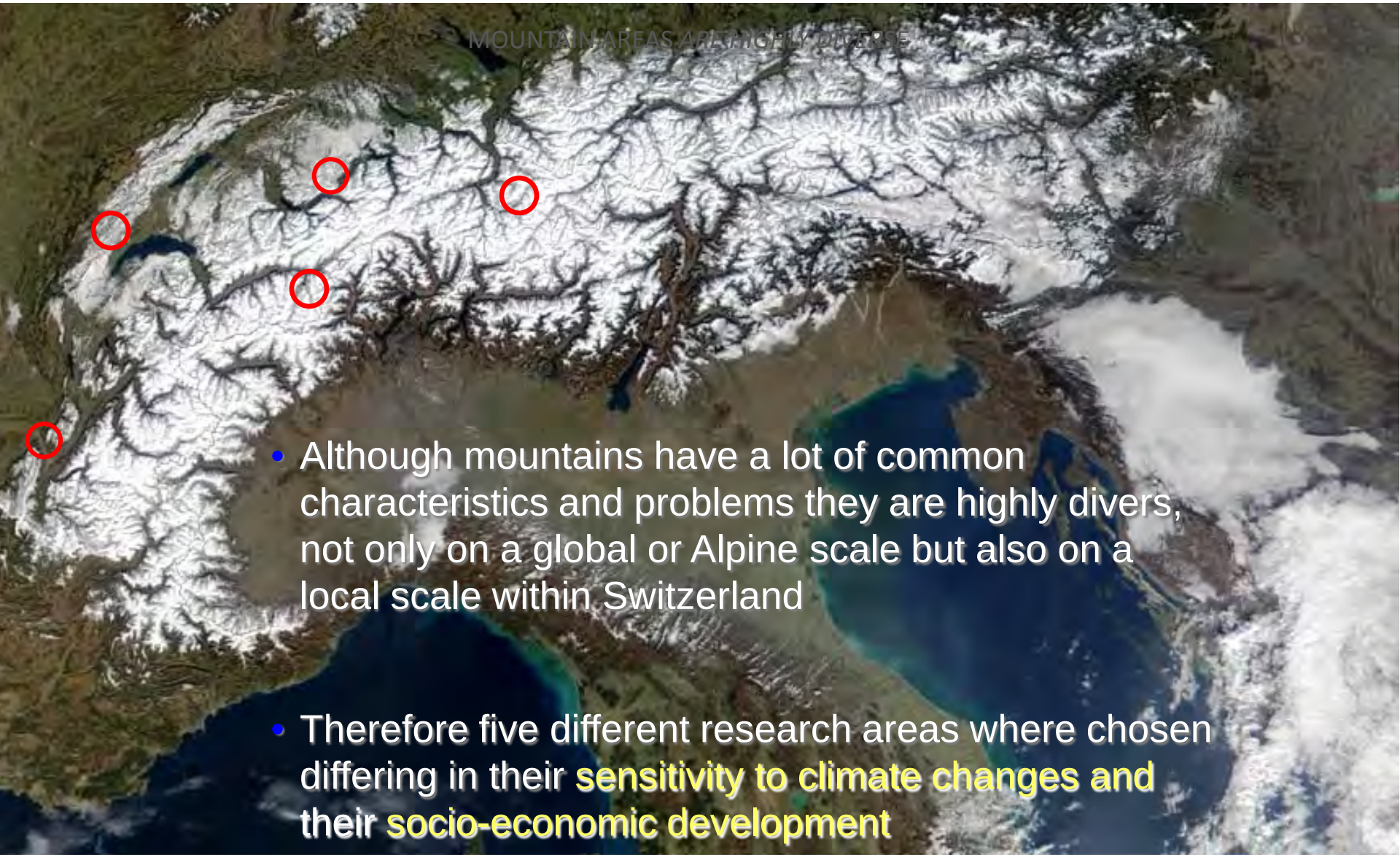
MOUNTLAND I
HydroServ
MOUNTLAND II
OPERA

Adrienne Grêt-Regamey

PLUS
PLANNING OF LANDSCAPE AND URBAN SYSTEMS

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Alpine Social-Ecological Systems



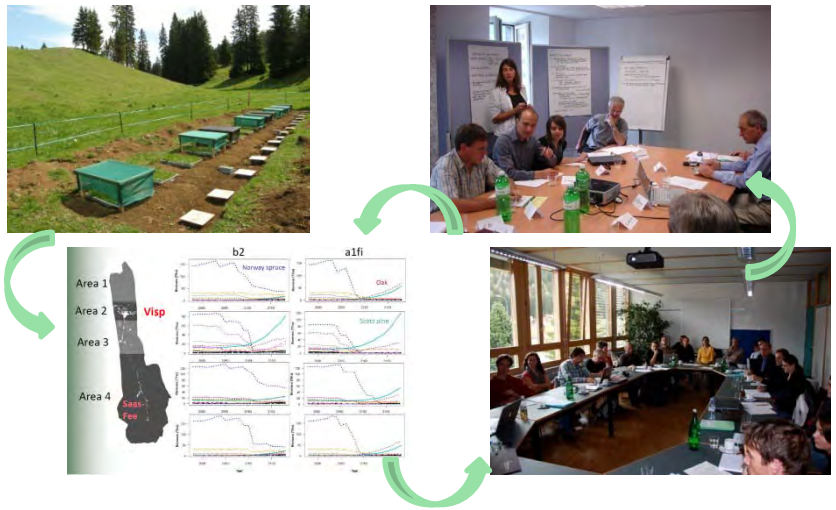
- Although mountains have a lot of common characteristics and problems they are highly divers, not only on a global or Alpine scale but also on a local scale within Switzerland

- Therefore five different research areas where chosen differing in their sensitivity to climate changes and their socio-economic development

MOUNTLAND I

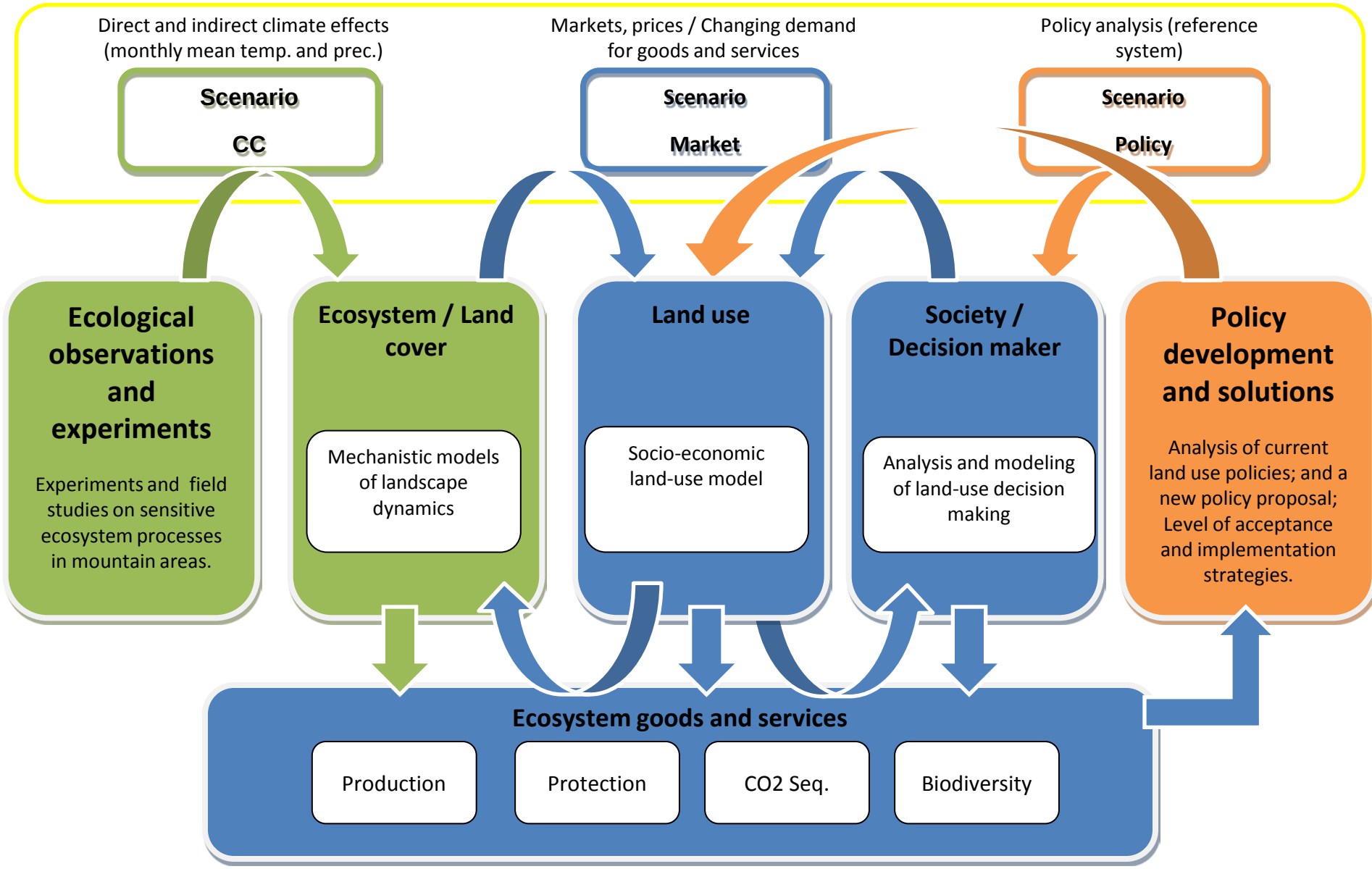
The goal is to contribute to the **development of adapted land-use practices and realizable policy solutions** for mountain regions that

- (1) warrant the life-supporting services required for sustainable development,
- (2) are economically and ecologically efficient, and
- (3) socially and institutionally feasible.

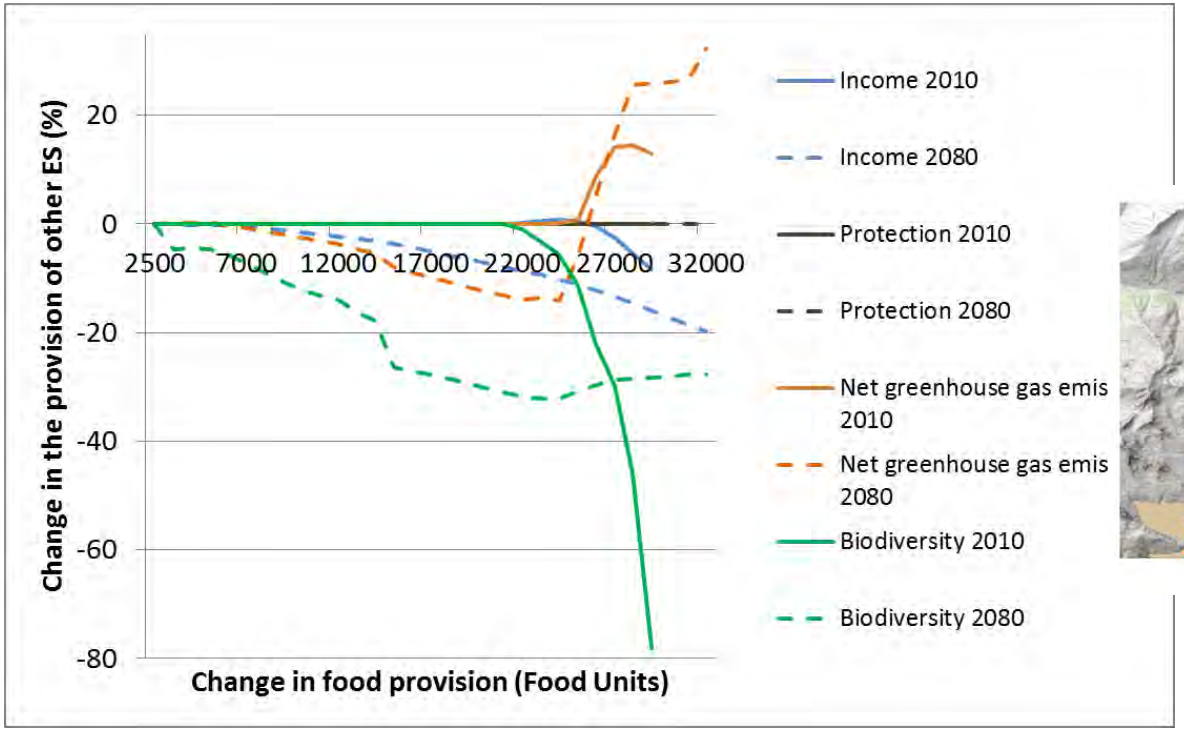


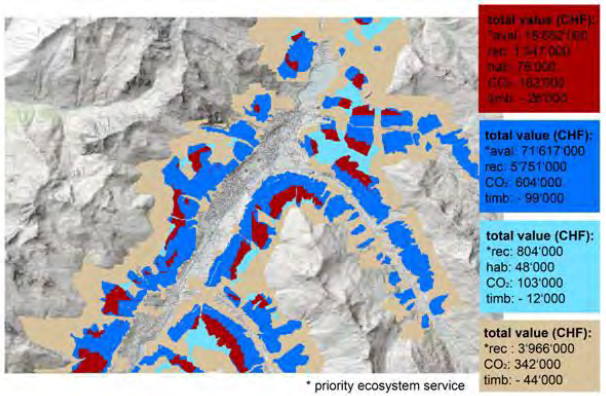
- We apply an integrative approach by combining methods of **economics, political science and natural sciences** to analyze ecosystem functioning and management in mountain regions under climate change.

MOUNTLAND I


Direct and indirect climate effects (monthly mean temp. and prec.)
Scenario CC
Markets, prices / Changing demand for goods and services
Scenario Market
Policy analysis (reference system)
Scenario Policy
Ecological observations and experiments
Experiments and field studies on sensitive ecosystem processes in mountain areas.
Ecosystem / Land cover
Mechanistic models of landscape dynamics
Land use
Socio-economic land-use model
Society / Decision maker
Analysis and modeling of land-use decision making
Policy development and solutions
Analysis of current land use policies; and a new policy proposal; Level of acceptance and implementation strategies.
Ecosystem goods and services
Production
Protection
CO2 Seq.
Biodiversity

Results : Trade-offs





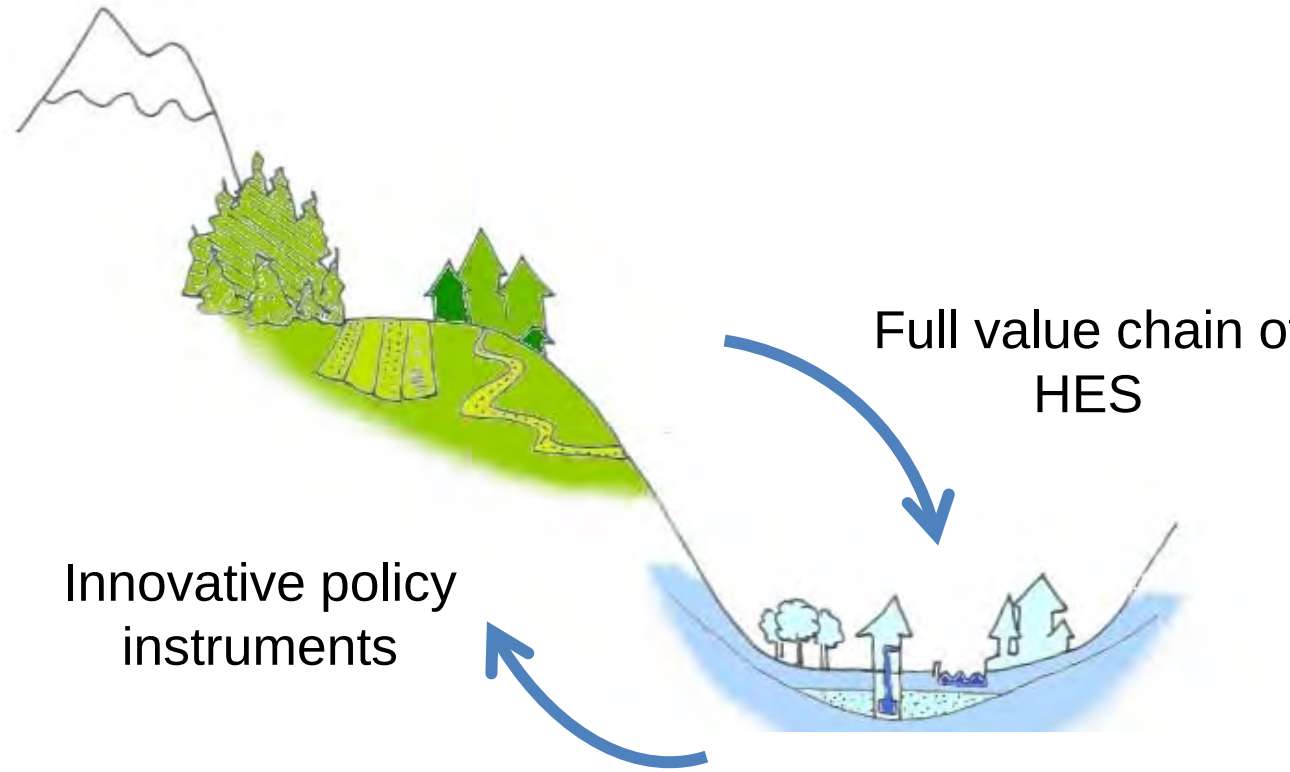
Trade-offs between the provision of food and other ES as well as the sectoral income today (continuous line) and in the year 2080 (dashed line)

Changes in climate and socio-economic parameters will affect trade-offs between different ES.

HydroServ

The goal is to

- foster understanding on **the full value chain of HES**
- suggest **innovative policy instruments to bridge supply and demand** for HES



HydroServ

Vegetation model

Hydrological model

Ecohydrological Model

Discharge
Water quality

Value Ecosystem Services

Preferences

-Agriculture/Wood Production

-Drinking water production

-Water regulation

-Recreation

-Energy

CHF/ESL/year

Policy instruments

Institutional regime

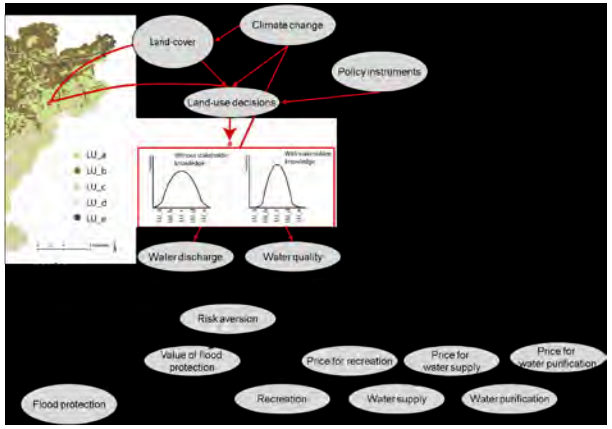
Management

Land use decision model

Stakeholder-knowledge

(spatially explict) data

Land Use



MOUNTLAND II / OPERA

1. Future states

FORECASTING

(TA, 02.12.08)

Current state

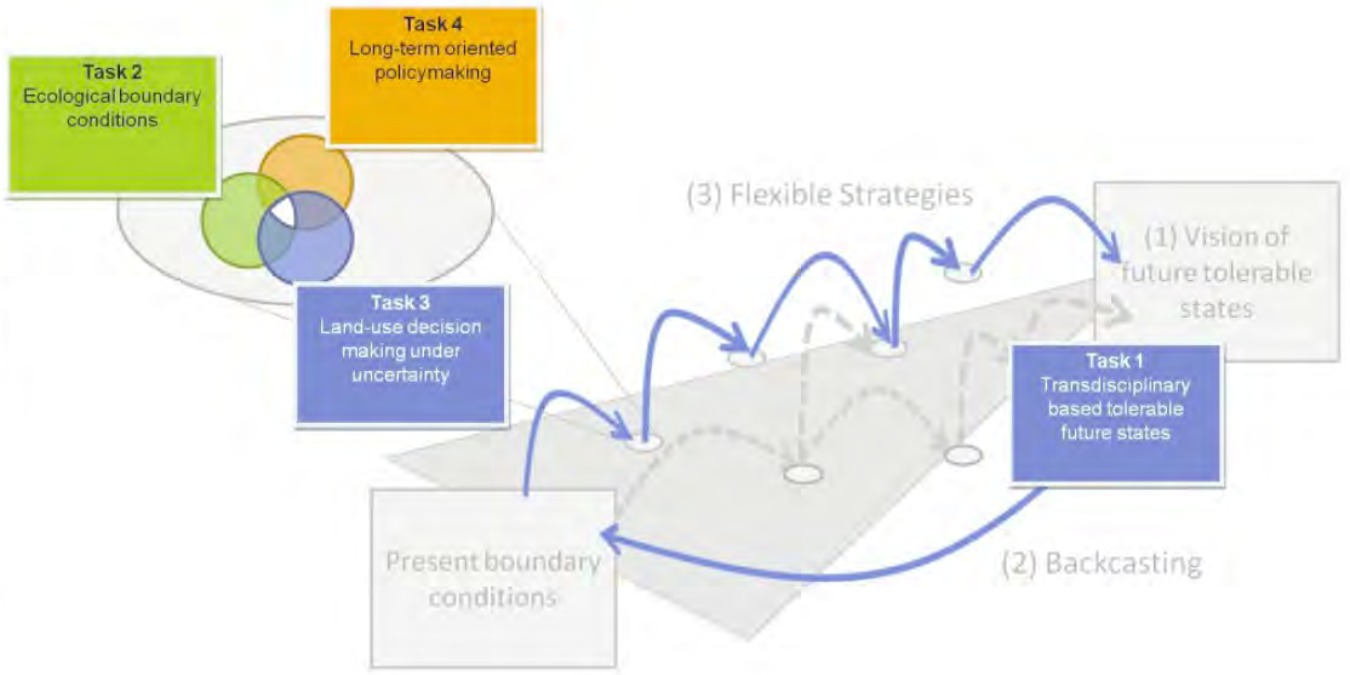
2. Backcasting

MOUNTLAND II / OPERA

Step 1
Transdisciplinary elaboration of tolerable future states via 3D landscape images (Task 1)

Step 2
Assessment of ecological, socio-economic, and political boundary conditions and decision space in each development step using forecast modeling (Task 2-4).

Step 3
Prioritization of policy and management options that support the achievement of future tolerable states (Synthesis).



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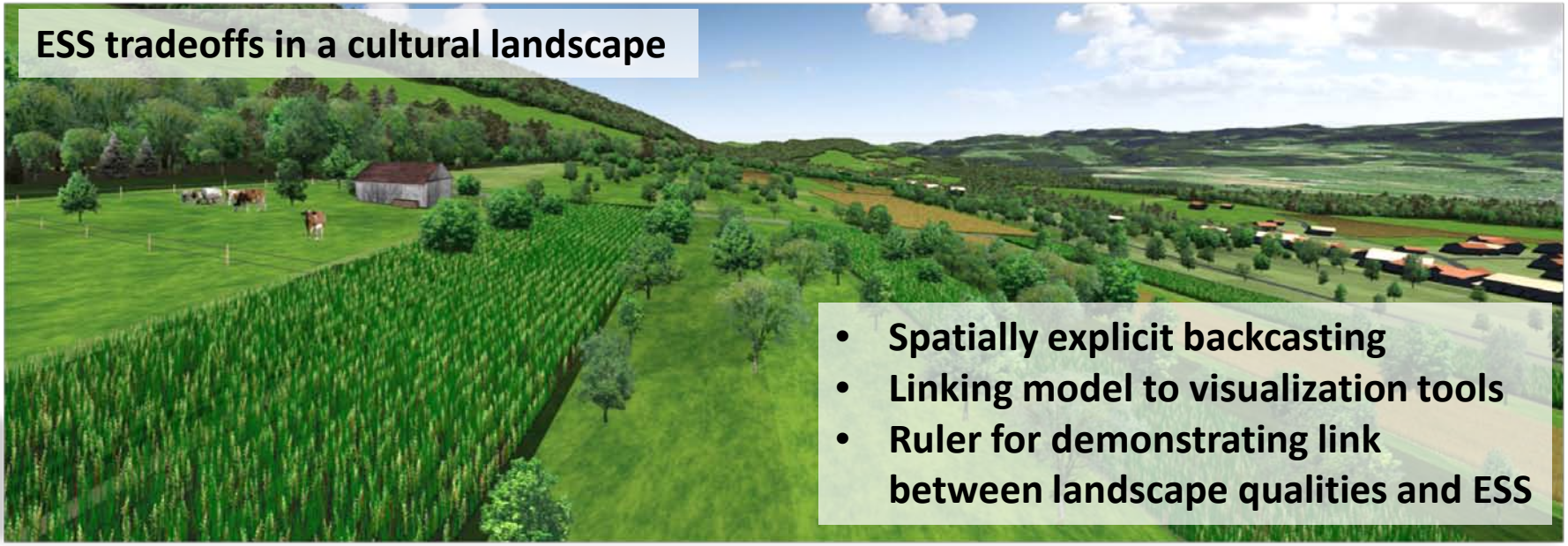

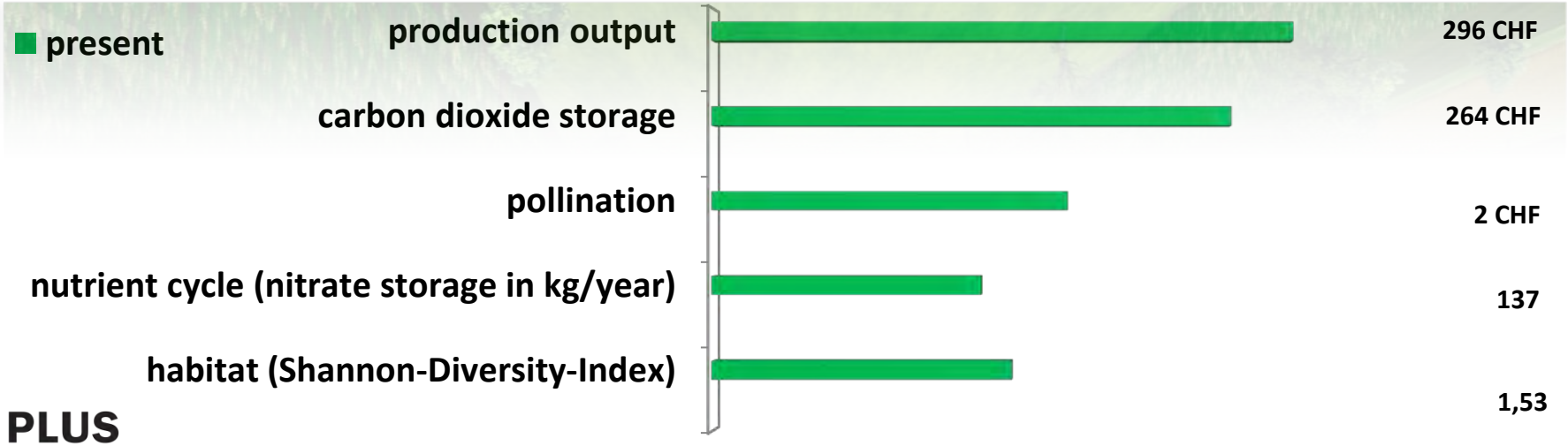

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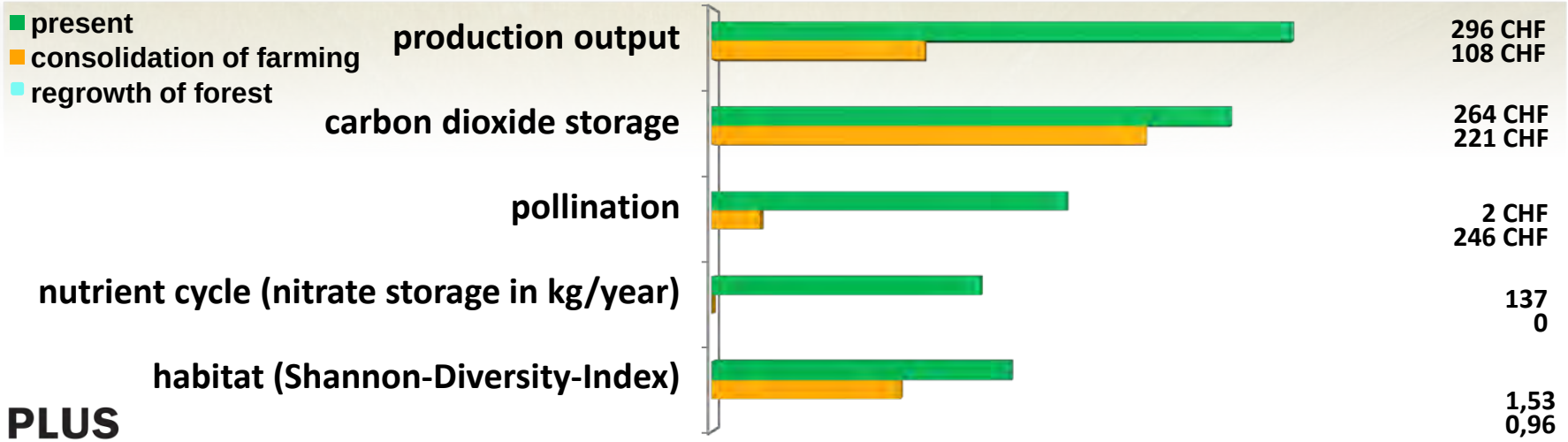

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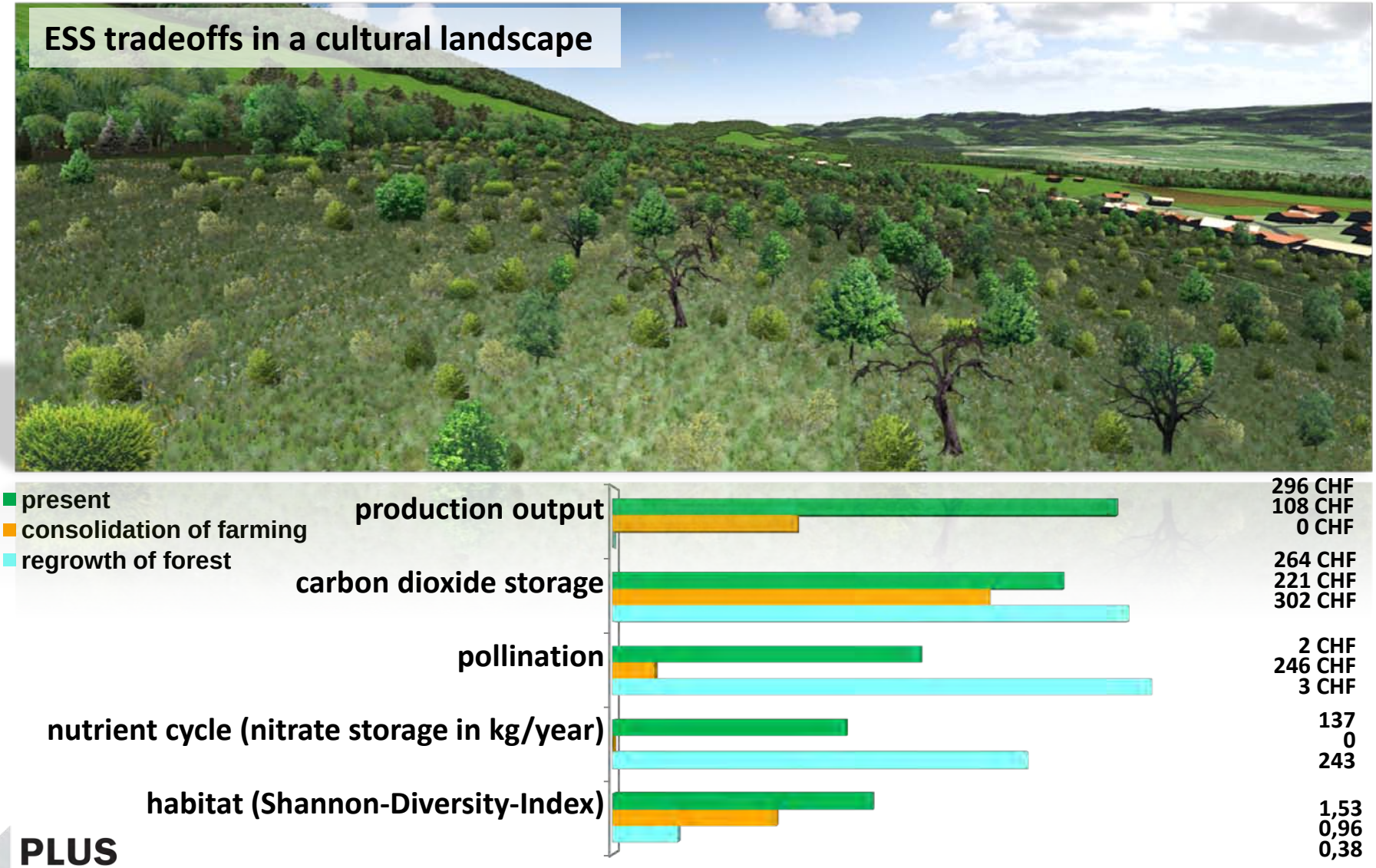

FORECASTING

Spatial, economic, ecological requirements

$$\overline{P}^{RP} = \hat{\beta}_0 + \hat{\beta}_1 SQM + \hat{\beta} X^*$$

BACKCASTING

ETH
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Swiss Federal Institute of Technology Zurich

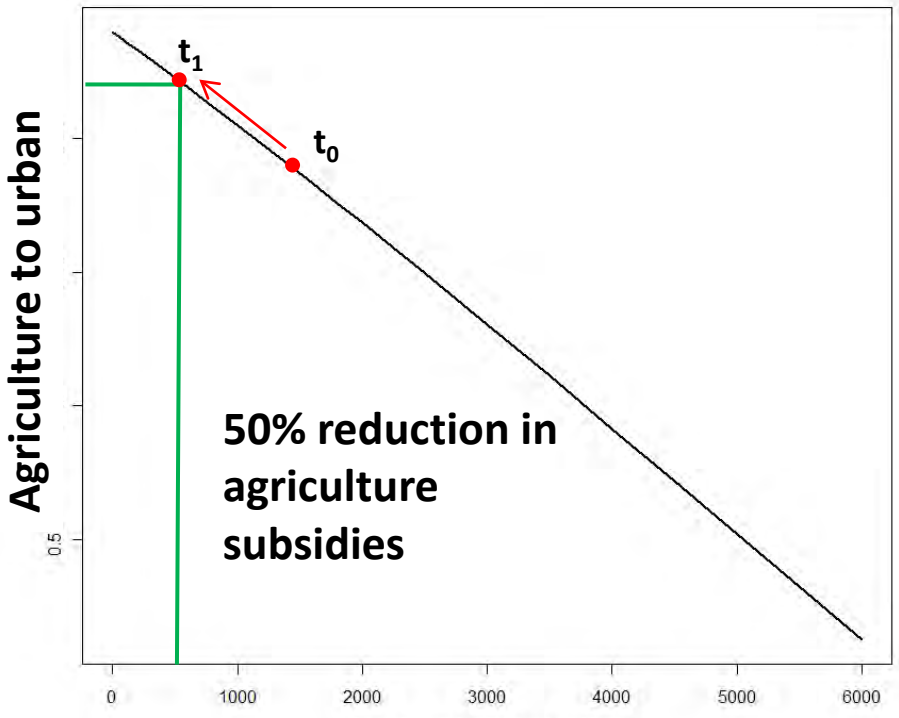
EPFL
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

PLUS
PLANNING OF
LANDSCAPE AND
URBAN SYSTEMS

What – Where - How?

CLUSTER 1

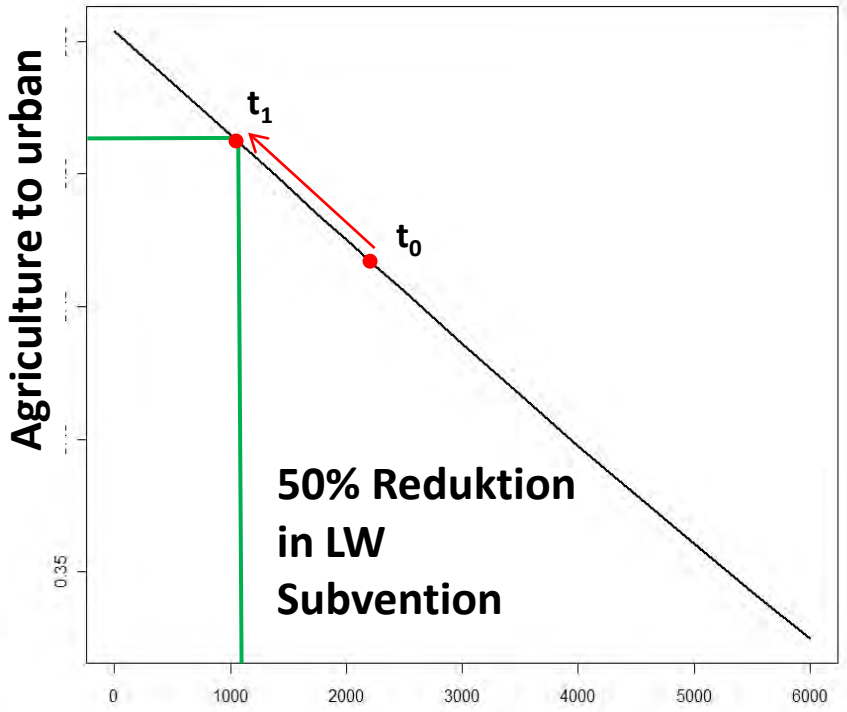
- Distance CBD: 775 m
- Subsidies: 1040 CHF/ha Jahr



Agriculture subsidies in CHF per ha and year

CLUSTER 2

- Distance CBD: 2100 m
- Subsidies: 2540 CHF/ha Jahr



Agriculture subsidies in CHF per ha and year

Research network

Swiss Federal Institute of Technology Zurich ETHZ

Chair of Planning of Landscape and Urban Systems – Prof. Grêt-Regamey

Chair of Environmental Policy and Economics (PEPE) – Prof. Engel

Chair of Agri-food and Agri-environmental Economics (AFEE) – Prof. Lehmann

Chair of Forest Ecology (FE) – Prof. Bugmann

Chair of Natural and Social Science Interface (NSSI) – Prof. Scholz

Chair of Hydrology (IFU) – Prof. Bugmann

Swiss Federal Research Institute for Forest, Snow and Landscape WSL

Research Unit Forest Dynamics (FD) – A. Rigling

Research Unit Forest Ecosystem Processes (FEP) – M. Dobbertin

Research Group Forest and Treeline Ecosystems (EB) – P. Bebi

Research Group Environmental Process Modelling (EPM) – H. Lischke

Research Group Soil Biogeochemistry (SB) – F. Hagedorn

Ecole Polytechnique Federal de Lausanne EPFL

Ecological Systems Laboratory (ECOS) – Prof. Buttler

Swiss Graduate School of Public Administration

Political sciences – Prof. Knöpfel

Universität Bayreuth

Chair of Ecosystem Services – Prof. Köllner

Swiss Graduate School of Public Administration

Ecological Systems Laboratory (ECOS) – Prof. Buttler

AND FP7 Research Group….

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