP2). Small farms without access to irrigation (SP1) generate farm income per family worker that is 40 times lower than that of the largest irrigated units. It should be noted that for the most input-intensive citrus-growing practices, intermediate consumption per hectare (around €2,600) far exceeds the agricultural income per worker of farmers with small areas and those with no access to irrigation.



In the Ndramé Escale region (Senegal): farming based more broadly on agroecology

Farmers in Ndramé Escale practise relatively uniform crop rotations, alternating groundnuts with cereals, usually in the succession groundnuts/millet, or groundnuts/millet/groundnuts/corn. Crops and livestock (horses and donkeys for traction, cattle, sheep and goats primarily for meat) are closely linked: crops provide fodder by-products for the animals, animal waste is spread on the plots and animal traction is used in most cropping operations.

In the dry season, the animals graze on the cultivated plots, once the crops have been harvested, to consume the crop residues, and are penned on the plots at night.

In the rainy season, the draught animals eat the groundnut haulm that has been harvested and stored, and the other animals are driven by cowherds to uncultivated areas set aside for grazing. Overnight penning in paddocks near the house during the rainy season collects animal droppings, which are spread as powdered fertiliser, applied as a priority to the millet fields and small corn fields.

These crops (millet, groundnuts and maize) are grown without the use of herbicides (weeding is carried out by draught power, supplemented by hand tools if necessary), and without the use of any plant protection products. However, due to a lack of organic fertiliser, the vast majority of farmers use synthetic fertilisers on their crops. As a legume, groundnuts are self-sufficient in nitrogen, thanks to the fixation of diazote from the air by symbiotic bacteria installed in nodules on the root system, but they do require phosphorus and potash to grow. In general,
150 kg of NPK 6-20-10 fertiliser is applied per hectare to groundnuts. Millet receives an average of 150 kg of NPK 15-10-10 fertiliser, supplemented with organic fertiliser or 100 kg of nitrogen fertiliser (urea), depending on the grower (herd size, cash flow). This fertiliser gives an average yield per hectare of 1.5 tonnes for groundnuts and 1.5 tonnes for millet.

Access to the funds needed to buy these synthetic fertilisers is therefore a factor of social differentiation. On very small farms and some small farms, farmers grow groundnuts with little (50 kg per hectare) or no fertiliser, and without always having the necessary equipment at the right time (sowing, weeding): groundnut yields plummet to 0.8 tonnes per hectare (or even 0.3 tonnes per hectare without fertiliser), while millet yields are halved on very small farms, which can only apply 50 kg of NPK 15-10-10 per hectare, supplemented by small quantities of powdered organic fertiliser.

For the time being, crop yields in the Ndramé Escale region are therefore sustained by the use of synthetic fertilisers. However, our interviews show that the use of powdered fertiliser has increased over the past ten years, as the price of synthetic fertilisers has risen. These differences in yields linked to access to fertiliser therefore also help to explain the differences farm incomes between categories of farmer by a factor of one to five, again less marked than in the other areas studied, but which nevertheless places some farmers below a minimum economic threshold estimated at €1,200 per family worker per year.

Agroecology: a question of access to resources?

In the Rio Azul region (Brazil): the challenge of access to land to maintain mixed crop and livestock family farming

In Rio Azul, our research shows that the area available to farmers is a determining factor in the mix of crops they grow. It shows that a minimum area is necessary for family farmers to avoid strict specialisation in tobacco growing: this enables them to produce surplus maize for their own consumption and to feed pigs, or even to plant temporary grassland and raise cattle. Maintaining family farming in Rio Azul based on mixed farming and livestock rearing, which contributes to family food self-sufficiency and the supply of foodstuffs for the domestic market in Paraná, is therefore directly linked to the issue of land distribution. However, the boom in soya production in the region, driven by attractive prices, has been accompanied by the expansion of large farms, which have the easiest access to land through leasing or buying from retiring farmers.

This trend is fuelling a significant rise in land prices in the region, which have quadrupled in constant currency terms over the last ten years, making it increasingly difficult for producers running very small farms to expand.

From top left to bottom right: (1) harvest of a peasant variety of maize, (2) pig farming, (3) meeting to re-establish the mill run by AS-PTA in Invernada, (4) young cattle eating crop residues on a maize plot.

It reduces these family farmers to producing only tobacco, and sees some of the siblings switch to salaried farming to limit the fragmentation of family land.

In Torotoro (Bolivia): emerging agroforestry systems, provided there is minimum access to water

High producer prices for lemons encourage most farmers in the communities studied who have irrigation to invest in this crop. Depending on their access to land and, above all, irrigation water, farmers vary the proportion of the available surface area allocated to this crop and the density of planting. However, practices remain relatively homogeneous.

Nevertheless, there are farmers (SP4) who, with only very small areas (0.3-0.5 ha) and precarious access to water (short water cycles and low flow), have developed different practices in which lemon trees are complemented with less demanding, more seasonal crops, more closely aligned with the rainy season and the period when the flow from the springs is still high: other perennial crops (guava) and food crops (maize, sweet potatoes, manioc, groundnuts) family consumption.

Therefore, making a virtue out of necessity,, more precarious access to water leads to a greater diversity of crops, which thus take full advantage of rainfall and spring water before their flow drops. These practices make it possible to identify,
for the farm as a whole, the highest levels of added value per hectare in the region (see SP4 economic results above).

It should be noted that these practices, which are accompanied by an increase in agricultural biodiversity, can be a lever for limiting the pest imbalances mentioned above, as well as the economic risks associated with specialisation. They are encouraged locally by development organisations working in the region, distributing seedlings to diversify orchards (sweetsop, avocado, guava) or supporting the search for profitable outlets for these crops (setting up a cooperative unit to produce guava juice and jam). However, these outlets are still limited compared with those for lemons, and for the time being these practices are reserved for certain farms which, because of their precarious access to resources (land and irrigation water), cannot or have no interest in focusing on specialisation.

Any generalised move towards agroecological practices of this type is currently hampered by the incomparable economic performance of lemon production, which is all the more accessible to those with privileged access to water. In order to encourage their development and address the problem of dwindling water resources in this region, it may be necessary tackle the thorny issue of water distribution in the communities concerned.

Consultation with regard to the latter could focus on the inclusion of all farmers, including those who currently have no access irrigation at all. It could also provide an opportunity to consider a system of water rights integrating the different types of agricultural use, encouraging the agroecological practices described here, and limiting the water allocated to the most demanding crops, such as lemons.

Complex association of food crops and lemon trees

In the Ndramé Escale region (Senegal): preserving and strengthening agroecological practices

At Ndramé Escale, one of the key points is to maintain crop yields (and even increase them for disadvantaged producers), while securing access to fertiliser for producers, particularly those with the most limited cash resources, against a backdrop of rising prices for synthetic fertilisers. The stakes are not only economic (farmers' incomes), but also food, insofar as a large proportion of the region's agricultural produce is intended for home consumption or the domestic market. In the Ndramé Escale region, there are some farms that use no synthetic fertilisers and have some of the highest groundnut, millet and maize yields recorded in all our interviews.

They benefit from very good availability of organic manure, thanks to a large herd of cattle (around 25 cows for around 6 ha).

Farms that are self-sufficient in terms of manure exist, provided that they are able to capitalise on their livestock, have the labour to drive them (herdsmen), and have access to the fodder resources needed to maintain them throughout the year. Strengthening the role of organic manure in crop management in the region therefore means supporting farmers' ability to capitalise on their herds and their access to fodder resources.

For poor farmers, this may mean firstly supporting access to equipment and synthetic fertilisers, which they can use sensibly to boost crop yields.

Given the cost of growing groundnuts, the trend in other parts of the groundnut basin is also towards partial or total replacement of groundnuts by cowpeas, another legume that can be harvested for its seeds and haulms, and which is much cheaper to grow than groundnuts (Garambois et al., 2018). [2]

This trend is also beginning to be observed in the Ndramé Escale region: on very small farms, the difficulty of obtaining sufficient groundnut seed and the necessary fertilisers is leading farmers to grow a combination of groundnuts and cowpeas. The same research carried out in other parts of the Senegalese groundnut basin shows that in these regions, in the absence of sufficient cash to provide easy access to synthetic fertilisers, the maintenance of soil fertility has also relied on the gradual construction and upkeep of man-made tree cover, which dominates all cultivated areas. It is home in particular to Faidherbia albida, whose status as a legume and reversed growth rate in relation to rain-fed annual crops make it a key species for agroecology in the region.

Faidherbia albida on a plot of millet in the Ndramé Escale region

[2] GARAMBOIS N., LE GOFF U., THIBAUDEAU L., 2018. Chapter 1: Sécheresse et ajustement structurel, une double adaptation : bassin arachidier sénégalais, pp.23-52,in Systèmes agraires et changement climatique au Sud : les chemins de l'adaptation, COCHET H., DUCOURTIEUX O., GARAMBOIS N. (coord), Quae, 269 p.

TRANSFORMATIONS AND SPECIALISATION IN FAMILY FARMING IN THE GLOBAL SOUTH: WHAT PLACE FOR AGROECOLOGY?

Conclusion

In the Rio Blanco region of Brazil, although tobacco growing, which is very intensive in terms of synthetic inputs, has been decisive in maintaining family farming on very small plots of land, this form of development is now reaching its limits. Against a backdrop of increasingly smaller landholdings per worker as a result of the division of estates and highly unequal competition for access to land from large soya-producing farms, young people from families with the least land are increasingly exposed to the risk of forced rural exodus.

In Torotoro (Bolivia), the development of lemon growing increased the agricultural income of family farmers and helped to stem outflow of migrants from the 1990s and early 2000s. However, its limitations are now clear to see: pressure on water resources, ecological imbalances linked to monoculture, the virtual disappearance of livestock farming, loss of autonomy for production units and growing inequalities. Although agroecological practices are now emerging to counter this trend towards specialisation, they remain limited to farmers who have access to irrigation water, even if this remains precarious.

They will therefore only be able to develop further if the issue regarding the distribution of this resource is addressed, as well as that of finding profitable outlets for crops other than lemons.
At Ndramé Escale, the use of synthetic fertilisers currently seems unavoidable for most family farmers, as they lack the livestock and animal manure needed to maintain their yield levels and food self-sufficiency. However, there are ways forward, developed in the region or in other parts of the Senegalese groundnut basin, which could help to boost fertility renewal through a more agroecological approach.

These three study areas show that **agroecology remains a key solution for small and medium-sized family farms, but that its full implementation as a lever for boosting producers' incomes may come up against limited access to certain resources: land, water and livestock.** Farmer-led initiatives exist in the various study areas, promoting farm operations based to a high degree on agroecology. However, our research shows that **local support for agroecology can only represent a viable alternative if it is part of a wider debate, including fair access to resources for producers in each region, which therefore points to the need for fairer agricultural policies.**

Nadège Garambois and Samir El Ouaamari

Acknowledgements

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to all the farmers who kindly agreed to explain their practices to us, and to the members of AS-PTA, CIPCA and Caritas Kaolack who helped with the fieldwork.

Photo credits: Authors, 2023.

To find out more...

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FORESIGHT PROCESSES FOR THE TRANSFORMATION OF FOOD SYSTEMS THROUGH AGROECOLOGY

KEY LESSONS AND RECOMMENDATIONS


Marie De Lattre-Gasquet


Fatma Zahra Rostom


Théophane Hazoume

1. Introduction and method

In order to improve the contribution of foresight approaches to the transformation of food systems through agroecology, the FAO, CIRAD and GIZ launched a project in December 2022 entitled "Foresight of Challenges and Opportunities for Sustainable Food Systems and the Agroecological Transition". The project focused on three themes:

- analysis of recent foresight initiatives in order to learn from them and produce a guidance document;
- demonstrating the importance of participatory approaches to foresight with a diversity of stakeholders;
- improving the practical use of foresight to move from building scenarios to developing policy measures and recommendations for a variety of stakeholders.

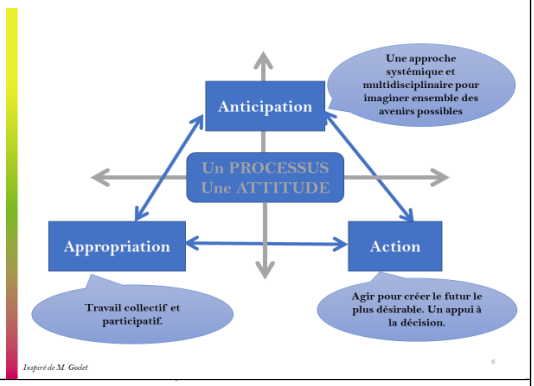
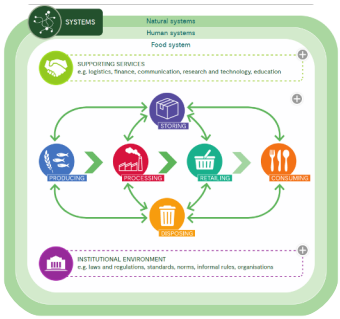
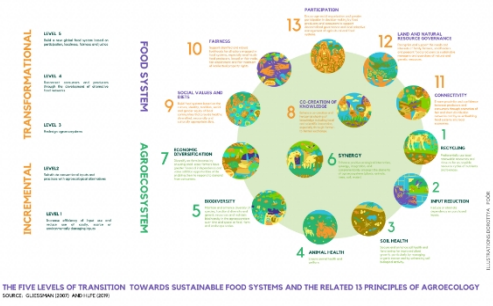
A "Guidance document" and a "Guidance note" on foresight processes for the transformation of food systems through agroecology will shortly be published. They are aimed at two audiences: foresight practitioners and agroecology specialists. These working papers provide an overview of the main results of the processes studied. The analysis is based on a corpus of 16 foresight processes that include at least one scenario involving agroecology or related approaches such as sustainable intensification or natural agriculture (see Table 1). The analysis was performed using a framework that examined the general characteristics of the foresight process, those of participatory approach, those of the system and variables, the description of sustainability and agroecology in the scenarios, the implications of the scenarios, and the strengths and limitations of the foresight process and its results.

FORESIGHT PROCESSES FOR THE TRANSFORMATION OF FOOD SYSTEMS THROUGH AGROECOLOGY

1. The foresight exercises corpus

Name and reference of foresight exercise	Terms relating to the sustainability of food systems
A Long Food Movement: Transforming Food Systems by 2045 (IPES-Food and ETC Group, 2021)	Agroecology (+ food sovereignty)
"Farmers and food systems: What future for smallscale agriculture?" (Woodhill et al., 2020)	Sustainability
Agrimonde - Scenarios and Challenges for Feeding the World in 2050 (Paillard et al., 2014)	Ecological intensification
AgroEco2050 with Agribiom India (Dorin et al., 2013)	Agroecology / Natural farming
Land Use and Food Security in 2050: a narrow road. Agrimonde-Terra (Le Mouël et al., 2018)	Agroecology/Sustainable intensification
"Vers un scénario « Des usages agro-écologiques des terres pour une alimentation diversifiée et de qualité et un système alimentaire territorialisé » en Tunisie en 2050". (de Lattre-Gasquet et al., 2017)	Agroecology
"An agroecological Europe in 2050: multifunctional agriculture for healthy eating", TYFA project (Ten Years for Agroecology in Europe). (Poux and Aubert, 2018)	Agroecology
. "Exploring the option space for land system futures at regional to global scales: The diagnostic agro-food, land use and greenhouse gas emission model BioBaM-GHG 2.0". (Kalt et al., 2021)	Agroecology (with several production systems)
"Modelling environmental and climatic ambition in the agricultural sector with the CAPRI model: exploring the potential effects of selected farm to fork and biodiversity strategies targets in the framework of the 2030 climate targets and the post 2020 Common Agricultural Policy". (JRC - Joint Research Centre, for the European Commission, 2021)	Agroecological practices
The Afterres 2050 scenario (Couturier et al., 2016)	Generalised agroecology
Enriching the Shared Socioeconomic Pathways to co-create consistent multi-sector scenarios for the UK (Pedde et al., 2021)	Sustainable practices
) "Cuatro futuros agroalimentarios para América Latina y El Caribe. Escenarios prospectivos al 2040". Comisión Económica para América Latina y el Caribe (CEPAL). (Patrouilleau et al., 2023)	Agroecology
The Impact of Agroecology on the Achievement of the Sustainable Development Goals (SDGs) – An Integrated Scenario Analysis (Millenium Institute, 2018)	Agroecology
Rapport de co-élaboration de scénarios du département de Fatick en 2035 (Sénégal) (Cirad and ISRA, 2022)	Agroecology
Anticiper l'avenir des territoires agricoles en Afrique de l'Ouest : le cas des Niayes au Sénégal (Camara et al., 2019)	Agroecology
Supporting better crop-livestock integration on small-scale West African farms: a simulation-based approach (Sempore et al., 2016)	Sustainable intensification

2. Concepts used

Foresight is a systemic, participatory and multi- or even transdisciplinary approach aimed at exploring and developing medium and long-term futures. Although many tools can be used in foresight analysis, here we have only considered the construction of scenarios, whether qualitative or quantitative. As an approach that aims to understand and contribute to the construction of futures, foresight is a key to analysing the governance of transformations.	
Food systems encompass the issues affecting multiple stakeholders and their interconnected activities, from production to waste management of food products from agriculture (crops and livestock), forestry, fisheries and food industries, as well as the wider socioeconomic and biophysical environments in which they are embedded.	
Agroecology is a holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of sustainable agriculture and food systems. It seeks to optimise the interactions between plants, animals, humans and the environment, while taking social aspects into account for a sustainable and equitable food system. Agroecology can be defined as a science, a set of practices and a social movement.	

3. Main lessons and recommendations for developing foresight processes with a view to transforming food systems through agroecology

Lessons	Recommendations
Phase 1 : Identify the stakeholders and define the foresight question	
There are still few foresight exercises that consider the transformation of food systems through agroecology (AE), and they are mainly carried out by institutions in northern countries. Foresight is a tool for joint learning and a forum for debate for food system stakeholders at all geographical scales and between geographical scales. However, the connection between scales is complex. For action, the territorial level is often missing. Many foresight exercises focus on production. They overlook important elements at the heart of food systems. Many factors and impacts are not considered. For example, for food security, availability is taken into account while access, stability, nutrition and diversification of production are neglected. Socio-economic impacts such as imports and exports of agricultural products and, in some cases, wages, profits and socio-economic well-being are taken into account, but employment, social stability, the future of small farmers and businesses, and food prices are neglected. Environmental outcomes such as land use, climate impact and biodiversity are taken into account, but less often pathogens and water use.	Participate in, or even initiate, forward-looking thinking. Recognise that transforming food systems through agro-ecology is a political issue with financial implications, but it also has significant benefits for human and animal health and for the environment. The key decisions for transformations through AE need to be taken at different scales and involve a diversity of stakeholders. The territorial scale needs to be given greater consideration. It would also make sense to involve participants from across the food system (including policy makers) and reach agreement on objectives and issues. Use participatory approaches and consider the ethics of participation and deliberation. Consider the five levels of agroecology: changes at farm level can only be incremental. Transformative transitions require redesigning agroecosystems, reconnecting producers and consumers, and renegotiating rules on a global scale. Look to the long term and take into account the radical nature of social and societal changes, as well as the speed of development and adoption of technical and organisational innovations (sometimes rapid, sometimes slow).
Phase 2 : Represent the system	
All the forward-looking studies adopted a systemic approach. The system designed by each exercise depended on the approach (qualitative or quantitative), the geographical scale, etc. The main differences are the levels of detail and the way in which the respective systems are visualised. The main differences are the levels of detail and the way in which the respective systems are visualised.	Take a systems approach from the outset and maintain it throughout the process. Show the interconnections between variables, cause and effect relationships, uncertainties and risk factors. Include the 'outputs' of food systems that are insufficiently taken into account or neglected.

FORESIGHT PROCESSES FOR THE TRANSFORMATION OF FOOD SYSTEMS THROUGH AGROECOLOGY

Phase 3 : Choosing variables and hypotheses	
The most commonly used variables relate to production, diets and use of non-food products, demographics and geopolitical contexts, economic organisation, including the role of the state in the economy and trade policies, land use and associated conflicts, and energy resources and use. There are blind spots, including forestry systems, fisheries, agricultural structures, supply chain organisation, waste and losses, stakeholder values, mobility, science, innovation and the co-creation of knowledge, market concentration, food prices, the financing system and capital flows, capital structure and technological intensity, control and ownership of Big Data, water use and access, epidemics and ecosystem degradation. Quantitative variables are mainly used for cropping systems or climate, where measurements are very important. Qualitative variables are used more for social, political and even economic issues, such as social structures and finance. These variables are much more complex to model and quantify, but they are essential to understanding the system.	Choose variables based on the principles of agroecology. Use your creativity to formulate a wider range of hypotheses for agroecology To identify new variables, carry out a retrospective analysis, identify blind spots in previous forecasts, identify weak signals, and imagine profound upheavals that could take place. Subjectivity plays an important role in the choice of variables, blind spots and assumptions. When formulating hypotheses, work across disciplines, change your perspective and question the usual paradigms. Recognise that not all variables and hypotheses can be measured, even if approximations are used. It is therefore necessary to formulate qualitative and quantitative hypotheses. For agroecology, it is necessary to have quality data and to develop new indicators. Don't be afraid of radical approaches, because transformation through agroecology demands it.
Phase 4 : Building scenarios	
The methods used to construct scenarios are diverse. Some scenarios are written as narratives, others are essentially quantitative and designed using models, while still others combine narratives and models. Where there are two scenarios, one is based on current trends (business-as-usual) while the second describes a transition of food systems towards agroecology. When there are three scenarios, there is a business-as-usual scenario, a positive transformation situation and a more negative situation than business-as-usual. In some forward-looking studies, several scenarios including agroecology have been developed, showing that agroecology is not monolithic. Four types of model have been used in foresight processes: biophysical equilibrium models, economic models, system dynamics models and spatial models.	Write powerful and imaginative stories about the future of food systems. Draw how agro-ecology could have an impact on people's daily lives. Don't be afraid to build futures that seem unimaginable today. Understand the advantages and disadvantages of the chosen number of scenarios. One scenario focusing on agroecology may seem too prescriptive. Two scenarios help to visualise agroecology by highlighting the contrast between two situations, which are often extreme. Four (or more) exploratory scenarios with agroecology open up the range of possible transformations and help to identify more triggers for change; however, these scenarios are more difficult to communicate. Combine stories and modelling. This will help to understand the changes and will be more convincing than isolated stories or figures. Develop new models and indicators for agroecology.

FORESIGHT PROCESSES FOR THE TRANSFORMATION OF FOOD SYSTEMS THROUGH AGROÉCOLOGY

Phase 5 : Learning from the scenarios and assessing their implications	
All the foresight processes in the corpus highlight the fact that the business-as-usual scenario with 'conventional' / 'high-input' / 'industrial' food systems does not meet global challenges. It is therefore undesirable. Agro-ecology is an alternative scenario that can meet major challenges: ensuring food and nutritional security (increasing the quantities produced, greater diversity of production, balanced diet) and having positive impacts on the socio-economic context, and/or equity and territorial balance, and/or the environment. For example: carbon sequestration, job creation, increased income for farmers, regional development. Agroecology scenarios show that transformations cannot be achieved without compromise. They can lead to social and political tensions. These will vary according to the factors and assumptions adopted. Agro-ecology does not solve all the problems, and may raise new ones.	Draw lessons from the comparison of scenarios as well as from each scenario (stories and/or modelling results). Be specific about the negative impacts of high-input industrial food systems. Be specific about the lessons learned from the scenarios with agroecology: the positive aspects and tensions, as well as the hopes and fears of stakeholders. Be clear about the strengths and weaknesses of the methods used.
Phase 6 : Propose options for action and highlight changes in the system	
Most of the options for action concern nutritional policies, agricultural practices such as input use, social rights, financial support and trade regulations. Other important themes are education and training, land tenure, transport, supply chain management, science and innovation, and the coordination of public policies. Policies need to be tailored to each territory and country. However, there are 'no regrets' objectives, i.e. objectives that should be pursued in order to avoid disasters.	Remind decision-makers that 'when it's urgent, it's already too late'. Emphasise emerging trends and blind spots, leverage effects and links between policies to avoid silo policies.
Phase 7 : Communicating and debating results to encourage change	
All the foresight projects have given rise to a working group dynamic between foresight practitioners and participants, with individual and collective learning. There are various ways of communicating foresight processes: books, articles and/or reports, websites, etc. There are as yet no studies of the impact of foresight processes, as it is difficult to assess the resulting changes.	Communicate throughout the foresight process. Develop a communication strategy targeting different audiences in order to fuel the debate on agroecology. Diversify the media chosen to disseminate the results and the information provided, depending on the audience.

4. Conclusion

Desirable transformations of food systems can be observed in scenarios that incorporate agroecological assumptions: there is an improvement in the health of humans and ecosystems, as well as increased food availability. However, agroecology also raises socioeconomic and political issues, for which compromises need to be debated. What's more, there is no one-size-fits-all solution for transforming farming and food systems through agroecology. Each region, each country and each territory must identify its own specific policies, leverage points and feedback loops for changing direction, as well as the synergies and adverse effects, in addition to the power relations between stakeholders. To achieve this, it is important to forge linkages connecting different scales: the territorial scale is key to shaping future landscapes, while at the same time identifying the political obstacles and levers at national and international levels.

Foresight can help to create communities, debate and identify areas for attention, compromise or conflict. It can support the repoliticisation of the future by forging bonds of trust between stakeholders in the field and those involved in research, so as to bring about effective, useful and informed change.

CONCLUDING REMARKS

The studies and analyses presented in this report show that just agroecological transition is a complex, multifactorial process, requiring integrated, contextualised approaches. Our partners' initiatives in Bangladesh, Bolivia, Brazil and West Africa meet these expectations by deploying innovative strategies to respond to local issues while contributing to the global objectives of sustainability and social justice.

The initiatives described highlight several key points for a successful agroecological transition:

- **Local capacity-building**: training and support for local communities are essential to consolidate and disseminate virtuous agroecological practices;
- **Advocacy and defence of rights**: defending the rights of local communities, particularly land rights, is crucial in order to ensure access to the resources needed to implement agroecology;
- **Institutional and political support**: the commitment of local and national institutions to promoting agroecology through favourable public policies is essential for a large-scale transition;
- **Participatory and inclusive approach**: drawing on the know-how and experience of local communities to design and implement projects helps to ensure that the solutions proposed are adapted to local contexts and meet the real needs of local people;
- **Innovation and research**: research and innovation are necessary to develop solutions that are adapted to the specific and constantly renewed challenges of the different territories, in order to improve existing practices.

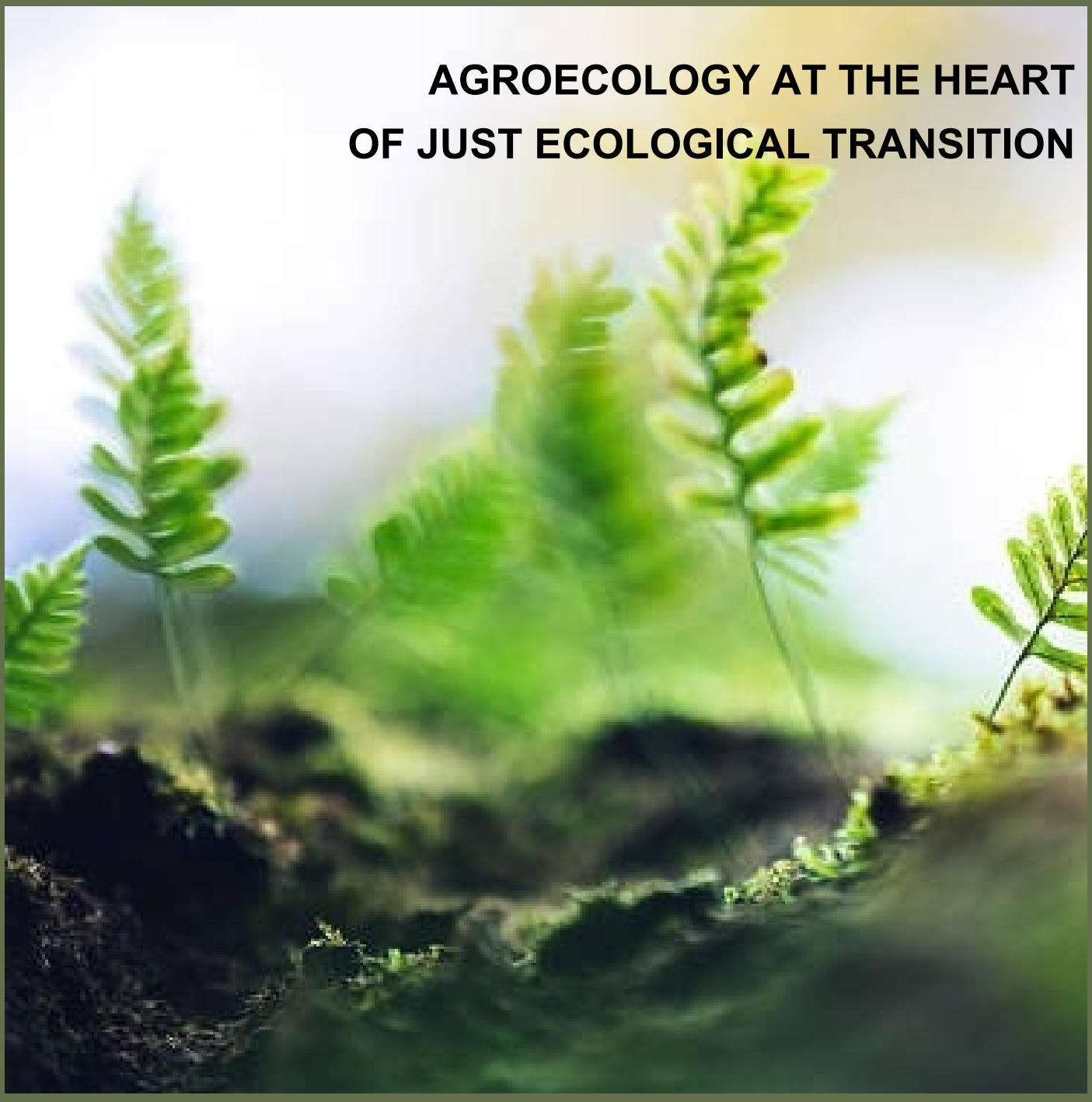
While ambitious, the agroecological transition offers a promising path towards sustainable, resilient and equitable food systems. Often challenged by political headwinds, it requires long-term commitment and close collaboration between local stakeholders, researchers, policymakers and civil society organisations.

The experiences presented in this publication show that, despite the obstacles, significant progress can be made thanks to well-designed initiatives backed by strong political will and appropriate public policies. They also highlight the importance of sharing knowledge and networking to build capacity and accelerate the transition.

The agroecological transition is not only an ecological and social necessity, but also an opportunity to redefine our relationship with the land and build fairer, more sustainable societies. There is a long way to go, but the first steps taken by partners "in the Global South, by members of the CoRe network, local communities and a variety of stakeholder groups" offer promising and inspiring models in the face of the tumultuous challenges they are confronted by.

Flore Berruto, Gemdev General Secretary

AGROECOLOGY AT THE HEART OF JUST ECOLOGICAL TRANSITION



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