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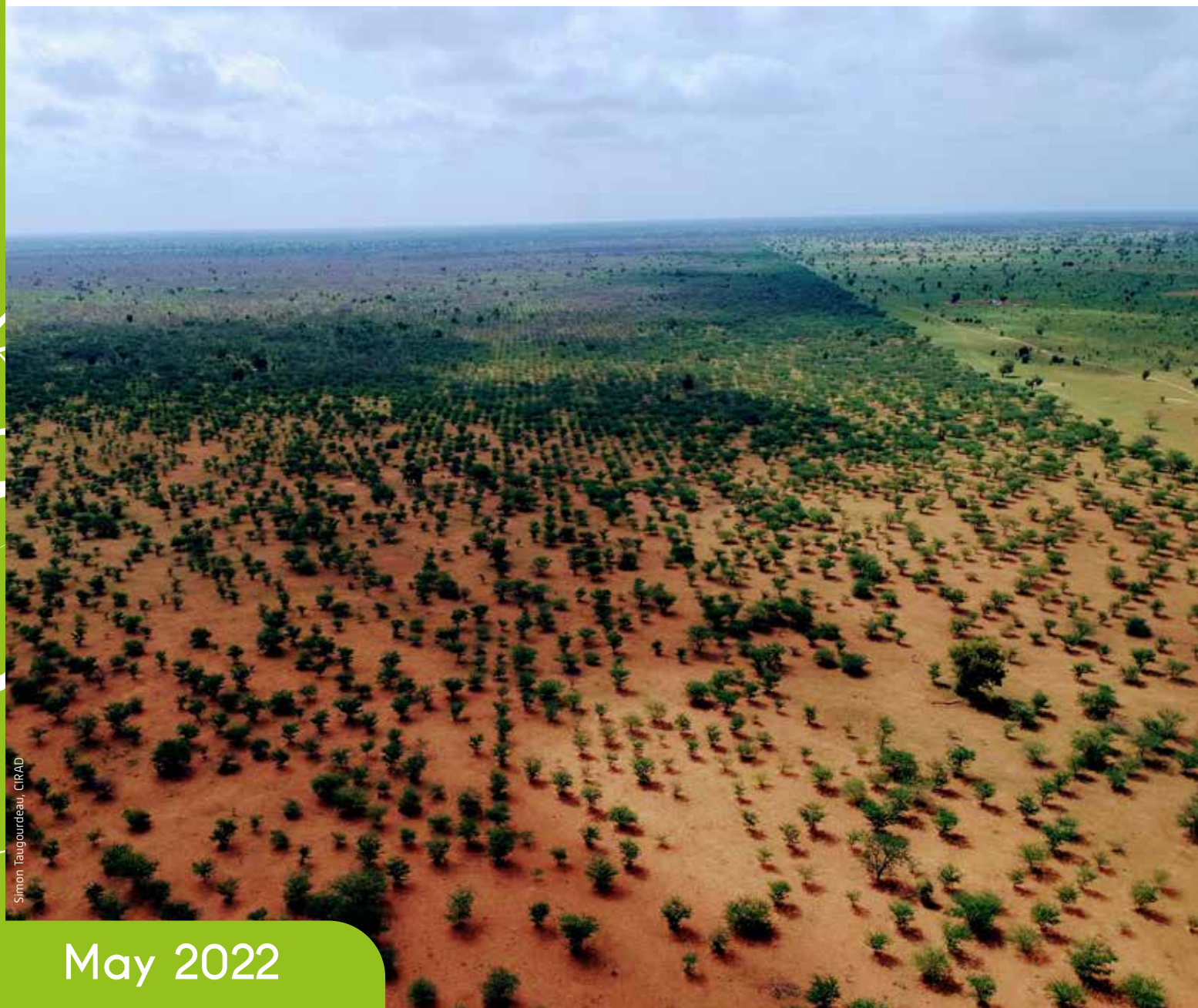
AGRICULTURAL RESEARCH FOR DEVELOPMENT

How is CIRAD supporting the new approach to the Great Green Wall?

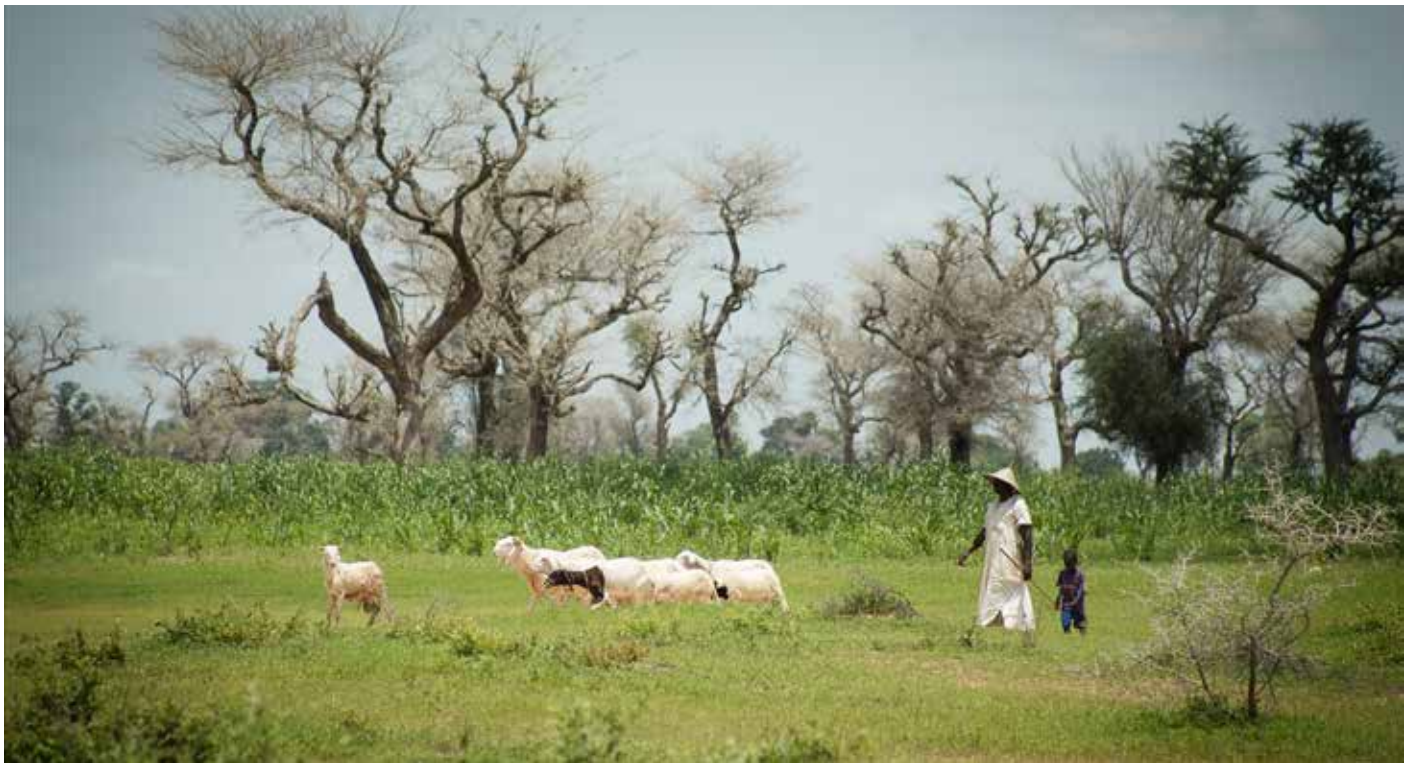


Simon Taugourdeau, CIRAD

May 2022

Launched in 2007 by the African Union, the Great Green Wall (GGW) is a game-changing African programme to combat land degradation and desertification. The recent review of the decade of action 2011-2020 has identified and determined new operational approaches and key strategic areas to make the initiative more effective. It has given rise to a 10-year priority investment plan 2021-2030 (PIP), which recalls the conceptual approaches of the initiative and identifies new priorities. A "Great Green Wall Accelerator" has been set up to coordinate and support the initiative.

CIRAD is fully engaged in the current vision of development driven by the Great Green Wall. It is working in seven of the GGW countries, with around 50 different partners, on targeted research projects covering the many issues linked to agricultural and rural development.



Raphaël Belmin, CIRAD

A renewed conceptual approach with a focus on territorial development

The GGW conceptual approach takes account of the sociological, economic and ecological realities and the true aspirations of the local communities in the territories concerned. It is based on a range of activities that are integrated and planned at the territorial level and involve local people. It is intended to be multi-sectoral, multi-stakeholder multi-level and holistic. The goal is thus to develop sustainable land management actions with a low-carbon footprint that contribute to the restoration, protection and conservation of natural resources. At the same time, the GGW initiative also aims to encourage income-generating activities for all actors while meeting social requirements for infrastructure and services, especially in health, education, access to water, sanitation and energy.

CIRAD supports the current vision of the GGW, which aims to achieve rural development through territorial approaches, improving the management of natural resources and the sustainability of food systems. With the national agricultural research centres (NARCs) and universities in the countries concerned, it is contributing to this new approach in several ways.

Integrated approaches

The initiative aims to ensure combating desertification in the Sahel is an opportunity for local economic development, through solutions based on the sustainable management of natural resources. The goal is to couple the ecological res-

toration of degraded lands with socio-economic development, in particular by strengthening the agricultural sector and its different value chains within the territories.

CIRAD actively supports the new approach to the GGW, which prioritises the sustainability and viability of systems. To achieve this, it is essential to integrate the different building blocks of a territorial approach: the management of common goods (land, water, trees, landscapes, territories, sectors) and the organisation of stakeholders and governance systems (food systems, economic systems, etc.), while also taking account of the notion of private goods (household income, wellbeing, employment, etc.)

Raphaëm Belmin, CIRAD

Development through research

In line with the evolution of the GGW initiative, CIRAD confirms the importance of the continuum between research and development: it promotes research activities that are applied to issues on the ground and co-developed with the beneficiary populations, in order to meet their needs and to accompany them towards desirable futures. CIRAD and its partners are thus working on various types of solutions (biological, technical, organisational, institutional) in many different fields, in order to address the specific constraints of the GGW countries. To that end, it fosters an inclusive approach built on the questions raised locally by partners, and ensures articulation with the national and local authorities.

CIRAD is engaged with its national partners in the implementation of research and development programmes, which are often accomplished through the "Platforms in partnership for research and training" (dP). These platforms enable research centres and universities to work within a network, supported by teams dedicated to jointly defined scientific programmes, on many of the issues linked to the GGW initiative. By way of example, there are currently five dPs (IAVAO, ISA, ASAP, PPZS, DIVECOSYS) in the GGW countries, involving 13 partners around different issues (pastoralism, crop-livestock integration, food systems, varietal improvement, agroecology, etc.).

Context-based multi-level research

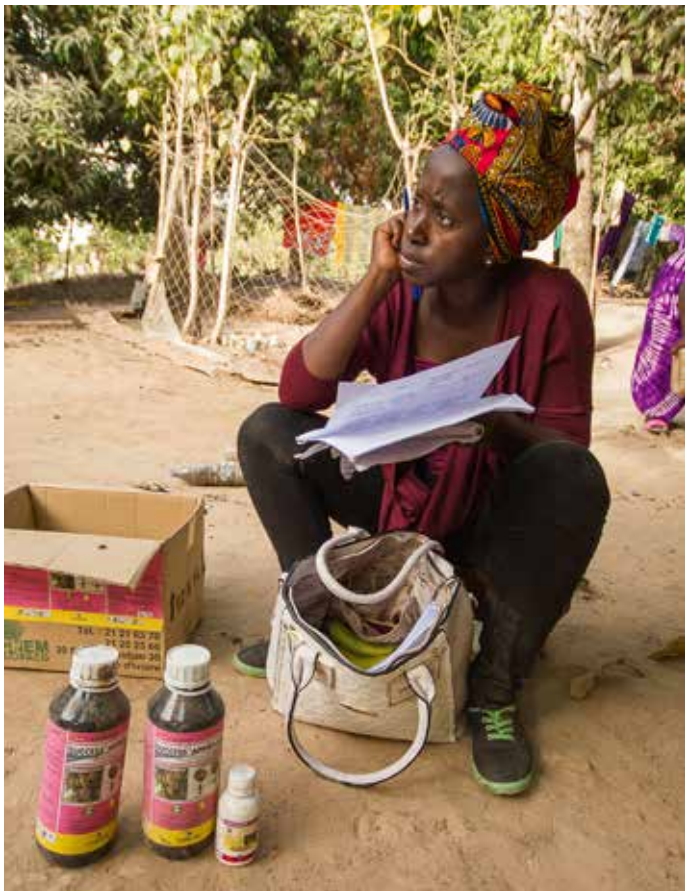
Multi-level integrated research, as described in the PIP, should help to remove the obstacles (both biophysical and human) to the change of dimension required in the GGW. For CIRAD, it is important to understand every scale of intervention (from micro to macro) in order to foster comprehensive sustainable development that will benefit the populations concerned, for and through the restoration of cultivated ecosystems.

CIRAD conducts context-based research that takes account of the diversity of socio-ecosystems in the GGW zone, with the goal of addressing the issues specific to each territory and the corresponding social demands

Consideration of impact

The PIP rightly stresses the importance of research impact and monitoring with, in particular, the introduction of appropriate indicators. The research conducted by CIRAD and its partners is designed to assess the changes and impacts resulting from their work, thereby addressing the social and economic issues of the populations at different levels: food security, employment, wellbeing, ecosystem preservation, access to natural resources, etc.

To this end, CIRAD implements tools (in particular the ImpresS methodology) within its teams and programmes. These tools are designed to include all partners in the development of jointly identified solutions, while establishing suitable monitoring-evaluation systems.



Raphaël Belmin, CIRAD

Research focus areas in line with the pillars of the GGW

To support agricultural and rural development in the Sahel and the implementation of the GGW objectives, research focuses on the issues covered by the Ouagadougou Declaration (2018). This declaration was jointly signed by the national agricultural research centres in the Sahel zone, three regional institutions in the Sahel (the Permanent Interstates Committee for Drought Control in the Sahel [CILSS], the West and Central African Council for Agricultural Research and Development [CORAF/WECARD], and the West African Science Service Center for Climate Change and Adapted Land Use [WASCAL]) and CIRAD, then validated during the Niamey workshop in 2019. The Ouagadougou Declaration includes research focus areas that are fully articulated with the five key pillars of the GGW, recalled in the 2021-2030 priority investment plan. Some of these focal areas are taken up in the French Scientific Committee on Desertification (CSFD) 2022 Topic Brief on the GGW. Numerous projects conducted in partnership in the Sahel countries contribute to their implementation and illustrate the impact of research for each of the pillars.

PILLAR 1 Restoration, planning and recovery of land and water resources and biodiversity conservation

Guaranteeing the sustainable management of habitats and natural resources

In order to combat the degradation of land and natural resources, research is contributing to the sustainable management and restoration of land, forests, wildlife, fisheries and biodiversity. These actions are implemented in particular in degraded areas (including by mining activity), integrating the challenges of climate change (adaptation, mitigation) and the different uses of these resources (materials, fodder, food, biomass energy, etc.).

Stepping up the development of hydro-agricultural infrastructures and irrigated crops

Access to water is one of the key elements of land restoration in the Sahel region. Research is therefore expected to contribute significantly to improving agricultural production, taking account of climate issues through the integrated management of water resources and the adaptation of cropping systems. It should also help to co-develop new modes of water governance in all types of irrigation schemes.

Working towards the ecological intensification of production systems

Agroecology as a science has reaffirmed the importance of the relations between agricultural practices and ecological processes. It is now a key area of research to increase the sustainability of agroecosystems in the GGW countries, while also improving crop productivity there. Increasing productivity per hectare is an important issue to reconcile food security and biodiversity conservation in areas where population growth is still very high. It is therefore essential to promote agroecology as a solution for the restoration of degraded lands, taking account of the diversity of agropastoral systems (irrigated, rainfed or crop-livestock systems, pastoralism, peri-urban market gardening, etc.) as well as the economic needs of households.

Consolidating silvopastoral systems

Pastoralism plays a decisive role in the GGW zone – two thirds of which are composed of savannah and grasslands –, contributing substantially to income and to food and nutritional security for local people. Pastoralists and agropastoralists have a central position in the initiative. The sustainability of pastoralism is closely linked to the presence of trees in rangelands. It is essential to promote sustainable livestock production systems that are carbon neutral and adapted to climate change.

Enhancing cultivated biodiversity through innovative varietal selection systems

The genetic diversity of species grown in the Sahel is a major source of adaptation to climate change and a key way to meet societal expectations. An essential component of the GGW is the deployment of interconnected varietal selection systems at the regional level to optimise the conservation and use of this diversity and to contribute to agroecological intensification in a context of climate change.

Project spotlight

For the sustainable management of natural resources

The FONABES project (Burkina Faso, Mali, Niger) has organised domestic fuel (firewood and charcoal) supplies to the cities of Ouagadougou, Bamako and Niamey, improving the living conditions of rural populations while fostering the conservation of tree- and shrub-based forest ecosystems in the Sahel.

Coordinated by CIRAD, the project is financed by the French Facility for Global Environment (FFEM).

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/fonabes-project

The IRRINN project (Burkina Faso) aims to enable a larger number of smallholders to improve their irrigation systems. To that end, the project is working on supplemental irrigation and small private irrigation systems.

Coordinated by CIRAD, the project is financed by the European Union as part of the DeSIRA programme.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/irrinn-project

The FAIR Sahel project (Senegal, Mali, Burkina Faso) aims to use agroecological intensification to develop more climate-resilient agriculture and to boost food security for local populations. The innovations developed by the project are helping to improve the performance of agricultural production systems, with a positive impact on producers' living conditions and on rural areas as a whole. FAIR Sahel is based on producers' knowledge and experience and on the methodological, scientific and technical contributions of research and development actors.

Coordinated by CIRAD, the project is co-financed by the European Union and Agence Française de Développement (AFD)

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/fair-sahel-project

The 3F project (Burkina Faso) aims to increase and optimise the ecosystem services provided by biodiversity through the intensification of agro-silvopastoral systems. Farmers are used to managing biodiversity, as their agricultural systems are characterised by a high level of genetic diversity, due to their traditional intercropping and agroforestry practices. The goal of this project is to optimise these local traditional practices, building on recent progress in agronomy and ecology through the co-design of innovative agroecological technologies.

Coordinated by CIRAD, the project is financed by the McKnight Foundation.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/3f-project

The ABEE project (Burkina Faso, Niger, Senegal) aims to better coordinate varietal selection processes (in terms of the management and assessment of genetic resources), at both the regional and the national levels, placing breeders of five target species (millet, sorghum, fonio, groundnut and cowpea) from three countries (Burkina Faso, Niger and Senegal) at the heart of action to improve and modernise their selection practices and to better respond to market demand.

Coordinated by the West and Central African Council for Agricultural Research and Development (CORAF/WECARD), the project is financed by the European Union as part of the DeSIRA programme.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/abee-project

https://www.iavao.org/en/projets/abee

Paddy field near Kolda, Senegal. Simon Taugourdeau, CIRAD

PILLAR 2

Managing and reducing vulnerability to climate impacts

Imagining a more climate-resilient agriculture and supporting low-emissions crop and livestock systems

Climate change challenges agricultural systems not only in terms of their capacity for resilience and adaptation, but also as a contributor to both GHG emissions and carbon storage. From the perspective of climate change, it is thus essential to adapt agricultural systems and practices, while striving to improve the balance between GHG emissions and carbon storage. At the same time, it is important to assist Sahelian agriculture in gaining wider access to "climate" finance.

Developing the circular economy and renewable energy production in rural areas

Access to energy in rural GGW areas is essential to the development of certain economic activities. This is why research is striving to identify sustainable energy sources, especially through agricultural waste recovery. This research aims to secure energy supplies for agri-food SMEs, while reducing the risks in terms of human health, food security and environmental contamination caused by this waste.

Project spotlight

Meeting climate and energy challenges

The CASSECS project implemented in six Sahelian countries (Burkina Faso, Mali, Mauritania, Niger, Senegal, Chad) provides stakeholders in ruminant (agro)pastoralism (cattle, sheep and goats) with the skills, tools and references needed to better quantify the impact of livestock systems on climate change and to contribute to the development of appropriate livestock policies in the region.

Coordinated by the Institut Sénégalais de Recherches Agricoles (ISRA), the project is financed by the European Union as part of the DeSIRA programme.

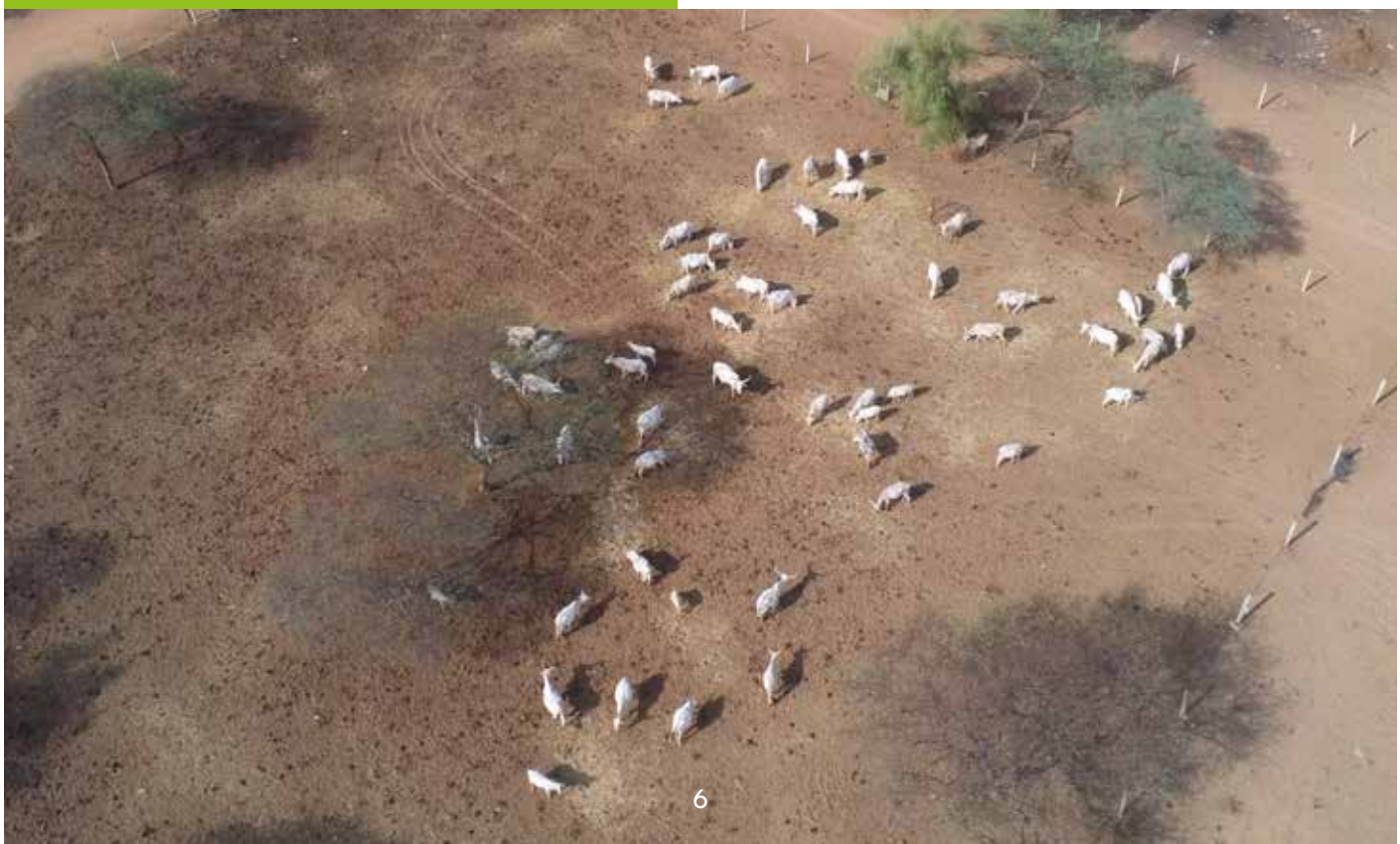
https://www.cassecs.org/en

The BIOSTAR project (Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal) aims to set up bioenergy production units in (or close to) agri-food SMEs, using their organic waste. Five sectors have been identified – cashew, groundnut, shea, mango and rice –, within which SMEs that have the capacity to innovate have been selected, in collaboration with local interprofessional organisations.

Coordinated by CIRAD, the project is financed by the European Union and the Agence Française de Développement as part of the DeSIRA programme.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/biostar-project

Simon Taugourdeau, CIRAD



PILLAR 3

Economic development and security

Increasing efficiency in all sectors, from production to consumption

Economic development is one of the key issues of the GGW initiative. Research aims to increase efficiency in the different sectors by working towards the emergence of innovative sectors connected to markets and private actors, while supporting the organisation of stakeholders for an equitable distribution of value-added.

Deploying healthy and sustainable food systems to ensure food and nutritional security for populations

Food insecurity is an aggravating factor in the security situation in the Sahel. It has an impact on agropastoral activities, economic development and natural resource management. It is therefore crucial to ensure agricultural change that meets needs and cultural practices in a sustainable and accessible manner, while providing jobs and income (especially for young people and women) and contributing to a healthy, balanced diet.

Fostering support for inclusive development

In collaboration with the actors concerned, including professional and non-governmental organisations, research co-develops inclusive innovation systems that support transitions in agricultural and food systems and the creation of jobs. It also develops systems to restore degraded lands, reduce conflicts linked to transhumance and foster equitable access to land.

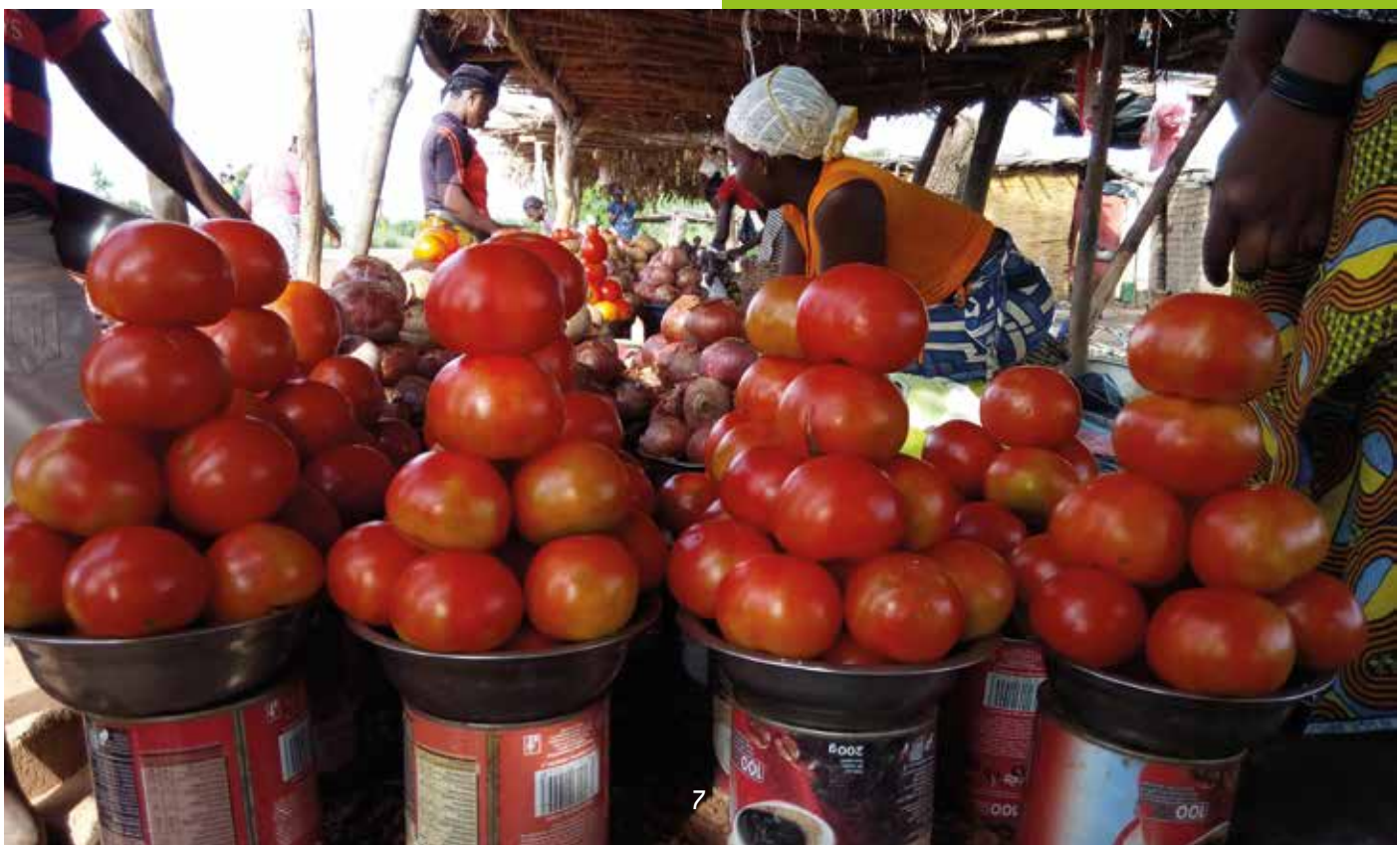
Sustainably innovating within the sectors

Job creation in agricultural sectors requires simultaneous consideration of innovation capacity and natural resource management issues. Research supports innovation processes, in particular on biodiversity (cultivated and natural), new products that could obtain the GGW label (food, cosmetics, pharmaceuticals), and new sectors based on the use of natural resources (non-wood forest products, fuelwood, etc.). The goal is to work on both the extraction and the distribution of value to encourage local communities to commit to the restoration of degraded lands.

Rethinking the connection between health and the territory as a whole

The recent COVID-19 epidemic has highlighted the importance of a global approach to health, or "One Health", for the protection of animal and ecosystem health to benefit human populations. Livestock production plays a key role in lifestyles, income and food and nutritional security in the region. Improving human health means taking account of both animal health and environmental health.

Tintilou market, Burkina Faso. Anne Bichard, Iram



Project spotlight

Research for economic development and food security

The Africa-MILK project (Burkina Faso, Kenya, Madagascar, Senegal) aims to secure dairy supplies in the face of increasing imports of powdered milk and environmental degradation, through two processes: the ecological intensification of milk production and the co-design of efficient, inclusive collection systems.

Coordinated by CIRAD, the project is financed by ERA-Net Cofund Leap-Agri.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/africa-milk-project

The RELAX project (Burkina Faso, 2017-2019) has helped to better understand the determinants of food diversity throughout the year in agricultural households, focusing on farm production, natural resources and selling and buying practices on rural markets. The project has given special attention to seasonality as well as to relations between individuals (especially between women and men) within households.

Coordinated by CIRAD, the project is financed by Agropolis Fondation, Fondation Daniel et Nina Carasso, and Fondazione Cariplo.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/relax-project

The ACCESS project is an action research project on support for innovation in three fields – agroecology, agri-food processing and digital agriculture – in Burkina Faso. Approaches and tools are co-developed with support professionals and researchers to build capacities among innovating entrepreneurs and multi-stakeholder innovation partnerships, and to diversify the range of support services available to innovators in order to accelerate the dynamics underway.

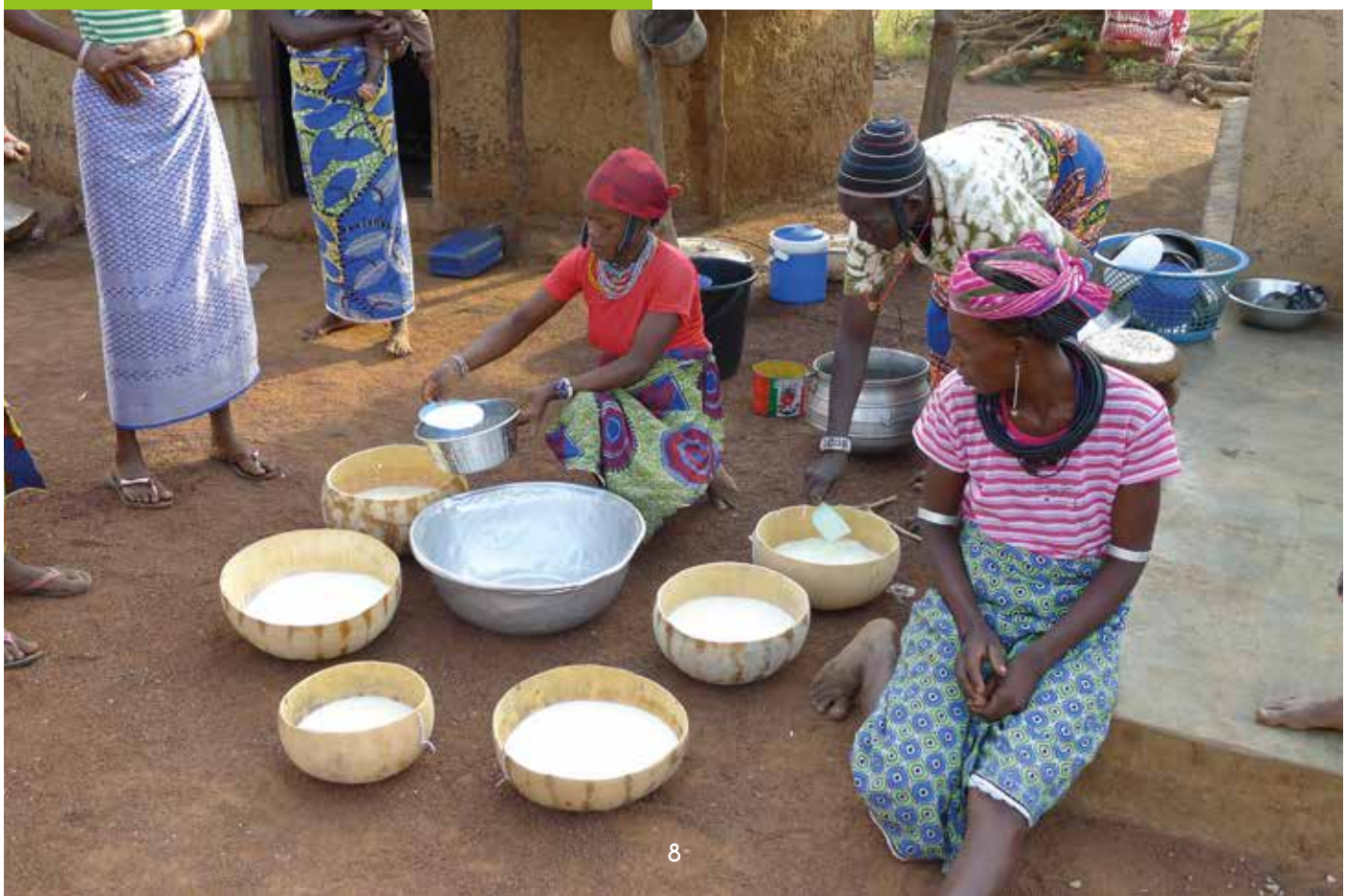
Coordinated by CIRAD, the project is financed by the European Union as part of the DeSIRA programme.

The Health & Territories project (Benin, Cambodia, Laos, Senegal) takes an evolving approach based on the co-identification of issues and the co-design of solutions. This support process will enable the development of tools for consultation and local coordination, and will be implemented within living labs. A living lab is a methodology in which citizens, inhabitants and users are considered as key actors in research and innovation processes. The actors will work together to develop and test consultation frameworks and activities to stimulate the agroecological transition specific to their territory, in connection with the health issues that have been identified there.

Coordinated by CIRAD, the project is financed by Agence Française de Développement and the European Union.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/health-territories-project

Milk delivery in a Fula camp in northern Benin
© G. Duteurtre, CIRAD



PILLAR 4

Communication, marketing and advocacy

Encouraging the application of research findings

Communication within research programmes aims to ensure the knowledge from research is systematised and shared as widely as possible. It can articulate different actions: the formalisation, systematisation and sharing of experience, especially through information and capitalisation systems, public communication, inclusive training and activities for political, economic and institutional actors. It focuses on the collective development of messages and arguments aimed at policymakers and networks of actors (policy briefs, national or regional workshops, sharing of results, etc.).

CIRAD uses its tools for communication, sharing and exchange to support the GGW projects according to their particular topics.

Supporting advocacy and decision-making

Research must help to provide scientific insights for the GGW actors on the different issues in the territories concerned and on the solutions required. Through the production, dissemination and use of scientific knowledge by different target groups, it constitutes a decision-making tool for the public authorities and civil society actors in the countries affected by desertification. By providing tangible information and contributing to awareness raising among policymakers and society, it is a key element of advocacy initiatives.

Developing early warning systems

Access to meteorological information is strategic for agropastoralists, whose economic activity is strongly dependent on rainfall patterns. Early forecasting models for the rainy season have considerably improved over the last 10 years. CIRAD is contributing to the development of early information and warning systems based on weather forecasts. The dissemination of digital technologies is enabling more rapid circulation of information and stimulating practice changes to cope better with weather hazards. Civil society and states are developing digital tools for agricultural sector stakeholders, to build their resilience to climate change.

Project spotlight

Strengthening communication and advocacy

The BoosT-AE project is a collaborative platform that brings together different actors, enables them to share knowledge and solutions, and provides methodological support for an agroecology adapted to tropical regions and countries in the South. It gives access to initiatives, data and useful knowledge for the different actors on the ground who are contributing to this transition with local agroecological approaches. BoosT-AE has a dual objective: serving as a basis for scientific activities and the capitalisation of research conducted by CIRAD on the agroecological transition, by facilitating contacts between researchers working on these issues in different contexts; and serving as a basis for communication and experience sharing on the many dimensions of the agroecological transition, by providing a portal for the exchange of expertise within the community of partners associated with the platform.

The project is coordinated by CIRAD and financed by CIRAD and INRAE. Still under construction, it will be financed and led with partners.

https://boost.cirad.fr/en/1/home.html

The Dynamic for an agroecological transition in Senegal (DyTAES), which CIRAD helped to found, has since May 2019 brought together the key stakeholders in agroecology in Senegal (producers, community organisations, NGOs, local authorities, researchers and private companies). Building on the research and field experience of its members, this movement aims to support the Senegalese state in the development of agroecological policies and to make the country a model in this field. CIRAD and DyTAES have produced a photo exhibition that tells the story of the people who work daily to lay the foundations for an agroecological transition in sub-Saharan Africa.

https://dytaes.sn/

Pathways to African agroecology exhibition (in French only)
https://storymaps.arcgis.com/stories/3bba510c317a41b-cae8a7513274d8ba2

The Digital divide project (Benin, Ivory Coast, Senegal) looks at new uses of digital technology in the agricultural sector, ranging from endogenous information systems (WhatsApp groups) to new digital services that facilitate access to markets (e-banking). The aim of the project is to quantify these uses in three agricultural sectors (including pastoralism in Senegal) and to identify people who are potentially weakened by this digital development for reasons of cost, skill, willingness or interest. The goal is to determine how to reduce the digital divide in the agricultural sector in order to foster more inclusive development.

The project is coordinated by CIRAD and financed by the French Ministry for Europe and Foreign Affairs.

PILLAR 5

Building technical and scientific capacities, based on training, professional development and support for research

Contributing to capacity building and strengthening institutions involved in research, innovation support and agricultural training

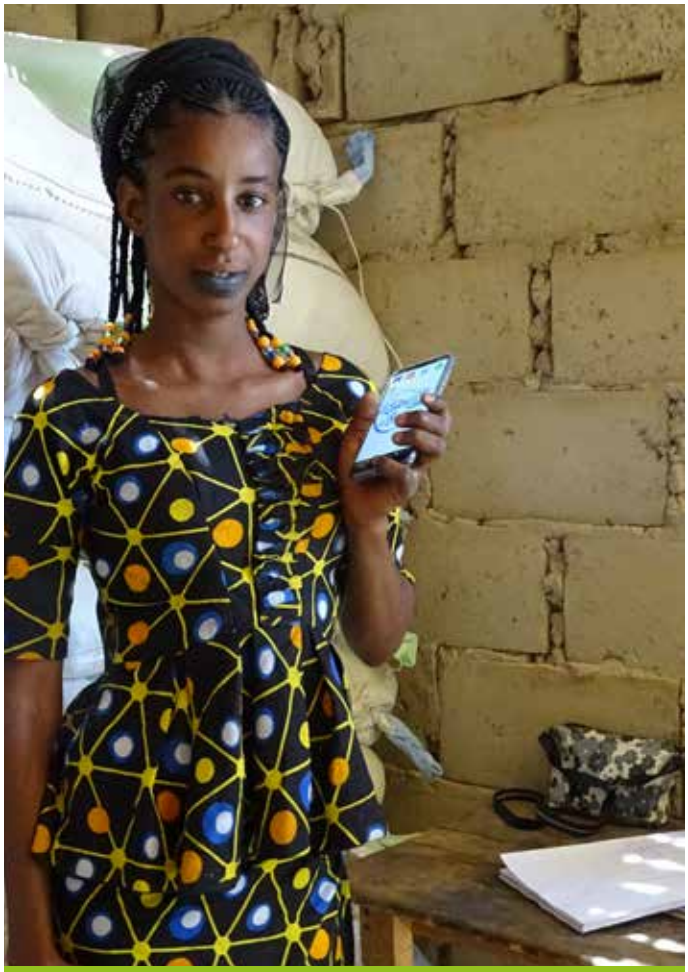
To meet the challenges of the GGW, the role of research and training appears essential. This involves capacity building for scientific institutions, professional organisations, non-governmental organisations and other actors involved in agricultural development. CIRAD's activities contribute to developing and modernising professional training, using research findings to create jobs in rural areas and to make them more attractive.

Building scientific capacities by creating networks of research actors

The GGW countries have many issues in common. Creating linkages between research centres and infrastructures fosters knowledge sharing, helps to build capacities on shared problems and facilitates the identification of solutions to the issues identified.

Working to improve conceptual approaches

Territorial approaches, integrated and inclusive processes: these are some of the approaches adopted in the framework of the GGW. These approaches are not standardised, and therefore need to test inclusive frameworks that articulate the different research areas presented with a view to sustainable development, including public-private-civil society partnerships with impact requirements.



The manager of the animal feed shop in Belel Massosse with the feed application and the receipt terminal. JDC, 2021

Project spotlight

Research for capacity building

The ACOTAF project (Benin, Burkina Faso, Ivory Coast, Guinea, Niger) is aimed at improving the performance and impacts of integrated agricultural advisory systems for family farmers in sub-Saharan Africa, with a view to obtaining the changes desired by farmers and decision-makers. Specifically, the goal is to improve knowledge management and to build capacity among advisory stakeholders for a renewal of advisory services to foster the agroecological transition in this region.

Coordinated by CIRAD, the project is financed by the French Ministry for Europe and Foreign Affairs.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/acotaf-project

The platform in partnership for research and training (dP) Pastoralism and drylands pole (PPZS) seeks to promote scientific partnerships and the development of territories and societies through research and knowledge transfer on the functions, functioning and functionalities of pastoralism. This knowledge is particularly useful for pastoral and agropastoral policies and communities at different levels. The PPZS collates the multidisciplinary expertise of national and international institutions on the major questions concerning the impacts of livestock production: carbon sequestration and its real weight in methane emissions; the economic role of livestock production in the Sahel and the coastal countries; and the contribution of pastoralism to the sustainable development of territories.

The dP PPZS is coordinated by the Institut Sénégalais de Recherche Agricole (ISRA).

https://www.ppzs.org/en

Contacts and references

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Resources

Ouagadougou Declaration
https://www.cirad.fr/Media/page-edito/documents/declaration-de-ouagadougou

News sheet 2022 of the French Scientific Committee on Desertification (CSFD) on GGW
http://www.csf-desertification.org/actualites/item/2030-pour-que-the-great-green-wall-in-the-sahel-is-a-full-success

Other organizations

Great Green Wall Accelerator
https://www.greatgreenwall.org/great-green-wall-accelerator

Pan African Agency of the Great Green Wall
https://www.grandemurailleverte.org/

Centre National de Recherche Agronomique, Ivory Coast (CNRA)
https://cnra.ci/

Centre National de Recherche Agronomique et de Développement Agricole, Mauritania (CNRADA)
https://www.cnrada.org/

Centre National pour la Recherche Scientifique et Technique, Morocco(CNRST)
https://www.cnrst.ma/index.php/fr/

Permanent Inter-State Committee for Drought Control in thethe Sahel (CILSS)
http://portails.cilss.bf/

West and Central African Council for Agricultural Research and Development (CORAF/WECARD)
http://www.coraf.org

United Nations Convention to Combat Desertification (UNCCD)
https://www.unccd.int/

Institut d'Économie Rurale, Mali (IER)
http://www.ier.ml/

Institut de l'Environnement et de Recherches Agricoles, Burkina Faso (INERA)
http://www.cnrst.bf/index.php/inera/

CIRAD is the French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions.

It works with its partners to build knowledge and solutions for resilient farming systems in a more sustainable, inclusive world. It mobilizes science, innovation and training in order to achieve the Sustainable Development Goals. Its expertise supports the entire range of stakeholders, from producers to public policymakers, to foster biodiversity protection, agroecological transitions, food system sustainability, health (of plants, animals and ecosystems), sustainable development of rural territories, and their resilience to climate change. CIRAD works in some fifty countries on every continent, thanks to the expertise of its 1650 staff members, including 1140 scientists, backed by a global network of some 200 partners. It also supports French scientific diplomacy operations.

CIRAD is a public establishment (EPIC) under the joint authority of the Ministry of Higher Education, Research and Innovation and the Ministry for Europe and Foreign Affairs.

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