

## BACKGROUND

The rising number of regulatory frameworks and scientific initiatives on natural resources and environmental asset protection reflects the concern on Natural Capital (NC) depletion at the international level. At the same time decision making capacity is becoming urgent at the scale of local ecosystem service (ES) supply. Operational frameworks should allow effective implementation of ES planning into natural resources management at multiple-scale. The EU FP7 OpenNESS project (<http://www.openness-project.eu/>) adopts a multi-scale approach to integrate case study analysis into the process of decision making support at different levels..

The French case study is located in the Vercors Mountains Range (French Alps), focusing mainly on natural and semi-natural habitats. The area is hotspot for biodiversity and recreation activities, and, at the same time, highly sensitive to rapid land cover changes.

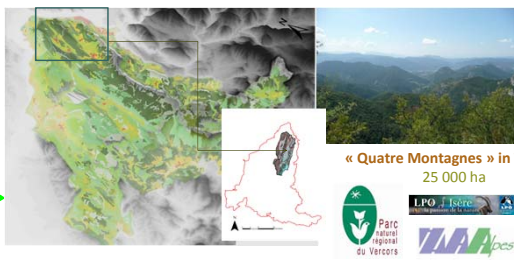
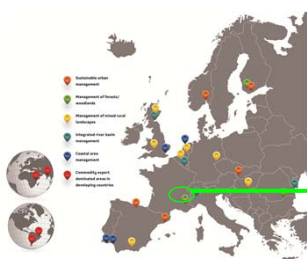
## A multifunctional landscape



securing the long-term provision and demands of mountain ecosystem services

Photos @ S. de Danielli, G. Loucougaray, M. Redon, S. Luque

The OpenNESS approach: a place-based exploration of the ES and NC concepts



LTSER ALPS – Coupled dynamics of alpine ecosystems, land use and climate

The area present specific issues related to the loss of grasslands and open areas, the loss of traditional practices (pastoralism) and the impact of suburban sprawl and tourism (ski resorts). Those issues and the related services shift need to be investigated through a spatio-temporal approach which analyses the distribution of land use and landscape patterns affecting the delivery of ES.

## OPENNESS ES & NC TOOLS

### 1. COMBINING DIFFERENT METHODS FOR SPATIALLY-EXPLICIT MAPPING OF ES

A **hybrid model** is applied to map the **recreation supply**, it combines a crowdsourced information analysis with a linear prediction model and an accessibility/demand analysis.

The **INVEST Timber and Carbon Model** will be used to map the **timber value and carbon (storage, sequestration and value)** for forest ecosystems.

### 2. INTEGRATED VALUATION OF ECOSYSTEM SERVICES

**Bayesian belief network (BBN)** are constructed in collaboration with R. Smith (CEH) in order to compare ES supply with **biodiversity conservation** objectives and conflicts. BBN-GIS is tested in collaboration with JHI.

### 3. ECOLOGICAL AND SOCIO-ECONOMIC TRAJECTORIES

A spatio-temporal approach will analyze the distribution of land uses and landscape patterns affecting the delivery of ecosystem services using **Dinamica EGO**.

## SPECIFIC QUESTIONS/ISSUES:

### HOW MANAGE ECOSYSTEMS IN A WAY THAT PROMOTES ECOLOGICAL SUSTAINABILITY?

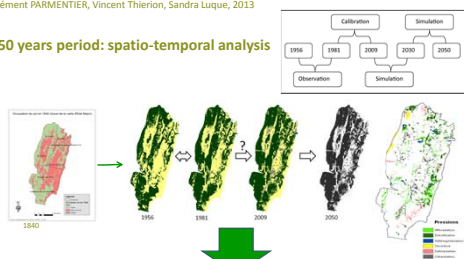
- What are the major requests to adapt / improve and introduce the ES concept in multi-scale/ multifunctional decision processes?
- How to simultaneously maintain economically and ecologically sustainable forestry at the landscape scale and in the long run?
- How to enhance long-term sustainable development of desired services?
- How to translate perception and needs from stakeholders and local population on plausible land use change scenarios given different options?
- Trade offs: How to balance the objectives of multifunctional landscapes: how to deal with production of one service when is targeted at the expense of another?

## RESULTS SO FAR

### Spatio-temporal approach

Clément PARMENTIER, Vincent Thierion, Sandra Luque, 2013

### 150 years period: spatio-temporal analysis



A scenario model combines past landscape trajectories with **stakeholder input** of transition likelihood and physical factors that determine suitability to generate future land cover



DINAMICA Ego®

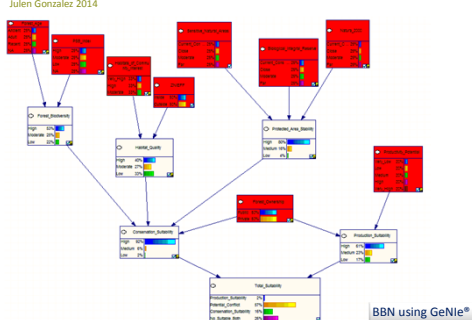


System Understanding – Pressures shift Through time

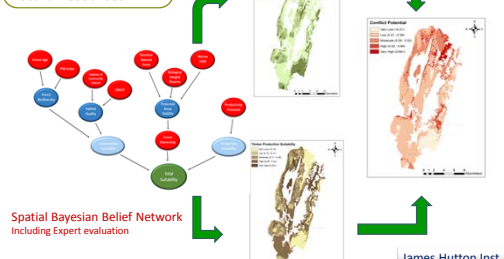
- Increase of Mixed Forest
- Decrease on Transitional land
- Stability for other forest types

### Bayesian Belief Network model

Julen Gonzalez 2014



Reconciling biodiversity conservation with the increased demands of natural resources



## EXPECTED RESULTS

- Development and refinement of spatially-explicit methods for assessing and comparing different ES
- Production of maps and scenarios based not only on biophysical changes but also on knowledge on past landscape trajectories within a participatory framework
- Production of maps highlighting potential conflicts and trade-offs between different ES
- Transfer knowledge to forest owners and managers, policy makers and society at large that benefit from the goods and services provided by forests
- New insights on the integration of ecosystem services into sustainable management of complex forested landscapes



## REFERENCES:

Gonzalez J. 2014. Using a Spatial Bayesian Belief Network Software to Integrate Conservation and Productivity in Land-Use Planning: A Forest Land Suitability Assessment at the French Alps. Dissertation in MRes Sustainable Development, University of St Andrews, 22nd August 2014.

Thierion, V., Parmentier, C., Cordonnier, T., Luque, S., 2013. Simulation des dynamiques paysagères : analyse de l'évolution d'indicateurs de production et de biodiversité forestière dans les Quatre Montagnes. Actes du séminaire "Forêts et écosystèmes cultivés : vers une intensification écologique ?". 3 - 4 Décembre 2013, Grenoble, France. 7p.