

Présentation des projets financés au titre de l'édition 2008 du programme Vulnérabilité : Milieux, Climat et Sociétés

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Titre du projet	ACOCLI : Adaptations cognitives aux changements climatiques
Résumé	The project constitutes fundamental researches on various aspects of cognitive adaptation to climatic changes: representations, categorisations, understanding, temporal and spatial cognition, problem-solving. We will collect data from French population exposed to different degrees of risk: "high-risk" region (Nouvelle-Calédonie), "mid-risk" regions (French Guiana), region with climatic hazards (Chamonix) and "protected" regions (Paris and its suburbs). We adopt the approaches of developmental, cognitive and cross-cultural psychology. The data will allow identifying different cognitive adaptation forms to then establish a more general model of the relationship between human cognition, rapid climatic changes and vulnerability. The second part of this research will result in the design of an interactive exposition model that will present the different cognitive attitudes toward climatic changes.
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Titre du projet	BIOCRUST : Vulnérabilité des croûtes biologiques et dégradation des sols en zone sahélienne.
Résumé	BIOCRUST is a multidisciplinary and multiscale project, based on comprehensive study of different aspects of biological soil crusts (BSCs). We need to understand how BSCs will respond to global changes and anthropic pressures in the Sahelian environments. Although BSCs are a common feature of soil surface in the Sahel, neither the inventory of their different forms nor the estimation of their spatial extension have been conducted. Such issues are nevertheless important for making regional budget of the ecological roles and monitoring spatial and temporal changes of BSCs in face of climatic and anthropic disturbances. The research activities will focus on the interactions between biotic and abiotic attributes. They will bring insight in the feedback effects resulting from soil surface disturbance due to land-uses and climate changes.
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Référence	ANR-08-VULN-003

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Titre du projet	ECLIS: Contribution of livestock systems to the reduction of rural population vulnerability and to the promotion of their adaptability to climate and society changes in sub-Saharan Africa
Résumé	The challenge of ECLIS is to assess the contribution of livestock activities to the inter-relations between society vulnerability/adaptability and ecosystem vulnerability/resilience. These relationships are studied by focusing on the interface between the ecosystem services to the livestock husbandry and the differential access of the rural population to these resources as mediated by the economic, social and political institutions. The approach relies on the analysis of the historical dynamics of this interface along the last 50 years. Indicators of vulnerability are identified, and their sensitivity tested on 4 sites selected for their regional significance. Local scale is privileged being the scale at which population are regulating the access to ecosystem goods and services.
Partenaires	CESBIO UMR 5126 / UM 12 LMTG UMR 5563 CNRS / UMR 154 IRD HSM- Montpellier CNRS UMR 5569 LTHE CNRS UMR 5564 CIRAD URP 68 département ES PRODIG CNRS UMR 8586 C3ED IRD UMR_D63 Laboratoire Aménagement, développement, environnement et société - CNRS UMR 5185 IRAM
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Titre du projet	EVOLFISH : Effects of global warming and contamination on the evolutionary response of two coastal fishes
Résumé	In the EVOLFISH project, synergy between the effects of global warming and contamination will be explored on fish populations of two widely distributed coastal species, the sole (<i>Solea solea</i>) and the flounder (<i>Platichthys flesus</i>). To disentangle thermal and contaminants effects, we intend to implement a multidisciplinary approach involving physiologists, geneticists, population biologists and ecotoxicologists. Natural populations situated along a north-south gradient along the western coast of Europe will be compared using on-site evaluation of fish status and performance, as well as common garden experiments. These experiments will particularly aimed at deciphering aspects of local adaptation from phenotypic plasticity.
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Titre du projet	IPER-RETRO : Impact des perturbations sur les réseaux trophiques en lacs: approche paléo-écologique
Résumé	IPER-RETRO is a pluri-disciplinary program studying the ecosystem-scale vulnerability and responses of four French subalpine lakes over the past 150 years to fish introductions (Whitefish), changes in nutrient levels and global warming. The study sites are the four large, deep French sub-alpine lakes (Lake Geneva, Lake Annecy, Lake Bourget and Lake Aiguebelette). The impacts of these three perturbations on these lakes food webs, such as on sedimentological processes, are investigated from sediment archives, by the combination of paleo-limnological and ecological methods. By comparing these lakes contrasted in terms of perturbations intensity, we aim at discriminating the ecosystems responses to local and to global perturbations.
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Titre du projet	LANDSOIL : Landscape design for soil conservation under land use and climate change
Résumé	<p>This research program nicknamed Landsoil focuses on the evolution of agricultural soils over medium time scales (decades to centuries) in relation to changing conditions of land structure and climate. From the precise study of the soil 3D organization of well documented and contrasted study areas, soil redistribution in space will be linked to existing landscape components (field geometry, hedges or ditches network) and their past evolution. A dynamic and spatial modelling approach will be developed to understand the present variability of soil thickness and related functions (carbon and water storage) at landscape scale. This modelling approach will afterwards be applied in a prospective manner over larger regions under different scenarios of landscape structure and climate change. The results of this research will contribute to the implementation of durable landscape design options which enable to preserve soil quality in a context of climate change and farming activity evolution.</p>
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Titre du projet	
Résumé	The Peru-Chile upwelling system is the most productive coastal region in terms of fisheries, representing up to 20% of the global fish catch. Stocks vary significantly on intraseasonal to interdecadal time scales, in relation to climate change, which could have a tremendous impact on the local economy of emerging countries. The PEPS project aims at using dedicated methods to describe and analyse the variability of environmental parameters relevant to fisheries and study its impact on the populations of two intensively exploited species in the region, sardines and anchovies. The recent period (1958-present) and several IPCC-based scenarios of climate change will be studied and compared in order to understand the key processes in regional models used to project climate change. Different fishing pressure scenarios will also be included as to estimate the vulnerability of the system.
Partenaires	LOCEAN CNRS UMR 7159 LEGOS CNRS UMR 5566 LMD CNRS UMR 8539 Modélisation des écosystèmes marins MEMMS Upwelling Ecosystems ECO-UP
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Titre du projet	PICREVAT : Prévisibilité de l'information climatique pour la réduction de la vulnérabilité de l'agriculture tropicale
Résumé	<p>The project « Predictability of the climatic information for reducing tropical agriculture vulnerability » (PICREVAT) regroups physicists of the atmosphere, agronomists, geographers, and socio-ethnologists from 5 research teams. PICREVAT focuses on the impact of climate variability upon harvesting of crops in the tropics. Its aim is to define, test and validate an integrated methodology to fill in a major gap between seasonal climate predictions, usually issued for seasonal amounts at regional-scale and the local-scale information needed by end-users to mitigate the adverse effects linked to climatic variability and decrease their vulnerability. This multidisciplinary project compares three tropical and subtropical areas (Cameroon, Kenya-Tanzania, and Argentina) allowing to (i) better understand the multiscale interaction between global-scale forcing and the intra-seasonal variability at regional-scale and (ii) better evaluate the potential application of the seasonal predictions on regions whom the main crops, the capacity to mitigate adverse effects and to take into account seasonal predictions are highly distinct.</p>
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Titre du projet	RIWER2030 : Climat Régionaux et incertitudes, ressources en eau et énergétiques associées de 1960 à 2030.
Résumé	RIWER 2030 will attempt to improve existing methodology and tools for characterising the impact of climate change on water and related energy resources in mesoscale water systems. Researches will be conducted with Electricité de France on the Upper Durance and the Upper Loire basins. RIWER 2030 will analyse the possibility to develop a weather generator able to produce for the 2 case studies relevant weather scenarios. RIWER 2030 will explore possible strategies for reducing associated uncertainties and will propose an appropriate probabilistic framework for characterizing the remaining ones. For the final impact assessment, RIWER2030 will develop a set of quantitative and probabilistic criteria to judge the systems behaviour under different climatic and management configurations
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Titre du projet	SCAMPEI : Scénarios Climatiques Adaptés aux zones de Montagne: Phénomènes extrêmes, Enneigement et Incertitudes
Résumé	The project attempts to precise the climate response in French mountains. We associate high resolution (12 km) modelling with Météo-France, LMD and LGGE regional climate models with statistical downscaling with Météo-France analyses (8 km) to take into account terrain complexity. The accurate description of daily-scale events during three 30-year periods will allow to produce indices of extreme events (temperature, precipitation, wind). It will also enable an altitude-dependent description of the snow cover. Over the Alps, a refined snow mantle model will improve the description. In this region, a statistical model of debris flows will evaluate the probability of such events in the climate change. Another target of the project is to estimate the uncertainties about our results using a multi-model approach.
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Titre du projet	SHIVA : Evaluation socio-économique de la vulnérabilité rurale des usagers de l'eau sous l'effet des changements globaux dans la zone de socle du sud de l'Inde
Résumé	<p>The impacts of global climatic and anthropogenic changes in rural water-stressed regions are expected to rearrange social and economic constraints and opportunities of local water users. The SHIVA project is a social sciences research oriented project. It aims at developing transposable methods for the assessment of economic and social impacts of the rural vulnerability of water users, in water-stressed regions subjected to global changes. Based on foreseen vulnerability mapping, the results will provide guidelines for water management policies at the State level. Climate changes and anthropogenic scenarios will be analysed and results will provide indications on water users' exposure and/or sensitivity to changes. A special care will be given to the study of adaptative capacity of rural water users in context of rapid economic changes as occurring in South India. Adaptative capacity is a key concept of SHIVA project: it is one of the dimensions causing water users' vulnerability, but it is also one that can be influenced through policy measures or initiatives in order to modify vulnerability. Then, a first socio-economic approach within the project is to identify how adaptative capacity influence vulnerability; and a second approach is to determine how it could be modified to reduce vulnerability impacts. Vulnerability impacts will be assessed in terms of costs and benefits.</p>
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Référence	<p>ANR-08-VULN-010</p>

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Titre du projet	SOLAO : Implication des communautés bactériennes dans l'état de vulnérabilité des sols sahéliens : approches biologiques, physico-chimiques et sociales.
Résumé	<p>The project « SolAO » addresses the effects of climate change (drought, Rise of the temperatures) and anthropomorphic activity (Overexploitation of farmlands, changes in agricultural practices) on soil vulnerability in tropical ecosystems. Three area in Western Africa were chosen to study the soil microbial community in order to define the potential bio-indicators related to the soil ecology and function in terms of soil vulnerability. These goals require state-of-the-art approaches, which will include the use of phylogenetic microarrays based on 16S rDNA and clone libraries with high throughput sequencing. This metagenomic approach (avoiding limitations associated with cultivable bacteria) will be applied to samples from different representative sites as well as microcosms where different controlled stresses will be applied so that statistically sound correlations can be derived between the microbial community and the soil physicochemical characteristics. A range of traditional methods will be used to measure these soil characteristics. In addition, society-based actions will accompany the scientific exploration in order to incorporate multiparty participation in the development of an organized and effective response to soil vulnerability.</p>
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Titre du projet	
VULNOZ : Vulnérabilité des agro écosystèmes à l'ozone. Quels risques à l'horizon 2020-2030 ?	
Résumé	<p>The predicted ozone levels are above acceptable thresholds for optimal development of agroecosystems. Studying the consequences of increases in ozone concentrations by 2020-2030 requires changes in scale from ozone molecules to ecosystem via the whole plant. The aim is to improve the risk indicators currently proposed by UNECE which uses concentrations measurements or considers an exposure index. The VULNOZ project aims to estimate the effective ozone flux into plants which is a balance between the global ozone flux and the detoxification capacity of leaf cells. From experiments on 4 model species, VULNOZ will generate detoxification laws linked to plant growth. The strength of the project will consist in the integration of a sub-model for plant functioning under ozone constraint into more general models to predict the impact of ozone on crop growth (STICS and CERES) and on the functioning of ecosystems (ORCHIDEE) by including atmospheric chemistry (CHIMERE), to finally estimate the economical consequences (AROPA). The data obtained at various scales will emphasize the multidisciplinary aspect of the project.</p>
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Titre du projet	VURCA : Vulnérabilité URbaine aux épisodes Caniculaires et stratégies d'Adaptation
Résumé	<p>Our analysis aims to shed light on the potential contribution of the spatial dimension of an economy to local adaptation strategies to climate change and focuses its attention on a complementary local–urban scale of analysis which can inform the design of spatial planning and policy for adapting to climate change. The relevance of this is underlined by empirical evidence and data. Cities bring together 50% of the world population, and this share exceeds 80% in developed countries. Such population concentration, whose trend is expected to grow rapidly over the short term, gives rise to social, economic, and environmental concerns. Among these, the issue of the specific micro-climate characterizing the urban areas is of particular interest in that the so-called Urban Heat Island (UHI) effect could create serious consequences on public health when it comes to considering the overall temperature increase due to climate change. Particularly, the vulnerability of urban areas to an expected increase in the frequency and intensity of heat waves is what is raising the public and institutional concern and pushes them to search for solutions. In this context, the Vulnérabilité URbaine aux épisodes Caniculaires et stratégies d'Adaptation (VURCA) project aims at providing information that might contribute to the building up and setting in force of proper solutions that reduce the degree of urban vulnerability to heat waves. To do that, VURCA proposes an interdisciplinary approach where both environmental, technical and socio-economic aspects are considered, in order to provide first insights on the complex interaction between city economies and climate change and on the viability and effectiveness of identified adaptation options.</p>
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