

WP2. SERVICES PROVIDED BY THE MEDITERRANEAN ECOSYSTEMS

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Introduction

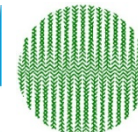
3rd OT-Med Progress Meeting 6 to 8 January 2016 in La Baume-les-Aix .



A*Midex
Initiative d'excellence Aix-Marseille



IRD
Institut de recherche
pour le développement



INRA
Institut National de la Recherche Agronomique



Background

Human civilization has had its cradle in the broader Mediterranean area – for several millennia, ecosystems have co-evolved with human society in the region. As a consequence, ecosystem services from land and sea are now crucial for economy and human well-being in the Mediterranean.

Due to multiple global change drivers (warming, pollution, invasive species etc.), ecosystem service provisioning capacity is declining at an alarming rate.

In addition, biodiversity is in decline:

Organisms	Nr species	% of world	% endemic
Continental flora	25 000	28%	~50%
Marine flora	860	10.9%	~28%
Continental fauna	1 910		~21%
Marine fauna	11 600	6.2%	~27%



Numerical tools, based on process-based simulation models and spatial data bases, permit the assessment of past, current and future ecosystem service provisioning.

Decision-makers, at the regional and international level, require credible information and scenarios about changes in ecosystem function, biodiversity and services, e.g. for IPBES

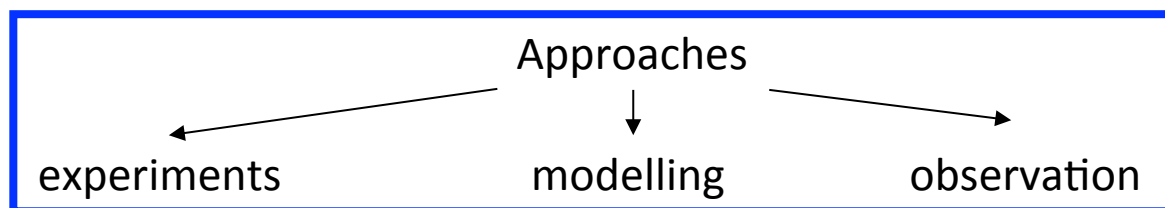
Objectives

Our goal is to improve understanding of:

- **human-environment relationships from the perspective of ecosystem services;**
- **relevant processes for the prediction of change in ecosystems and service provisioning, include major biogeochemical cycles, agriculture, fisheries, biodiversity, and land management**

Ecosystem service provisioning, biodiversity, and ecosystem functioning are studied in relation to the Mediterranean's high biodiversity and its evolution:

1. at the level of local adaptive processes, by analyzing the role of environmental stresses
2. at the level of macro-ecological processes recorded over much broader temporal and spatial scales
3. non-adaptive shorter-term evolutionary processes (demographic fluctuations, connectivity) are also be taken into account
4. at the level of interaction between ecosystem functioning and the human sphere



Marine biodiversity and the functioning of marine trophic webs up to exploited resources:

Adaptation and evolution of marine organisms

The evolutionary challenge of climate change: adaptive processes in the Mediterranean red coral. PhD student: Marine Pratlong, Supervisor: Didier Aurelle (IMBE)

Contribution of phenology to study the impact of climate change in coastal marine environment: the octocorals as models species Project leader: Alexander Ereskovsky (IMBE)

Phenology and life history of benthic Mediterranean invertebrates: viviparous bryozoans as a model_Mobility Fellowship Project (2013) by Dr Andrey Ostrovsky, Vienna University

Marine biodiversity and the functioning of marine trophic webs

Observation of the plankton community structure in relation to the biogeochemical cycles in the Gulf of Lions and the pelagic ecosystems of North Tunisia (Bay of Bizerte and Gulf of Tunis) (started in 2012) PhD student: Soumaya Boussabat Supervisors: Bernard Quéguiner (MIO), M.N. Daly Yahia (Tunisia)

Understanding ecological functioning of coralligenous habitats, and building New Indicators based on genetic tools to assess their GES (good environmental status) (NIGESCor) (started in 2014) PhD student: Aurelien de Jode Supervisor: Anne Chenuil (IMBE)

Forest modelling and dynamics

Assessing vulnerability to global change of western Mediterranean forests using tree rings and a mechanistic approach Post-doc: Guillermo Gea-Izquierdo, supervisor: Joël Guiot (CEREGE)

The ecophysiological basis of carbonyl sulphide (COS) gas exchange of plants with the atmosphere (started in 2012) PhD student: Alena Nosova Supervisors: Ilja Reiter (ECCOREV), Joël Guiot (CEREGE)

Carbon cycle and biodiversity in Mediterranean oak forest: impact of climate change (CYCABIOCLIM) (started in 2014) PhD student: Susana Patricia da Silva Pereira, supervisors: Virginie Baldy (IMBE), Catherine Fernandez (IMBE)

Origin and congruence of taxonomic, phylogenetic, functional and paleoecological diversity patterns: the model of European-Mediterranean woody plant biodiversity (WOODIV) (2016), supervisor: Agathe Leriche (IMBE) + CEREGE + INRA URFM Avignon (ECCOREV)

Mediterranean soils: modelling and management

Understanding human-environment relationships from the perspective of soil-derived ecosystem services in the Mediterranean Basin (2013-2014) Postdoctoral fellow: Mattia Trabucchi; Supervisor: Wolfgang Cramer (IMBE)

Agriculture modelling and dynamics

Agroecosystem management options for sustainable land use

PhD student: Simon Decock, supervisor: Alberte Bondeau (IMBE)

Solar energy for irrigation: mitigation and adaptation option for the Mediterranean?

Postdoc: Marianela Fader, supervisor: Alberte Bondeau (IMBE)

Socio-Ecological Indicators for Mediterranean Agro-ecosystem Sustainability (SEI-Med).

Supervisors: Wolfgang Cramer (IMBE), Claude Napoleone (ECODEV INRA Avignon) + LPED + GREQAM (2016)

Implementation

Urban biodiversity and its relationships with coastal development and human impacts

Impact of anthropogenic particles on coastal zones in PACA

Project leaders: Elvira Pulido (MIO), Richard Sempéré (MIO), Olivier Radakovitch (CEREGE)

Biotic and abiotic degradation of terrestrial organic matter discharged by Rivers (Rhône, Pô and Ebre) in Mediterranean Sea (started in 2013)

PhD student: Marie Aimée Galeron, supervisors: Jean-François Rontani (MIO), Olivier Radakovitch (CEREGE)

Managing biodiversity in a context of increasing urbanization and intensified human-nature interactions

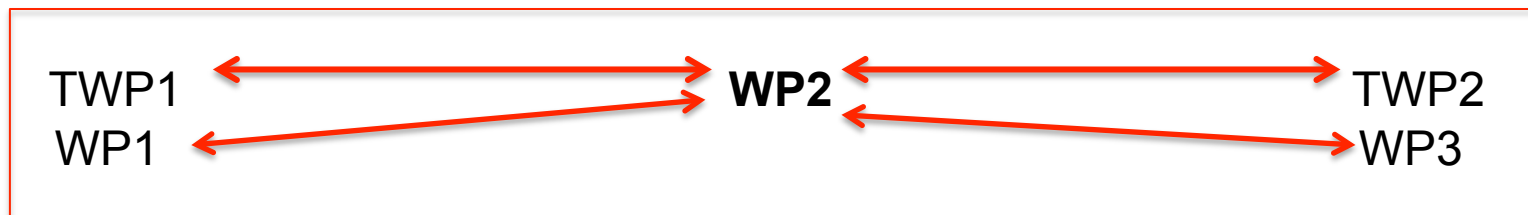
PhD student: Nathalie Boutin, supervisors: Pierre Batteau, Sophie Gachet (IMBE)

The role of WP2 for the overall objectives of OT-Med

Ongoing work in WP2 in 2012-2015 relates to four main OT-MED objectives:

Strengths & Weaknesses:

- **stimulate interdisciplinary research** on human – environment interactions in Mediterranean ecosystems, accounting for ecosystem functioning, biodiversity and human impacts, taking into account the various time scales of ecosystem development
- **identify and evaluate innovative strategies** to help decision-makers in elaborating public policies and enterprises in treating environmental questions (through data, models and technologies)
- **contribute to the meta-program MISTRALS**: Mermex, Biodivmex
- **development of connection with others WPs** of Labex:



Laboratories involved

- Centre Européen de Recherche et d'Enseignement en Géosciences de l'Environnement (CEREGE), UMR 7330, Marseille (climate and continental environment sciences)
- Géochimie des Sols et des Eaux (GSE), UR 1119, Aix-en-Provence (soil science)
- Groupement de Recherche en Economie Quantitative d'Aix-Marseille (GREQAM), UMR 7316, Marseille (economics)
- Institut Méditerranéen de Biodiversité et d'Ecologie marine et continentale (IMBE), UMR 7263, Marseille (ecology and biodiversity)
- Mediterranean Institute of Oceanology (MIO), UMR 7294, Marseille (oceanology)

Programs & Partners

- **BioDivMex** (BioDiversity of the Mediterranean Experiment)
- **HyMeX** (Hydrological cycle in the Mediterranean Experiment)
- **MerMeX** (Marine Mediterranean Experiment)
- **SICMed** (Continental Surfaces and Interfaces in the Mediterranean area)
- Programme Recif Prado