Societies and biodiversity
Social sciences and humanities (SSH) studies were focused on the diversity of living organisms much before the word ‘biodiversity’ was coined. Biodiversity became a specific focus of research as an upshot of the discussions that took place during the preparation and analysis of the Convention on Biological Diversity. This convention explicitly recognizes that the diversity of human cultures is an integral part of biodiversity, and article 8j stresses the key role of “indigenous and local communities” in the management of natural diversity. However, SSH research on biodiversity is not solely restricted to this human and sociocultural constituent; it encompasses all relationships between biodiversity, societies, and development.

More recently, the societal importance of biodiversity was widely acknowledged via the Millennium Ecosystem Assessment (2001-2005) process, and by clarification of the ecosystem service concept, which serves as an integrating framework for analysing the social value of ecosystems and biodiversity. Some 20 supply, regulation and ‘socio-symbolic and cultural’ services have been characterized, thus providing an exhaustive categorization of relationships between social groups and ecosystems and biodiversity.

Complementary approaches are based on three levels of analysis:
- studies of ecosystem uses and biodiversity by communities interacting closely with environments, but also for communities that consider they are not dependent on these services
- unreserved identification of real, assumed or discursive values that these uses, and sometimes ‘nonuses’, have for communities
- analysis of public and private policies and strategies that quite effectively contribute to the conservation of natural diversity.

Multidisciplinary approaches are clearly suitable for dealing with these questions. In each conceptual framework, they can reveal specific meanings and analytical instruments that may be combined to highlight the relevance and ramifications. It should also be stressed that they offer promising potential for academic research and more targeted projects conducted in industrialized economic settings as well as in developing countries.

In developing countries, efficient management of species, ecosystems and ecological processes is often essential to achieve sustainable socioeconomic development. Part of the research conducted with partners in developing countries is focused on the many complex types of interaction between biodiversity and social practices with respect to nature. Revisiting ‘local know-how’ in a globalization setting, examining the establishment of ‘natural heritages’ in developing countries, gaining insight into relationships between the genetic diversity of crop plants and the functioning of social networks, assessing the challenges and feasibility of transferring ‘biodiversity product’ development instruments (e.g., geographical indications, ecolabels), reconciling ecological connectivity and socioterritorial connectivity with respect to protected areas, questioning the political origins of conflicts pertaining to biodiversity, and dealing with associated environmental justice issues—these are some of the areas in which our teams have provided innovative approaches and original knowledge.

Over the years, biodiversity has become a pivotal issue in international political relationships. Developing countries often request that industrialized countries assume their responsibilities in the biodiversity crisis, while questioning the sharing of benefits derived from the utilization of the biological wealth within their territories, or requesting compensation for services derived from conservation. Drawing up agreements on systems of ownership, protection and utilization of biodiversity elements is a major challenge. We have been very highly involved in these questions, with recognized studies on genetic resource markets, bioprospecting problems and questions associated with benefit sharing and access, and on the leading role played by NGOs in biodiversity governance.

The major challenge for research is to reconsider biodiversity evolution and management in the emergency socioenvironmental setting of the 21st century. The vulnerability of societies and territories in developing countries is closely correlated with the complex relationships between climate change, the hoarding of natural resources for food security or energy purposes, migratory flows, the rising poverty of direct biodiversity users, as well as the increasing marginalization of minority and indigenous communities.

Within the different teams and organizations that are investigating different society/biodiversity relationships, a broad range of research—in terms of disciplines and topics—is carried out in Montpellier. The studies presented hereafter roughly illustrate its varied, rich, promising and wide scope.

Jean-Michel Salles (UMR LAMETA) & Bernard Moizo (UR Dynamiques socio-environnementales et gouvernance des ressources)
Modelling and experimentally testing instruments of these policies, based on the understanding that biodiversity and ecosystems are associated mainly with private areas and that conservation issues are often of international scope.

Since the late 1990s, LAMETA researchers have been involved in several topics:
- Analysis of incentive instruments to promote biodiversity conservation on private land (taxes, transferable rights, etc.) or in developing countries (North-South transfers)
- Analysis of contracts to promote conservation, especially within the framework of agroenvironmental measures (including the question of their allocation via auction mechanisms)
- Assessment of biodiversity measures, especially those that combine economic aspects
- Economic assessment of services provided by ecosystems, landscapes, and farmers’ genetic resource management strategies.

LAMETA is the only French research unit that is collectively involved in research programmes on biodiversity economics. In Montpellier, it benefits from a network of interdisciplinary collaborations.

Economics of biodiversity and ecosystem services research is generally focused on two issues:
- Analysing reasons why biodiversity and ecosystem function contribute to social wellbeing. This involves upstream analysis of biodiversity measurement elements, while also highlighting links between biodiversity, ecosystem services and their social usefulness in order to identify economic incentives for implementing comprehensive conservation policies.
- Modelling and experimentally testing instruments of these policies, based on the understanding that biodiversity and ecosystems are associated mainly with private areas and that conservation issues are often of international scope.

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Its members are called upon for collective expertise assessments, such as one for INRA on agriculture-biodiversity relationships and a report of the French Centre d’Analyse...
What is the social value of pollinating insects?

As part of the Assessing LArge-scale Risks for biodiversity with tested Methods (ALARM) programme, researchers from LAMETA and the Pollinisation & Écologie des Abeilles laboratory (INRA Avignon) assessed the importance of pollination by insects, especially bees (Apis mellifera), with respect to world agricultural production. The study focused on the 100 most important food crops for the human diet, 46 of which depend on insects (excluding cereal and tuber crops). Based on a dependency ratio, potential threatened crop production loss was estimated at €153 billion, or around 10% of world agricultural production in 2005. The crop categories most affected are stimulants (coffee, cocoa), fruits and vegetables. This question was raised by the global debate on the decline of pollinators and the aim is thus to determine the economic impact of this phenomenon.

In an initial analysis based on consumer awareness of price variations resulting from the disappearance of pollinating insects, the social wellbeing loss was estimated at €2–300 billion on the same bases. These figures seem high but only represent around 0.5% of the world gross product for that year, even though they are based on the assumption of an instantaneous total disappearance. Scenario-based simulations of European farmer vulnerability patterns revealed that Mediterranean farmers are theoretically more susceptible than northern European farmers. In a broader ranging analysis, it was found that the consequences of this decline would be partially offset by substitutions which would buffer the social wellbeing loss, but it is clearly essential to determine the reliability of these results.

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A bee on a cosmos flower.
Nature-society relationships and biodiversity governance

The research unit (UR) *Dynamiques socio-environnementales et gouvernance des ressources* (IRD) was created through the merger of four research units, with the aim of strengthening complementary links between social sciences and humanities (SSH), agronomy and ecology for dealing with novel environment and natural resource governance issues. The UR focuses research on assessing how societies in developing countries reorganize to deal with crises and conflicts that arise as a result of environmental problems and due to rising tension concerning resource access and uses. This research concerns different aspects (representations, know-how and practices, systems of resource use and management, social networks and governance strategies) and is conducted on different scales (from local to international), while focusing especially on multiscale linkages.

Five multidisciplinary teams undertake research on biodiversity issues, including social management of nature, agrarian and environmental dynamics, environmental policies, social management of water and land regulations. The research concerns:

- forests that are built, destroyed or rebuilt by humans: from local know-how to policies
- protected areas: negotiations, setups and practices concerning nature conservation
- genetic resources: crop diversity building, genetic resource markets
- local societies and biodiversity: local representations and knowledge on nature in a globalization and global change setting
- international governance and biodiversity markets
- biodiversity and global change, with beekeeping systems as observatories of change worldwide.

The teams work in two research fields:

**Nature/society relationships:** among the many types of interaction between biodiversity and human practices, research is focused on...
relationships between local know-how and biodiversity building (genetic diversity, product diversity, area and ecosystem diversity. Studies deal with the question of biodiversity management through conservation and efficient use.

**Biodiversity governance** (at local and international levels), from studies on setting up systems of biodiversity usage and protection systems and mechanisms to research on new social regulation conditions and consultation between different categories of stakeholders. In addition to economic assessments, this includes anything that concerns market creation and rights with respect to biodiversity elements (genes, plants, local know-how), and negotiation companion research.

The unit is renowned for conducting interdisciplinary research on scientific issues—’SSH–biological and ecological science’, and, on an international level (research, expertise), on water, land, forest and biodiversity governance (local to international). It trains and supervises many students on these multidisciplinary issues.

The UT conducts research in various areas in many developing countries and benefits from a large network of partners in France (CIRAD, UMR MOISA, CEFE, etc.) and abroad (International Institute for Environment and Development, University of Marrakech, Ethiopian Environmental Protection Authority, Institut Sénégalais de Recherches Agricoles, Universities of Fianarantsoa and Antananarivo, Madagascar, Higher Institute of Agriculture, Brazil, Centre for Research and Higher Studies in Social Anthropology, Mexico, Center for International Forestry Research, etc.).

**Tropical forest ecosystems and societies**

The research unit (UR) **Tropical Forest Goods and Ecosystem Services** (CIRAD) focuses studies on tropical forest ecosystems and societies that interact with these ecosystems. The unit’s researchers study the functioning and changes of these ecosystems in interaction. The overall aim is to assess and/or implement policies, rules and practices that: (i) will facilitate their adaptation to constraints and opportunities resulting from global change, and (ii) enhance the sustainability of services they provide societies, on local and global scales. Specific and functional biodiversity is a focus of special attention in this research unit, in the light of its role in the adaptation of studied systems in response to global change, and by the need to preserve it as a service provider. ***

Biodiversity conservation and protection: legal and regulatory aspects

![Sampling issues, Croatia, 2006.](image)

With respect to biodiversity preservation and/or plant protection, the collection, holding, importation and exportation of dead or live organisms are generally subject to special conditions.

The collection of animal or plant species could require prior authorization from the concerned property owner and the country of origin. A valid transport ticket could be required for the holding, circulation, importation and exportation of collected organisms. The conditions for studying these organisms are regulated by a set of international, European or French provisions.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora regulates the international trade of wild fauna and flora specimens. Regulated species are listed in the Convention Appendices. The Contracting Parties of each Member Country are responsible for issuing permits and certificates when the required conditions are fulfilled. The European Union (EU) has issued several regulations concerning the protection of these species (338/97/EC amended and 709/2010/EU).

Biodiversity conservation is the main aim of the Convention on Biological Diversity. Each country that is a signatory to the Convention is committed to preventing the introduction of, controlling or eradicating alien species which threaten ecosystems, habitats or species (art. 8h.). The EU has issued directives on the conservation of wild fauna and flora (Directives 79/409/EEC and 92/43/EEC), which form the cornerstone of the Natura 2000 network in France, which is primarily aimed at preserving biodiversity. There are published lists of protected species in France. Conditional waivers may be issued to allow scientific studies on any of these species. The Direction Régionale de l’Environnement de l’Aménagement et du Logement (DREAL) examines such requests in France.

The main aim of the International Plant Protection Convention is to prevent the introduction and dissemination of pests of plants and plant products. The EU issued the Directive 2000/29/EC which includes appendices giving a list of prohibited pest organisms and requirements for plants. Controlled scientific studies of these organisms and plants may be allowed in containment facilities if a letter of authority has been issued for the petitioner’s activity with respect to the living material to be studied (Directive 2008/61/EC). In France, the Service Régional de l’Alimentation examines such applications.

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For further information:
- Convention on Biological Diversity: [www.cbd.int](http://www.cbd.int)
- EU Community law: [http://europa.eu.int](http://europa.eu.int)
- French law: [www.legifrance.gouv.fr](http://www.legifrance.gouv.fr)
Other teams focused on this topic

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117 scientists
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**UPR Locust Ecology and Control**
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11 scientists
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**UPR AGIRs**
Animal and Integrated Risk Management
(CIRAD)
22 scientists, including 10 ecologists
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**UR COREUS**
Biocomplexité des écosystèmes coralliens de l’Indo-Pacifique
(IRD, UPMC)
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**UR Green**
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The UR pools researchers from several disciplines (ecology, geography, political science) in three research areas:

- **Resilience of tropical forest ecosystems in a forest-use and global change setting.** This research area is focused on factors that can explain the structure and diversity of tropical forests, and on current and future impacts of resource use in a global change setting, especially climate change. The research deals especially with relationships between diversity, resilience and productivity, and on the integration of knowledge in decision-support tools to enhance the management of goods and services produced by forest ecosystems.

- **Relationships between the resilience of ecosystems and the vulnerability of societies that depend on them.** The research deals with associations between the tapping of forests for domestic or commercial use (which enhances the living conditions of communities) and the dynamics of tapped ecosystems in terms of biomass and biodiversity. Studies are focused on the strategies that these societies adopt to address changes in their ecological and human environment, and on ecosystem responses to these strategies.

- **Tropical forest public action policies and instruments.** This research area is focused on the analysis of ways that policies concerning tropical forests and methods for assessing their efficacy are formulated and implemented. Relationships between the overall features of forest ecosystems (structure, biomass, floristic diversity), as well as goods and services provided and payments for environmental services, are also studied interactively with the two other research areas. Some of the main topics investigated include mechanisms involved in the reduction of emissions due to deforestation and degradation, as well as their implementation via payments for environmental services, etc.

This research unit is active on three continents and on different scales, i.e. from the regional scale of large forest areas to the village or plot scale. It has established many partnerships in industrialized and developing countries: scientific partnerships with universities and national and international research organizations, institutional partnerships with ministries responsible for forest and/or environmental management, private partnerships with forest development offices, and with NGOs.
Contrary to many preconceived notions, Central African forest degradation and deforestation are mainly due to uncontrolled slash-and-burn cultivation, agroindustrial development and unsustainable gathering and use of fuelwood, which accounts for 90% of energy used in rural and urban households and a total of 80% of all tapped timber resources. The Makala project, coordinated by CIRAD with EU funding, is aimed at encouraging farmers to partially preserve forest biodiversity through the selection and protection of useful trees during crop field clearing operations. They may also be encouraged to replant saplings when trees become scarce—this can be in the form of enriched fallows, agroforestry gardens or multipurpose village groves. The forest tree species are mainly multipurpose local species whose numbers are dwindling due to excessive use.

The reforestation of Batéké grasslands, as well as the conservation or reintroduction of trees in degraded areas along forest margins around Kisangani, have had a significant catalytic effect in enhancing biodiversity. This phenomenon boosts the number of animal and plant species in the environment which are traditionally utilized by—and represent a source of wealth for—local communities. In addition to the direct impacts on areas in which the project is operational, the Makala project is one constituent in a set of research projects coordinated by CIRAD aimed at analysing and gaining insight into forest ecosystem patterns in the Congo Basin, especially tree species diversity dynamics. The regional CoForChange project, which is geared towards predicting the effects of global change on forest biodiversity in the Congo Basin, is another example of this.

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The Nam Khan Eco-vallée programme (Laos) strives to ensure joint management of water resources, as well as aquatic and terrestrial environment uses throughout the catchment. There is a high degree of complementarity between the environmental issues and the local socioeconomic situation.

These aims include: poverty reduction and the improvement of inhabitants’ living conditions; implementation of sustainable usage (agroecological) practices to fulfil peoples’ needs, and; improvement in local stakeholders’ governance, skills and expertise.

There are many specific objectives:
- preservation of water resources and associated ecosystems, gaining further insight into environments and habitats within the catchment, development of village-scale management plans and delineation of protected areas
- development: proposal of alternative management strategies on pilot sites, combining innovation and local know-how, improvement of essential rural infrastructures, promotion of local products and development of a quality label; proposal of ecotourism products
- training (local leaders) and public awareness (local communities).

Many inventories and assessments have been carried out over the last 5 years:
- identification of Nam Khan aquatic and fish-farming resources, and of living conditions of fishermen and catchment users
- assessment of the physicochemical characteristics of surface waters
- zoning and typology of ecosystems and sensitive environments in the catchment to understand environment-inhabitant interactions, and inclusion of the results in future management plans
- complete mapping of the catchment
- studies to analyse the hydrology in Nam Khan and to gain insight into the physico geographical features in the catchment
- biodiversity assessment based on a series of fauna and flora inventories
- development of a habitat typology and complete mapping of landscape structures via processing of a time-series of remote sensing data
- study to determine riverine vegetation patterns in Nam Khan for pilot initiatives to stabilize the river banks
- ecotourism potential of the valley to develop sustainable income-generating activities.

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Unloading dugout canoes when running the rapids. Urban population growth and the opening of roads between neighbouring countries (China, Vietnam, Thailand) has increased the demand for natural resources—here mahogany (Toona cinensis), for which uncontrolled logging is increasing.

Location: Kenhuang rapids on Nam Khan river (Xiang Nguyen district, Luang Phrabang province, Lao People’s Democratic Republic.)
Celebrating cocoa diversity

Chocolate quality generally depends on the raw material—cocoa. The way growers harvest cocoa beans is also a key factor in aroma and taste formation. This is what experts claim when assessing the cocoa quality, despite the fact that the praise usually goes to the chocolate manufacturers. The Cocoa of Excellence project conducted by Biodiversity International is unique as it recognizes the importance of the agricultural know-how, while also celebrating cocoa diversity.

This begins in cocoa-producing countries from which samples of dried beans representative of the varietal and environmental diversity of the region are sent. The beans are processed into cocoa liquor by CIRAD specialists and then assessed. The 50 most promising samples are processed into chocolate and presented at the International Cocoa Awards during the Salon du Chocolat in Paris. The jury selects those that have the best chance of integrating the booming controlled-origin cocoa market. Criollo cocoa varieties are the most highly acclaimed. They are now rare and have generally been overtaken by Forastero varieties which have defined the chocolate taste known by most consumers. Trinitario varieties, which are Criollo and Forastero hybrids, have a more distinctive and complex taste that evokes the taste heritage of the two parents. However, the variety is not the only key factor: The soil in which cocoa trees are grown also impacts cocoa quality. The only way to assess the quality of a cocoa crop is to process it, so growers who have participated in the project will obtain an evaluation of their sample so as to help them enhance their living conditions by producing high-quality cocoa.

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Hidden diversity of cash crops

Once a plant is cropped for its economic value, variations in taste, shape, agricultural performance or postharvest qualities of the target product tend to be minimized in the market-based decision-making process. The international banana trade, for instance, is based on a very small number of varieties that produce similar fruit no matter where the bananas are cropped. Copra (i.e. the dried meat of coconut) and dry cocoa beans are also mainly sold as undifferentiated products that meet the quality standards set by the industry.

Nevertheless, over time hundreds or even thousands of varieties have been bred by farmers seeking to fulfill different needs, for various types of use or for varied tastes. The main aims of the Commodities for Livelihoods programme, based in Montpellier (France), are to preserve this endangered diversity and promote its use so as to enhance farmers’ subsistence conditions. This programme, whose mandate spans the entire commodity chain, is part of Biodiversity International, one of the 15 international member organizations of the Consultative Group on International Agricultural Research (CGIAR).

Conservation is Biodiversity’s entry point in the public domain for the genetic resources of these crops. This work is carried out mainly by the following three networks: MusaNet, CacaoNet and COGENT. The conservation priorities of each network are defined by a global strategy developed in collaboration with partners in the sector.

There is an international germplasm collection for each crop to provide free access to healthy (i.e. disease-free) plant material. The international banana germplasm collection consists of micropropagated plantlets that are preserved at Biodiversity’s International Transit Centre in Belgium. In COGENT’s international coconut genebank, coconut palms are preserved in five field collections, each managed by a national institution in a host country, i.e. Brazil, Côte d’Ivoire, India, Indonesia and Papua New Guinea. Material in the two international cocoa collections, which are respectively managed by the Centro Agronómico Tropical de Investigación y Enseñanza in Costa Rica, and the Cocoa Research Unit at West Indies University in Trinidad, have been placed in the public domain.

Biodiversity collaborates with specialized research institutes to assess and document useful agricultural traits of these genetic resources. Assessment and characterization procedures, as well as genetic and comparative and functional genomics tools, have been developed, mostly in partnership, for this purpose. Biodiversity is also setting up information systems to provide access to all of the data generated.

This research supports breeders by providing access to the broadest possible range of genetic resources so as to enable them to breed new varieties. Biodiversity also boosts the awareness of development specialists on the importance of promoting varietal diversity—by facilitating its transformation and marketing—and on the role that this could have in enhancing production system management.

Biodiversity scientists are also based in banana-producing countries where they conduct research on the use of biodiversity to boost the production and resilience of agricultural systems. Their research encompasses various fields such as soil health and root systems, as well as disease epidemic threats and how to deal with them.
Development and use of Mediterranean wetlands

The Tour du Valat—which was founded over 50 years ago—is an independent nonprofit organization that is managed by a state-approved foundation based in the Camargue region of France. It conducts research aimed at preserving Mediterranean wetlands and is constantly striving to ‘gain greater insight into wetlands so as to enhance their management’.

The Tour du Valat generates knowledge, while also producing tools and information to help wetland decisionmakers and managers take the best measures to ensure sustainable wetland management and use. Its mission is: “To halt the loss and degradation of Mediterranean wetlands and their natural resources, to restore them and promote their sustainable use.”

Considering the extent of the challenges and the urgent need to come up with applicable responses, the programme is focused on the main issues and priority targets—those that will influence policymaking, affect a high number of management stakeholders or boost the awareness of communities or various socioprofessional groups.

The transfer concept is pivotal to the mission of the Tour du Valat. Wetland conservation is not possible without strengthening the capacities of different wetland management stakeholders: decisionmakers, technical managers and users. Expertise has thus been developed in various areas such as training, the publication of public awareness and informational documents and, generally, communications.

Tour du Valat activities are planned on a 5-year basis. The current programme is divided into three overall topics, corresponding to three complementary approaches:

- Global change and species dynamics
- Integrated management and ecosystem dynamics
- Observatories, biodiversity and public policies

Each constituent of the programme includes interdisciplinary projects which are conducted on different spatial scales: Mediterranean region, Camargue region, and the Tour du Valat station. Most of the different natural habitats in the Camargue region are found in this latter station, especially rare and endangered habitats.

The Tour du Valat is thus an ideal site for the research programmes it hosts. Moreover, 1,844 of the total 2,600 ha on this site benefit from a Regional Nature Reserve status.

Spatial views of protected areas in Madagascar

The continental island of Madagascar is one of the 10 main biodiversity hotspots in the world, with ecosystems (fauna and flora) recognized as being amongst the most diversified in the world. Natural mountain rainforests are being transformed under the impact of population pressure and climate change—forest landscapes are gradually being replaced by crop fields (rainfed and wetland rice cropping, cash cropping, rangeland fires, etc.), and are being altered by cyclones to an increasing extent.

At the request of the United Nations Education, Scientific and Cultural Organization (UNESCO) and via the French Centre National d’Études Spatiales (CNES), IRD research teams are now collaborating with three companies (EGEO, GEOMATYS, HYD) to assess the contribution of satellite remote sensing data, at various resolutions, for monitoring UNESCO World Heritage Forests. The aim is to develop mapping and monitoring methods and tools for forest managers. The ultimate goal is to help draw up a forest policy based on the transfer of local natural forest management to rural communities (biodiversity conservation and integrated development).

The project under way concerns the highland tropical rainforest spanning Ranomafana and Andringitra national parks and the Pic d’Ivoihibe special reserve, as well as the forest corridors that link them. Series of SPOT satellite images (spatial resolution: 20 m, 10 m and 2.5 m) are used, covering three to four periods between 1986 and 2009, depending on the sector. The use of satellite images, combined with field survey data, is the most suitable way to spatially quantify the impacts of development and conservation policies on these very large-scale, remote and hard to reach sites. It is now essential to find ways to reduce the image acquisition, image-processing software and staff training costs in order to streamline this process.

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Map of forest changes between 1986 and 2008 drawn up from SPOT images (Andringitra National Park and Pic d’Ivoihibe Special Reserve).
UMR TETIS has a staff of roughly 110, including around 10 researchers working on the biodiversity topic. Geoinformation is essential for gaining insight into, preserving and restoring natural areas and in developing strategies for implementing international biodiversity conservation obligations (Biodiversity Convention, Habitats Directive). Knowledge is thus required in the fields of wildlife, flora and natural habitats, while seeking ways to ensure their conservation.

The aims of the scientific research conducted by UMR TETIS are:
- to develop natural area inventory and monitoring methods via remote sensing data and geomatic methods: data selection, information extraction, habitat mapping, indicator development, observation system design
- to analyse the spatial structure of natural areas: mapping and analysis of ecological continuities, and of natural fragmentation patterns
- spatial pressure/impact modelling, combining human pressure indicators and environmental status indicators
- to analyse agroenvironmental protection measures and procedures and their applications, and to develop environmental decision support and consultation tools.

Some projects involve upstream research: remote sensing mapping of plant communities in Camargue region (Habitat Directive); baobabs in Madagascar (study in the diversity of the Adansonia genus), the Banc d’Arguin in Mauritania (UNESCO World Heritage Site), and analysis of the role of riverine habitats on the ecological status of aquatic environments.

Other projects are carried out to provide public policy methodological support, especially with respect to the Grenelle environment round table organized by the French Ministry of the Environment: coordination of a national framework document for the preservation and restoration of ecological continuities (in support of the ‘Green and Blue Belt’ operational committee, coordination of technical support for a national information system on biodiversity, or a feasibility study for a regional biodiversity observatory in Languedoc-Roussillon region (France), in support of local authorities.

UMR TETIS collaborates with many partners on biodiversity related projects: the Centre of Evolutionary and Functional Ecology, the Conservatoire des Espaces Naturels Languedoc-Roussillon, the Institut des Sciences de l’Évolution, the French National Institute for Agricultural Research, the Office national de l’eau et des milieux aquatiques, French national parks, the Muséum National d’Histoire Naturelle, the Service de l’observation et des statistiques, etc. The unit is also involved in different European projects such as the Best Practice Network for a Spatial Data Infrastructure in Nature Conservation (Nature SDIplus), the European Biodiversity Observation Network (EBONE), etc.
Dogmatic history of the olive tree revisited

The origins of the cultivation and domestication of olive—an emblematic Mediterranean tree—has always been a controversial topic. In the western Mediterranean region, despite the unquestionable indigenous status of olive trees and the archaeological discovery of many biological remains (charcoal and stones) suggesting that olive resources were being exploited even prior to Ancient Times, it is conventionally hypothesized that its original centre of domestication was in Palestine, during the Chalcolithic period, in the 4th millennium BC. Domesticated forms, know-how and practices slowly spread from the Near East, first towards the Aegean in the 3rd millennium BC, and then towards the central and western Mediterranean region, and finally to southern Gaul around the 1st millennium BC.

This history still prevails in scientific and popular literature, in which it is stated that indigenous communities in the northwestern Mediterranean region only discovered olive trees after trading posts and colonies had been set up. Quantitative analyses based on the anatomical features and geometric structure of charcoal and archaeological stones, respectively, by analogy to a large reference collection of modern specimens, has prompted reconsideration of the dogmatic history of olive domestication. The origins of olive cultivation and domestication in the western Mediterranean region date back to around 3000 BC, i.e. 2000 years before the introduction of new varieties mainly from the eastern Mediterranean areas.

These results, supported by genetic data, have also demonstrated that olive domestication took place independently in many regions and not at a single site in the Near East. However, these new data do not question the importance of the influence of the Phoenicians, Etruscans, Greeks and Romans with respect to the expansion of olive cultivation in the Mediterranean Basin.

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A subspontaneous olive tree (basaltic region of Ledja, Syria).