



AMI “grands programmes de recherche” - 2019

Lettre d’intention

Le dossier ne doit pas dépasser 5 pages (police 11). [Joindre le CV du porteur.](#)

1. Informations générales sur le projet

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Laboratoire de rattachement du porteur	UMR 1202 BIOGECO ; UR ETBX
Statut du porteur	DR ; DR
Titre du projet	Tackling Global environmental Change
Acronyme (s’il existe)	
Mots-clés	Socio-Ecological System, drivers, socio-ecosystem responses, societal decisions
Département principal	Sciences de l’environnement
Autres départements	CHANGES (Sciences sociales des changements contemporains)
Laboratoires impliqués	21 UMR/UR
Tutelles concernées (préciser si hors départements UB)	UB, INRA, IRSTEA, IFREMER, CNRS, FNSP, BSA
Adossement à une ou des plateformes	Plateformes GénoBois ISC INRA, Génome-Transcriptome CGFB ISC INRA, OASYS/ResIntBio, SOARC/SOMLIT, PINELINE/Pinus Portal, VitAdapt, SAVI, ICOS LANDEX (Eric Villenave EPOC), PhenoPyr, Unités expérimentales INRA arboriculture (Toulence) et forêt (Pierroton).
Lien avec des grands projets structurants (LabEx et Cluster actuels, Centre d’excellence, SIRIC, IHU, chaires...)	GPR Bordeaux Plant Science, GPR SYSNUM, Labex CEMEB (Montpellier), Labex CEBA (Toulouse), Labex IPSL (Paris)

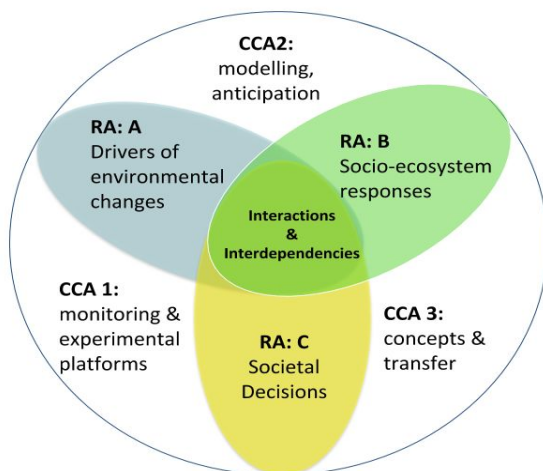
2. Description du projet

2.1 Objectifs et description synthétique du projet

Today we face unprecedented societal and ecological challenges. Global change threatens to compromise human and ecological well-being, demographic transformation increasingly urbanises territories, whilst inertia and neglect contribute to rising biodiversity loss. This raises several questions on how we assess chemical, biological and physical perturbations of oceans and land surfaces at large scales; address new problems of environmental health; find ways to live sustainably; and mitigate collapsing ecosystems and associated industries.

The ambition of this GPR is to tackle this global environmental change developing novel integrated natural and social science approaches. We will analyse the multiple drivers of environmental change, the variability of socio-ecosystem responses and the diversity of societal decisions. Working from the perspective of the 'socio-ecosystem' (SES hereafter), we will breathe new life into this concept by investing it with new insights. In particular, we will focus on interactions and interdependencies between SESs and those societal decisions that govern them. This will advance emerging sciences and concepts such as urban ecology and 'ecohealth', and bring together recent developments in natural and social science in novel ways. Throughout we will generate new understandings on disjunctures and discontinuities between ecological and societal change at both local and global scales, through continuous interactions with stakeholders.

There are three main strands to our scientific strategy: i) workpackages (joint scientific projects) investigating identified Research Areas (RA) and co-constructed by the GPR community (this ongoing programming will be completed by the end of the summer); ii) transversal Cross-Cutting Actions (CCA) and leverage effect activities; iii) national and international collaboration with other LabEx and international research institutes.



This scientific strategy has been developed with the research community over the last 18 months. We have met regularly to construct our GPR 'from the bottom up', working in plenary and in small specialised groups. This led us to prepare three Research Areas (RA) which form the core of the GPR, as well as Cross-Cutting Actions that include modelling and anticipation, monitoring and experimental platforms, concepts and transfer (see Fig. 1). Although each RA develops a distinct line of questioning with expected results, the central objective of the GPR is to work at the intersection of the RAs, favoring research workpackages which cover two or three RAs.

Research Area A: Drivers of environmental changes This RA-A aims at identifying the main drivers of ongoing environmental change (e.g. local and large scale pollution, climate change, emerging contaminants). Such an understanding is key to prepare appropriate measures to limit potential impacts. Nevertheless due to the complexity of the environmental system, it is necessary to properly evaluate the strength of the different drivers and the possibility of non-linear interactions between them that may strongly enhance their impact. This requires an integrated view of the different drivers and new approaches to account for non-linearities, which have not been sufficiently elucidated up to now. To make progress on this, new methodological approaches will be developed and collaborations between researchers from different fields will be made. The main environmental drivers could be separated into global-scale and local-scale drivers, whose essence and ways of coping are very different. For instance, climate change is a global issue, and the effort at the local scale must be coupled with large-scale efforts to mitigate it. In contrast, local pollution (e.g. pesticides, urban air...) needs to be tackled at a lower scale. This RA-A will develop cutting-edge analyses of these different drivers and the ways they may interact. A focus will be put on the understanding of both natural climatic fluctuations and extremes as well as human-induced climate changes, industrial policies and their direct consequences. This RA will tackle (i) anthropogenic pressure on terrestrial and aquatic SESs and also (ii) environmental contamination and pollution and their impact on health. Based on the results from this research, we will construct a new assessment of the pressure on our environment.

Research Area B: Responses of socio-ecosystems In this RA-B, we will quantify how fast SESs will need to adapt to environmental change. We will first decipher the mechanisms and processes allowing adaptation and/or extirpation of these SESs or even the emergence of new ones. Second, we will open up new research avenues to unravel the pace of evolution of these SESs and determine whether they will be able to withstand global environmental change. For this, we will rely on retrospective analyses, modeling, monitoring observatories, big data, citizen science and experimental approaches. Studying SES responses is critical for ecosystems that have particularly high value as cultural or natural heritage (terrestrial and aquatic SES such as agrosystems and urban forests). We will produce results in three main areas on (i) adaptation, (ii) extirpation and (iii) emergence of entirely new SES. (i) Exploring adaptation to new conditions from species to SES is essential to design sustainable scenarios and predict the impact of global changes. Adaptive capacity has two components: the inherent adaptive capacity of organism, species and ecosystems and the socio-economic factors determining the ability to implement planned adaptation measures. (ii) Human activities have reduced and fragmented most habitats, and this fragmentation of suitable habitat is expected to substantially reduce species migration and adaptation. Some species are consequently threatened and the functions of some SES are altered. However, little is known about the risk of extirpation, and there is therefore an urgent need to quantify the extent to which global change alters both populations migration / extinctions and SES transformations. (iii) Global change (biological invasion, climate change, change in land use, pollution) may trigger large scale shifts in species composition, leading to the emergence of new ecosystems. Entirely new, man-made SES (wind or solar farms, short-rotation forest plantations, vegetated buildings...) are emerging as well in response to societal and economical changes. Societal decisions made now and in the near future may gradually alter the extent to which SES shift to new states, recover from degradation, and shape the appearance and composition of newly arising SES.

Research Area C : Societal Decisions In this RA-C, we will examine multiple actors and decisions. We not only analyse how public policies contribute to global environmental change, but also how societal decisions beyond those linked to public policy (alternative lifestyles, markets, social movements...) influence socio-ecological transition. RA-C opens up a new research perspective analysing SESs as social constructions. We will produce new results on how societal decisions govern relationships between an ecosystem (interactions between species and their environment), infrastructure (artefacts, land use...) and society (individuals, social groups...). Assuming that there is nothing inevitable about how these relationships are governed, we will produce results on why people make the decisions that they do. Attention is paid to the spatial and temporal dimensions of decisions (e.g. transitions of land-use conflicts; re-localisation of environmental risks; urban-rural-industrial interfaces and food security; quality of life and services...). To produce results on processes leading to societal decisions we analyse actor resources, such as their power, or their motivation, and their capacity to innovate or build alliances. In so doing, we inject human behavioural features such as conflict, power, crisis, justice and equity into our analysis - features which are generally absent from SES analyses. We also grasp how public problems emerge, the form they take, whether they drive change or simply reproduce continuity. Both the type of decisional process (negotiation, consensus, conflict, mobilisation, political pressure...) and ex-post societal value and well-being derived from benefits will be studied. Using a variety of methods (modelling, qualitative research, comparative studies, research-actions, narratives), we pay particular attention to experimental alternatives, new solutions and change at the margins.

Interdependence and Cross-Cutting Actions (CCAs)

Our ambition is not only to open up new lines of inquiry as described in each RA, but to promote research on their interactions and interdependencies. To these ends, a central objective is to use the concept of the SES as a means of coming together, encouraging the integration of 'humans' into understandings of ecosystem responses on the one hand, and the integration of 'nature' into understandings of societal decisions on the other. Whereas in a first step we will adopt this reflective approach making best use of the SES as a federating concept, our overall ambition over 8 years of the programme is to test its limits, especially its theoretical weakness explaining and anticipating change. As well as working on RAs and their interactions, we have designed the programme with CCAs to facilitate connections. CCAs aim to federate the community through conceptual and methodological seminars, as well as transversal modelling, monitoring and experimental platforms and transfer.

2.1.1. Valeur ajoutée en regard de l'existant

The Labex COTE was highly successful in structuring an interdisciplinary community across 12 research units, enhancing the quality of research findings on interacting ecosystems at an international scale. It also excelled in

forging new links between science and society on environmental issues. In this GPR, we widen the community to tackle global environmental change **from the socio-ecosystem perspective**. Building this strong bridge between natural and social sciences provides a novel basis for opening up new research avenues in environmental sciences.

2.1.2. Indicateurs de résultat

Comprehensive and inclusive interdisciplinarity, characterised by an exchange of concepts and frameworks across natural and social sciences, and not just technical exchange of data between disciplines, measured by number of scientific workpackages overlapping two or three research areas and by joint publications in international journals. Scientific analysis of ‘interdependencies’ between changing SESs and/or sectors, allowing colleagues to move outside their comfort zone of single SES or sector research, measured by a survey of colleagues on their experience. A plurality of integrated frameworks - i.e. a variety of frameworks combining theories and concepts from both natural and social sciences - capable of explaining global environmental change / inertia, and possible consequences, measured by cross-cutting actions and seminars, the emergence of new topics and international leadership. A socially engaged science, underpinned by integrated communication tools to allow for two-way dialogue between scientists and stakeholders, measured by number of stakeholder fora, transfer projects and socio-economic partnerships.

2.2 **Durée envisagée et principaux jalons de la feuille de route:** See table in annexe below.

2.3 Équipes impliquées (départements UB)

The **number of ETP** in the Table is based on a **survey** sent to the former Labex COTE community and new partners early 2019. Overall **255 researchers from 21 units** (UB and non-UB) have since registered and **are already on board** while others will join us before the final submission. Named thematic contributions of the research units also emerge from the survey and are listed in the “apport” column. We have not listed the units for which less than 5 people joined up (UMR BFP, LBM and LAM).

Unités	Équipe	ETP	Apport (compétences, méthodologie, techniques...)
UMR BIOGECO	7 teams	28	Evolution, physiology, community, conservation, restoration
Centre Bordeaux Population health	1 team	5	Environmental health, environmental epidemiology, occupational exposures assessment
UMR Centre Emile Durkheim	N/A	10	Political economy, biodiversity governance, urban studies, environmental health, social movement studies, gender studies
UMR EGFV	N/A	10	Vine ecophysiology, functional genomics, modeling
UMR EPOC	6 teams	44	Ecotoxicology, aquatic biogeochemistry, coastal dynamics, climatology
EA Géo. & Envi.	N/A	5	Hydrogeology and community ecology
UMR GREThA	N/A	11	Ecological economics, bio-economic modelling, biodiversity management, Urban studies
UMR IMB	1 team	5	Modelling, statistics, biodiversity dynamics, computation
UR EABX	2 teams	17	Community ecology, estuarine ecosystem restoration, ecotoxicology
UR ETBX	2 teams	20	Actors, decisions, territories, water heritage
UMR ISPA	5 teams	18	Biogeochemistry, functional ecology, environmental physics, agronomy
UMR PASSAGES	N/A	18	Land use changes, territories, human ecology, urbanisation
UMR SAVE	4 teams	14	Ecology, pathology, genomic, biological invasions, biocontrol
UR Œnologie	1 team	6	Chemical, biochemical and microbiological processes

2.3.1 Principaux PIs

The three Research Areas described above are coordinated by three main PI from different UMRs: Didier Swingedouw (RA-A, UMR EPOC), Jérôme Ogée (RA-B, UMR ISPA) and J-C Pereau (RA-C, UMR GREThA). The steering committee will be composed of PIs, workpackage leaders selected through a bottom up process over the summer and representatives of stakeholder groups.

2.3.2 Equipes impliquées (hors départements UB)

Information comes from the survey sent in March 2019 (4 units): 1. Unité Santé et Génétique des Mollusques Marins, IFREMER (DU C. Stavrakakis, 7.5 ETP). 2. Lab. Environnement-Ressources d'Arcachon, IFREMER (DU H. Oger Jeanneret, 16 ETP). 3. Unité de Biogéochimie et Ecotoxicologie, Ifremer Nantes (DU T. Burgeot, 12 ETP); 4. Service géologique national (BRGM; 2 ETP).

2.3.3 Complémentarité des équipes

Answering the research questions asked in this GPR requires a broad consortium spanning different natural and social science disciplines working on a range of SESs (urban, forest, hydro, agro, environmental health...). The 21 units involved in this GPR provide an ideal coverage for meeting project objectives.

2.4 Articulation avec les axes scientifiques des départements

Our GPR spans two research departments: 1) Environmental Sciences and 2) CHANGES (Social science of contemporary changes). We will contribute to Theme 1 of Environmental Sciences *Ecosystems under natural and anthropic pressures* and Theme 1 of CHANGES *The governance of contemporary changes*, articulating both around the question of SES change and environmental policy.

2.5 Eléments de positionnement par rapport à l'international

The GPR will take advantage of our large number of European and international networks (e.g. European Network of Excellence, EVOLTREE; Partnership for European Environmental Research, PEER...) to involve international partners in our research program and lead on interactions and interdependencies between SES anticipating change.

2.6 Partenaires institutionnels, territoriaux, industriels, associatifs...

Based on the experience of the former Labex COTE in terms of dissemination, transfer and societal benefits of research results, our GPR aims at continuing the work with the Stakeholders Group which already exists. This group includes representatives from private companies, policy makers, ecosystem managers, representatives of nature conservation agencies, aquatic, agricultural and forest industry. Several persons from this group will be involved in the steering committee.

2.7 Nature des moyens nécessaires

The required 8-yr budget for this GPR is 11M€. We propose dividing this amount up into three main budgetary lines: i) scientific workpackages, including transfer (federating transdisciplinary thematic teams) (7.5M€); ii) cross-cutting actions (federating the whole community) (2M€); iii) collaboration with other national (eg. LabEx) and international (eg. IRP/LIA) partners (1.5M€). In i) the GPR will be composed of 12-15 federative workpackages (250-300k€; 4-yrs; 2 times) across the three research areas of our GPR. To ensure continuity and cross-disciplinary actions within each WP we will favor long-term (3-4-yr) post-doc fellowships, as well as PhD theses; in ii) we will strengthen transversal modelling, monitoring and experimental platforms, and initiate conceptual seminars. Small scale projects (between 10 and 20k€) will be initiated every year (starting the second year) to fund high risk research, developing platforms and field surveys. In addition, we will encourage the community through workshop animation to build larger consortiums within regional, national and international funding framework; in iii) we will co-fund projects with two Labex and one GPR and organise international summer schools. Finally, we will take part in partnerships between French institutes and international laboratories such as the INRA-University of California agreement.

2.8 Impacts attendus

Our GPR will be associated with the UB Advanced Graduate & Professional Program in Environmental Sciences (EUR SENSE) and in Economic Policy and Decision Making, contributing research-led teaching and funding master stages. GPR outcomes will also contribute to UN SD Goals (3,7,9,11,13,14,15), as well as to societal exchange via our stakeholder forum providing leverage for dissemination of results shaping the fabric of the region.

