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CIRAD is committed to the future of tropical forests

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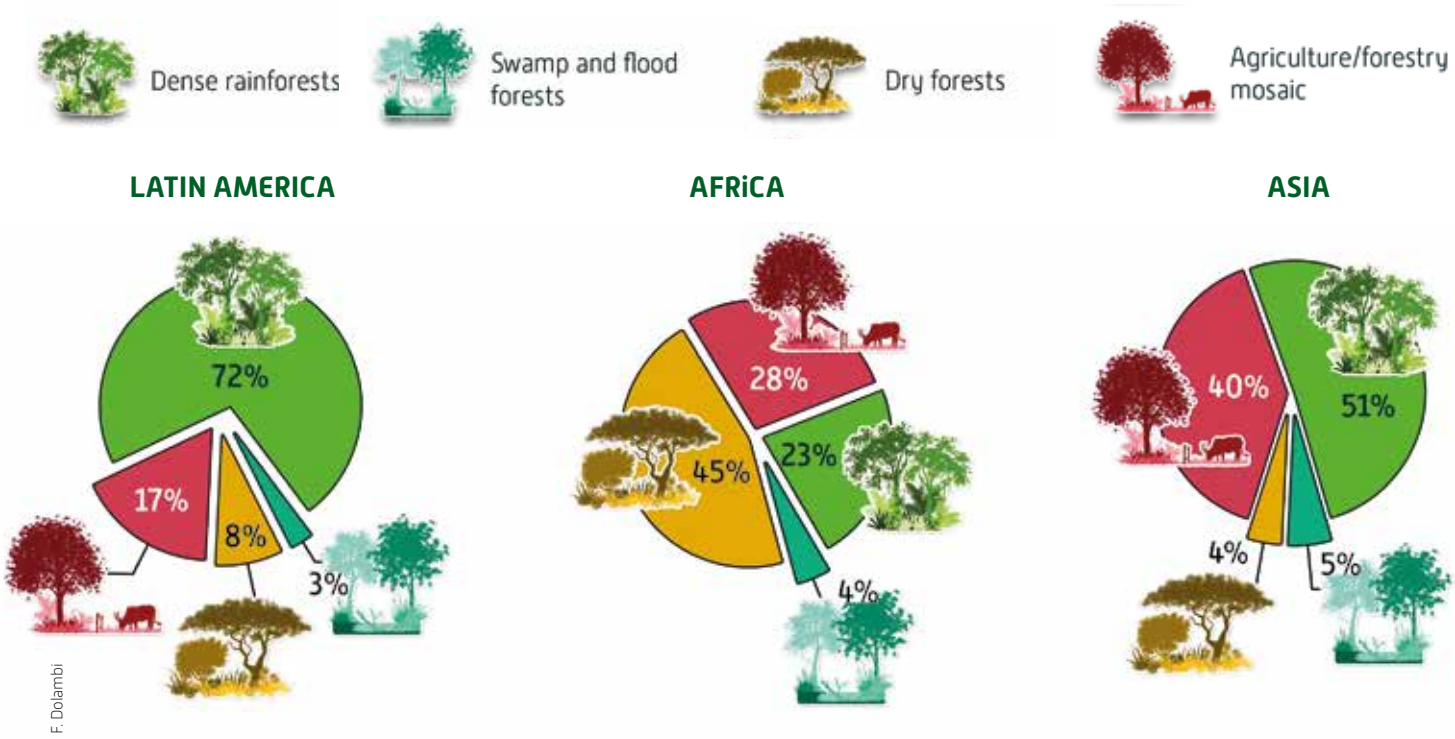
Tropical forests play a decisive role in global change mitigation and adaptation processes. However, their social, economic and ecological functions are under serious threat. Policymakers and managers face numerous challenges concerning the evolution of forest functions, their uses and the services they provide. They also have to address the growing risks to these forests. Meeting these challenges requires a shift away from profit-driven approaches in favour of territorial planning and resource management policies that benefit both local populations and the common good.

CIRAD and its partners consider that the conservation of tropical forests depends on recognition of their value by the users concerned, from the local to the global level. To achieve this, they reiterate the need for ambitious, interdisciplinary, participatory and transformative forestry research. This research must focus on action and the implementation of long-term innovative solutions, fostering the conservation of tropical forest systems to benefit rural populations and society in general.

Different types of tropical forests



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Tropical forests in a nutshell

Forests cover about 4 billion hectares, or one third of the Earth's land area, and are home to 80% of the Earth's biodiversity.

Tropical forests represent half of the world's total forest area.

As a unique reservoir of biodiversity, tropical forests alone are home to half of the world's terrestrial plant and animal species.

Tropical forests concentrate more than a quarter of the terrestrial carbon stock and 60% of the forest carbon stock. They therefore also play a key role in climate change mitigation.

Tropical forests are under threat

Tropical forests are seriously affected by deforestation and forest degradation caused by human activities, in a context of climate change and biodiversity loss. Although they contribute to carbon sequestration and the preservation of biodiversity, these forests are also affected by rapid changes in temperatures and in rainfall patterns, which can radically alter their plant and animal communities. Halting deforestation and forest degradation means taking account of the issues specific to forest ecosystems:

- First, the conversion of tropical forests to agricultural land, pastures and industrial plantations calls for an agricultural transition that is capable of proposing alternative farming systems that can be maintained within already deforested areas or extended to degraded lands.
- Logging raises the question of the sustainable management of forest areas as well as that of their protection as public goods.
- Demographic and socio-economic dynamics mean that subsistence activities (farming, fuelwood, etc.) are one of the main causes of deforestation in many areas, making forest uses a crucial issue.
- Following on from this, and echoing international issues, the question of food and the sustainability of food systems is a key issue for populations in forest regions.
- Social questions are raised, such as the recognition of the rights of indigenous peoples, as well as equality and equity between populations and between countries themselves.
- Finally, health (in the sense of "One Health") must be taken into account, given the key role forest ecosystems play in disease prevention and the fight against the emergence of new diseases.

In this context, CIRAD and its partners consider that there is an urgent need to safeguard existing tropical forests. Given their key role in ongoing transitions (climate, energy, agriculture, etc.), it is essential to plan their management so as to reduce pressure on these environments while enabling local populations to live in them and ensuring the sustainable management of their resources. The issue of governance and the role of the public authorities in arbitrating and controlling forest uses is therefore of paramount importance.

Specific development issues in tropical forests

Most tropical forests are used in multiple ways, making them resources with high economic and social value that are central to issues surrounding the preservation of global public goods. In addition to being biodiversity hotspots and huge carbon sinks, they make up half of the world's total forest area. Long-term natural processes and activities to meet immediate needs coexist within these forests. The issue of their valorisation and development to benefit local populations is therefore crucial and complex. Faced with finite territories, it is essential to plan inclusive management that ensures the coexistence of populations, activities and uses.

Taking account of the diversity of situations

Far from being a homogenous environment, tropical forests are plural and complex. The many uses made of them result in different types of socio-ecosystems, with varying levels of human impact, which provide diverse goods and services that must be taken into consideration. Similarly, these different socio-ecosystems evolve on timescales that vary according to these uses and cannot be monitored in the same way. These spatial and temporal changes therefore need to be taken into account in order to build lasting solutions.

A contextualised, multi-scale approach to planning forest management

The management of forest territories implies taking account of the characteristics of each context and understanding the specific articulation between the different issues and stakeholders. In addition to this necessary contextualisation, every forest ecosystem is analysed on several scales, ranging from the tree to the territory, each of which has different specificities and purposes. This is why a contextual, multi-scale analysis must be conducted for each forest territory to identify its functions, and to organise its governance, between states, territories and communities, and between public and private actors.

Fostering a territorial approach for sustainable forest management

The universal nature of issues linked to forest environments means that notions of public goods and sustainability must be taken into consideration. To do so, it is essential when planning forest management to include the different elements of the territorial approach: the management of common goods (land, water, trees, landscapes, territories, sectors) and the organisation of actors and governance systems (food, economic and legal systems, etc.), while taking account of the notion of private goods (household income, wellbeing, employment, economic activities, etc.).

Towards participatory governance

Tropical forests are simultaneously biological systems, ecosystems and sociotechnical systems in which physiological and ecological processes, economic approaches and social dynamics all coexist. The observed degradation of these systems and the growing threats to them reveal a lack of governance and an inability to articulate these different dynamics and systems. Faced with the challenges posed by the preservation of global public goods (climate, biodiversity, health), in which tropical forests play a crucial role, the emergence of territorial governance and commons management systems is essential. In the light of global norms, the different states, the communities concerned, the private sector and a set of territorial actors must contribute to implementing these new forms of governance, in a committed, intersectoral manner. This approach, based on common goods that are governed and territorialised, has been explored and implemented for many years in other fields (the preservation and sharing of water resources, for example, with the emergence of basin agencies, management plans, local users' organisations, negotiating forums, etc.). Planning should be conducted by forest sub-basin, logging zone, catchment and usage area, etc.

The crucial importance of forest research and training to address the risks

Halting deforestation and forest degradation requires improved knowledge of tropical ecosystems in order to better understand their response capacities. Several research questions therefore need to be further explored:

- **Tropical forests as physiological and ecological systems** (trees, species, communities, populations, reactions to change, risks, etc.);
- **tropical forests as sociotechnical and economic systems** (uses, goods and services, income, food, energy, inclusion or exclusion regimes, value produced by the different uses and products, etc.);
- **tropical forests as governed socio-ecosystems** (coexistence of visions, decision-making processes, norms and regulations, public action instruments at the global and state levels, negotiation and decision-making spheres and forums, relations and level of power between forestry-agriculture-environment sectors, and between forestry sector actors, means of action by the private sector, etc.).

Ensuring this research continues in the long-term is a permanent challenge, and even more so because forest ecosystems are long-lived. In this context, the material planning of research is difficult, especially when crises lead donors to adapt their priorities to the detriment of continuity. Teams or consortiums with long time horizons have a decisive advantage in conducting innovative research on the evolution of forest ecosystems. Forestry research is therefore a science of sustainability that is guaranteed by involving as many people as possible. It can only be participatory, which facilitates the acquisition of data, and needs to be built on long spatio-temporal scales, going beyond research groups. This is the advantage of systems like the platforms in partnership for research and training (dPs) set up by CIRAD and its partners, which enable data and knowledge sharing.

https://www.cirad.fr/en/worldwide/platforms-in-partnership

https://ur-forets-societes.cirad.fr/en/dans-le-monde/dispositifs-en-partenariat

Moreover, knowledge must be disseminated by academic teaching, but also towards management, to ensure that users take into account recent advances in research to underpin their decisions. This is all the more important when forest ecosystems are subject to significant and rapid human impacts. Transferring knowledge within academic structures and through professional training enables the development of operational expertise for the sustainable and multifunctional management of forest areas.

Our research areas

Research is being mobilized to address the challenges facing tropical forests. The goal is to explore the many different research topics and to ensure long-term planning, while involving as many people as possible, in order to guarantee a continuum between preservation, exploitation and valorisation, and to ensure the sustainability of tropical forests. To do so, CIRAD and its partners organise their work in the framework of projects, within research units. These projects inform discussions on seven key issues identified by the organisation. A set of complementary disciplines is thus mobilised by CIRAD and its partners, in particular in the context of the platforms in partnership for research and training in Africa, Asia and Latin America.

The contribution of forests to greenhouse gas mitigation

Forests are part of the solution to the greenhouse effect and contribute to mitigation when, during their growth, they capture carbon. Much is therefore expected of trees, in particular in the reforestation plans aimed at carbon sequestration, and in payments for avoided deforestation and offset mechanisms. However, the capacity of forests and plantations to mitigate the effects of climate change remains very limited and does not override the critical need to reduce our CO_2 emissions. Trees and forest formations are far more than just carbon sinks. They play various roles that are just as essential as that of carbon storage, including the preservation of biodiversity, the protection of soils and watercourses, and the regulation of rainfall. Research therefore focuses on several areas, including:

- **Analysing carbon cycle monitoring** through the estimation of stocks (aboveground parts, roots, soils) and natural or anthropogenic change dynamics (natural carbon capture/emission). This analysis is conducted in different environments (in natural forests in logging areas, in agroforestry systems and in planted forests), building on large-scale data acquisition (remote sensing) and modelling techniques.
- **Fostering forest restoration plans** aimed at carbon sequestration by producing and analysing carbon balances for restoration projects and assessing the impacts of these projects. This must include forest models (choice of genetic resources and species, productivity), the certification of balances including previous uses, socio-economic integration (land tenure, product valorisation, etc.), biodiversity balances and the sustainability of plantations.
- **Developing payments** for avoided deforestation and offset mechanisms, by analysing carbon markets, financial instruments, their governance and the effectiveness of monitoring and certification instruments and methods (REDD+, etc.).

Terri4sol project: Soil restoration and multifunctionality of degraded forest landscapes in Ivory Coast

© R. Belmin, CIRAD

The FAO estimates that if nothing is done to stop the desertification process, Africa will lose two-thirds of its arable land by 2030

The main objective of the Terri4sol project is to help preserve and restore organic carbon stocks by taking into account the multifunctionality of territories, combining agricultural, forest and post-forest dimensions and the implementation of a national "4p1000" initiative / Initiative for the adaptation of "Triple A" agriculture in Ivory Coast.

https://www.cirad.fr/en/worldwide/cirad-worldwide/projects/terri4sol-project

Forest adaptation to climate change

Forest ecosystems are impacted by accelerated changes in temperatures and rainfall patterns. Not all forests are naturally capable of adapting. Signals of tipping points are identified, including on large scales, such as that of the Amazon. Several aspects require further research:

- **Understanding the impacts of climate change** on forests, especially on individuals, genetic resources, species, forest stands and territories, taking account of joint climate factors and associated risks (storms, droughts, fires, pests, etc.), as well as of human forestry activities. This includes monitoring the dynamics of managed natural forests, the data from which helps to define more sustainable logging and forestry rules. This also includes the analysis of interactions between species and with their environment, especially soils as one of the components of resilience. Analyses are also conducted on the dynamics of carbon emissions during deforestation and forest

degradation, through the implementation of spatial and aerial imagery tools, or *in situ* measuring devices.

- **Building adaptive capacity and resilience,** and identifying tipping point signals, requires the analysis of physiological reactions of individuals, genetic resources and species (structural-functional approaches), acclimatisation, medium to long-term genetic adaptation, but also the ecological response of stands and territories (the maintenance of stands with different species) and measurements of vulnerability.
- **Developing adaptation strategies** for forestry practices. This implies identifying new forestry and natural forest planning methods, and thinking about the choice of species in forest restoration programmes, including new criteria such as resistance to fire and drought. These strategies also require genetic improvement of trees for better resilience. Finally, it is essential to implement warning systems and to promote approaches that include mitigation and guarantee synergies between adaptation measures, sustainable resource management, biodiversity preservation and improved livelihoods for local populations.

ALT project – Amazonian Landscapes in Transition (French Guiana)

© B. Lacombe

Paracou forestry system, French Guiana

The goal of the ALT project is to improve the parameters of vegetation models for the tropical forests of French Guiana in order to build knowledge about forest regeneration potential and the dynamics of the canopy, by combining inventory and remote sensing observations. The key question is whether these forests will be resilient to climate disturbances.

Description of the project

MataDIV (Brazil)

© J. Guillemot, CIRAD

Plantation of *Handroanthus impetiginosus* in southern Brazil

MataDIV is a study on the impact of a reduction in rainfall on plantations of local species. It is a tree diversity experiment that aims to improve our understanding of the functioning of restored forests in the highly diverse tropical Atlantic forest biome (Mata Atlântica) under climate change, and to provide scientific bases for the design of forest restoration guidelines.

https://treedivnet.ugent.be/ExpMataDIV.html

Halting deforestation and forest degradation

Although deforestation is regularly measured by satellite observations, improving the accuracy of measurements of forest degradation that cannot be seen from space remains a challenge. Degraded and deforested areas continue to expand, showing that the causes of deforestation, despite being determined and quantified, remain very active. They are largely conditioned by the public policies of states, whether voluntary or passive (through a *"laisser-faire"* approach), in their dialogue with local communities on the one hand, and with industrial companies on the other, all of which are primarily seeking new agricultural land. To address this, research is exploring a number of topics:

- **Improving measurements of deforestation** and degradation using instruments to monitor and measure dynamics, adapting the cost and accuracy of measurements to each type of issue. The goal is also to build capacities in terms of measurement, data processing and analysis, data storage and sharing, as well as decision support in the countries concerned.
- **Increasing the involvement of local populations** to take better account of their needs, and analysing the socio-economic motivations for deforestation at the local and national levels.
- **Supporting public actors** through the construction of deforestation scenarios for decision support and the implementation of REDD+ type projects, the monitoring of national and international regulations, norms, standards and voluntary provisions, support for public policies and the development of economic instruments (taxation, subsidies, monitoring and control, etc.), or the monitoring of land status and tenure.

TerrAmaz project
(Brazil, Colombia, Ecuador, Peru)

© R. Poccard-Chapuis, CIRAD

Paragominas, in Brazil, is one of the TerrAmaz project's five pilot sites

The TerrAmaz project supports Amazon territories in the implementation of policies to combat deforestation. The goal is to encourage the transition to a development model that articulates social development, low-carbon economic development and biodiversity conservation.

https://www.terramaz.org/

Forest landscape restoration

To guarantee effective long-term forest restoration and conservation, these forests need to be in positive interaction with agriculture. Sectoral approaches have shown their limitations, and protecting forest areas implies addressing agricultural activities in order to propose alternatives to slash-and-burn and intensive agriculture, and to integrate trees and biodiversity into cultivated areas. Logging intensity is currently far too high with not enough time between harvesting. There is therefore a need to adopt a new logging paradigm and to envisage economic substitutes for logging, in particular with plantations and agroforestry, or the management of secondary forests and natural regeneration, to avoid relying on natural forests only for timber. It is possible to plan restoration with a view to producing timber. In this approach, the notion of pilot territories facilitates the promotion of territory restoration within administrative and regulatory systems. Here, research focuses on several aspects:

- **Improving the economic and ecological performances** of plantations dedicated to forest restoration. This implies work on the choice of genetic resources, the diversity of species and their association, as well as real efforts with regard to assessment as proof of concept.
- **Planning and optimising restoration processes** through the development of specific tools and the implementation of participatory approaches involving beneficiaries in land use change and management.
- **Increasing national capacity** for tree planting through genetic improvement, the quality and quantity of seed, the establishment of forestry protocols, and ecological and economic modelling.
- **Involving territorial actors:** working together to define the pathways desired by these actors. The social aspect is decisive in restoration: before planting, it is essential to determine why to plant and for whom.

RELIQUES project (New Caledonia)

© AMAP, CIRAD

Fragmentation is the splitting up of a continuous forest area into smaller patches of forest that are adjacent but separated by ecological barriers such as human activities

The RELIQUES project is an example of forest restoration planning in the Parc de la Côte Oubliée (New Caledonia). It has two objectives: first, measuring how the fragmentation of forests on ultramafic soils affects biodiversity loss in New Caledonia and, second, proposing a management plan for forests on ultramafic soils with a view to combating fragmentation and thereby guaranteeing optimal dynamics for forest recovery.

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

Biodiversity preservation

Biodiversity loss in tropical forests affects every level of life. It includes species losses (or even extinctions) and reductions in the number of individuals in remaining species, even the most resilient. These losses have a direct impact on the functioning and resilience capacities of forests. They also affect fundamental values such as the existence value of species that disappear from the planet, but also the expectation or usage value of little-known species that die out. This concerns, for example, molecules for pharmaceutical use. Finally, according to the "One Health" principle, these losses directly impact the global health of individuals and their environment. Research currently focuses on several areas:

- **Improving knowledge of forest biodiversity** and its functioning faced with natural and anthropogenic drivers, on all scales, through the analysis of change dynamics, but also through integration in national and international networks to foster knowledge sharing.
- **Strengthening the monitoring of biodiversity** through the development of participatory approaches and the creation of regional reference databases.
- **Assigning value to biodiversity** as a key factor in its conservation, proposing appropriate logging methods that have an impact at national and/or local levels, such as selective industrial or community logging, or sustainable community management of hunted animals.

- **Enabling sustainable management** by working to define sustainability criteria and indicators in regulations, norms and standards, or by developing financial mechanisms for maintenance, protection and compensation.
- **Fostering the preservation-biodiversity-health continuum** by studying interactions between the ecology of health vectors and the spatio-temporal structure of forests. Mathematical and digital models are also being developed to study these interactions and to propose solutions to mitigate the risk of emergence and/or spread of vector-borne diseases.

SWM programme (Gabon, Zambia, Zimbabwe)

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The Sustainable Wildlife Management Programme (SWM), implemented at eight sites in Africa, the Caribbean and the Pacific, aims to protect wildlife and to ensure food security for local people. CIRAD operates in three countries: Gabon, Zambia and Zimbabwe. More specifically, the goal is to limit hunting of wild species to sustainable levels, to maintain the key ecological roles of wild species in forest and savanna ecosystems and to guarantee stocks and flows of ecosystem services (in other words food) that are essential to the world's poorest people.

https://www.swm-programme.info/

AFRICAM project (Cameroon, Guinea, Madagascar, Senegal and Cambodia)

© AdobeStock/Courage

The goal of PREZODE is to improve monitoring and early warning systems throughout the world in order to prevent pandemics

The AFRICAM project, launched in February 2023, aims to reduce the risk of emergence of zoonotic pathogens with epidemic potential in four African countries (Cameroon, Guinea, Madagascar and Senegal) and in Cambodia. The first project implemented as part of the international PREZODE initiative, it is coordinated by CIRAD and conducted with several partners, for a period of three years.

https://www.cirad.fr/en/cirad-news/news/2021/prezode-co-development-for-epidemics-prevention

dP F&B

Forests and biodiversity in Madagascar

© Myriam Merch

How can biodiversity conservation and improving living conditions for local people be reconciled? The biodiversity of the primary forest in Madagascar is a global treasure that must be preserved. However, this cannot be done at the expense of the people whose livelihoods depend on its many uses. The platform is working to address a dual challenge - preserving the forest and alleviating poverty - by involving local communities in the conservation and sustainable use of natural resources and the ecosystems in which they are found. To this end, its research is both multidisciplinary and conducted on various scales.

Long-term valorisation of forest goods and services

Forests provide many different goods and services. The increase in populations and their needs raises the question of the compatibility of harvesting with the capacity for regeneration, whether natural or artificial (plantations, farms). This harvesting also implies consideration of management principles, whether legal or traditional, in order to preserve the rights and duties of beneficiaries, with a view to equity. Research aims to:

- **Foster sustainable logging practices** with long-term monitoring (several decades) of forest plots, in order to analyse the impacts of these practices. The goal is also to model forest dynamics and therefore the recovery of carbon and timber stocks according to variables such as logging intensity and cycle length.
- **Improve sector sustainability** through support and training for operators along the value chains in industrial, artisanal, formal and informal sectors (industrial or artisanal timber, non-wood products). This improvement must follow the principles of the circular economy, and be accompanied by decision support for the sustainability of private investments, or support for innovation in order to improve the social, economic and environmental impacts of supply chains. Research is also underway to increase the reliability of international standards such as the FSC forest management label.

- **Meet the needs of local populations** through support for the management of food resources such as hunted animals, support for local producers in the development of ecologically intensive agricultural models (agroforestry systems, agroecology, etc.), or support for technological processes for biomass valorisation and conversion to energy.
- **Anticipate conflicts of use** through the implementation of territorial and multi-sector approaches, or the development of decision support tools for sustainable protocols on resource harvesting (natural, assisted or artificial regeneration).
- **Support each sector identified** through international provisions such as imported deforestation: land-use dynamics, regulatory mechanisms, monitoring and control, traceability.

BIOSTAR project

(Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal)

© J. Blin, CIRAD

Mango waste

The BIOSTAR project aims to install equipment to produce bioenergy, either on agrifood SMEs' premises or nearby, in order to recycle their organic waste and reduce pressure on resources. Five value chains have been identified: cashew nut, groundnut, shea nut, mango and rice.

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

TmFO network

CIRAD has coordinated the TmFO (Tropical managed Forests Observatory) network since 2013. This pantropical network includes more than 30 experimental sites across three continents and more than 650 permanent monitoring plots. This long-term monitoring makes it possible to assess the impact of practices and the study of forest dynamics in order to foster more sustainable practices.

https://www.tmfo.org/

DYNAFAC collective (Cameroon, Gabon, Central African Republic, Republic of the Congo, Democratic Republic of the Congo)

D. Louppe © CIRAD

The DYNAFAC collective is a set of structures involved in monitoring forest dynamics, based on a network of sites and permanent plots set up in the forests of Central Africa. Its goal is to implement activities that will ultimately improve development plans and ensure better management of production forests in Central Africa.

https://www.dynafac.org/en

dP Amazonie

Forests, agriculture and territories in the Amazon

© N. Cialdella, CIRAD

Égrappage de l'acai en forêt

How can we reconcile environmental protection and support for rural populations in this region, which plays a decisive ecological role on a global scale and has huge agricultural potential? The Amazon is not just a forest; it is also an area in which people live and a source of jobs and income for millions of people, with implications for global agrifood and energy supply chains. Promoting sustainable forms of development goes beyond mere repression as regards deforestation. The aim is to work with local stakeholders to develop alternative environmentally-friendly production systems and to rally each and every stakeholder in the area around this objective. An agrarian shift of this kind requires quality scientific outputs to which operators can relate, as well as training.

Support for public authorities and for the implementation of international agreements

Tropical forests crystallise the expectations of numerous actors and countries throughout the world. The issue of forests is therefore becoming increasingly prominent in international agendas and corporate strategies, in particular through "carbon offsetting". Unfortunately, these agendas cannot rely on public incentive policies mobilising a broader range of economic instruments alone (taxation, subsidies, credits, offsets, payments for services, etc.). These instruments are often too sectoral (climate, biodiversity, food, employment, etc.), and linkages and synergies are needed between their methodologies and purposes. Above all, public policies need to address inequalities and land tenure insecurity, and ensure better remuneration for farmers. To do so, investment is needed in the transformation of agri-food systems, education, land reforms and the consolidation of institutions guaranteeing the rule of law. Similarly, consumption patterns in industrialised and emerging countries need to rapidly evolve in order to reduce pressure on forest areas, which is translated in the EU regulation against imported deforestation. CIRAD and its partners are supporting the public authorities to this effect, in their local and national actions, and during their participation in the major global forums. The organisation thus aims to:

- **Strengthen global forest governance** through the analysis of policy interfaces and the development of recommendations contributing in particular to the construction of a shared agenda for food security, the fight against deforestation and the restoration of ecosystems.
- **Improve global financing** for biodiversity (offsets, credits, etc.) and climate change mitigation mechanisms through efforts to analyse existing mechanisms (REDD+, incentive policies, payments for environmental services, etc.).
- **Support the definition of appropriate legislatio**n (incentive, fiscal and agricultural policies, insurance systems, etc.) through the analysis of existing public policies and the establishment of a structured policy dialogue.
- **Build the capacities of public policymakers,** through professional and academic training.

dP R2FAC

Research Network on the Forests of Central Africa

© Doctrovée Bansimba

How can we improve polices and intervention strategies at different levels so as to ensure the long-term preservation of the Congo Basin forests, food security for local populations and improved livelihoods? The preservation of the Congo Basin forests and of the services they provide lies at the heart of many environmental, agro-economic, social, governance and territorial issues. The R2FAC platform in parnership for research and training is supporting efforts to improve forest management and forestry policy, to understand the effects of global change and to study and preserve biodiversity.

https://www.cirad.fr/en/worldwide/platforms-in-partnership/r2fac

dP PP-AL

Public policy and rural development in Latin America

© Demian Medina

The platform in partnership for research and training PP-AL studies public policies in order to examine their mechanisms and their effects in terms of change in rural areas and the reduction of inequalities. It brings together teachers and researchers from 45 institutions in 14 countries across Europe, Latin America and the Caribbean, as well as several academic partners in Canada and the United States. The research conducted by the PP-AL partners mobilises agronomists, anthropologists, economists, geographers, political scientists and sociologists in comparative, bilateral, trilateral or network projects.

https://www.cirad.fr/en/worldwide/platforms-in-partnership/pp-al

References

Living with tropical forests: a book to rethink human relationships with forests

"Living with Tropical Forests" is the result of 75 years of forestry research and was written by a group of more than 50 scientists from the CIRAD Forests and Societies research unit. Composed of portraits and testimonies of people who live with forests, this book, while addressing current controversies around conservation policies, is an invitation to travel. [in French only]

Vivre avec les forêts tropicales. P. Sist, C. Doumenge, V. Gond, J. Tassin, J.-F. Trébuchon (eds). Éd. Museo, 2021, 216 pp.

Tackling deforestation

Deforestation continues at a worrying pace worldwide, except in temperate and boreal countries. It is caused by the race for land, underpinned by population growth and rising global demand for "deforestation-prone" products. Moreover, with climate change, mega-fires are now posing unprecedented threats to forests.

Geopolitics of the World's Forests: Strategies for Tackling Deforestation. A. Karsenty, Études de l'Ifri, Ifri, June 2021, 54 pp.

Amazon Assessment Report 2021 - The Amazon We Want

With 1000 pages and 200 authors from the Science Panel for the Amazon, this recent report can be seen as a reference as regards deforestation in the Amazon. Its third part, to which CIRAD contributed, is specifically intended for local and international policy-makers. It sets out a series of steps to halt the destruction of the world's largest tropical forest while enabling local people to continue to make a living.
https://www.theamazonwewant.org/amazon-assessment-report-2021/

State of Central Africa's Forests: a new report to better manage the Congo Basin forests ecosystems

The State of Central Africa's Forests 2021 report was officially presented on 7 July in Libreville (Gabon), on the sidelines of the 19th meeting of the parties to the Congo Basin Forest Partnership, which is celebrating its 20th anniversary in 2022. Some twenty CIRAD scientists were involved in drafting it.

The State of Central Africa's Forests 2021. Eba'a Atyi R., Hiol F., Lescuyer G., Mayaux P., Defourny P., Bayol N., Saracco F., Pokem D., Sufo Kankeu R. et Nasi R., 2022. Bogor, Indonesia : CIFOR, 474 p.

DOI: 10.17528/cifor/008565

"Cut less and let it rest: a new management of tropical forests is needed" article by Plinio Sist published on *The Conversation* website on 2/09/21 [in French only]
https://theconversation.com/couper-moins-et-laisser-reposer-une-nouvelle-gestion-des-forets-tropicales-simpose-164637

Resilient secondary tropical forests?

Although deforestation is endemic in the tropics, forests have a strong capacity to regrow on abandoned land. These "secondary" forests could play an increasingly important role in biodiversity conservation, climate change mitigation and landscape restoration. This article published in the journal Science, to which CIRAD researchers contributed, analyses attribute recovery patterns in 77 secondary forest sites in America and West Africa.

« Multidimensional tropical forest recovery », Poorter *et al.*, *Science,* 9 Dec. 2021, Vol 374, Issue 6573, pp. 1370-1376
DOI: 10.1126/science.abh3629

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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 1700 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 and Research and the Ministry for Europe and Foreign Affairs.

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