recharge.green –
Balancing Alpine energy and nature

Brief introduction to the project

@greenAlps Stakeholder Workshop, Triglav – Prealpi Giulie, 26-27.5.2014

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The project framework

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o ## Aim:

o ## To provide the basis for balancing Alpine renewable energy production and nature conservation

o **Expected outputs:**
  o Assessment of the Alps' renewable energy potential (biomass, solar, wind and hydro) and tools to evaluate trade-offs with other ecosystem services

o Co-funded by Alpine Space Programme /ERDF (Total budget: 2,7 mio €)

o Duration: October 2012 – June 2015

o 16 partners from 6 countries (research institutes, administrations, energy companies)

The context

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Environmental, social & economic issues

Demand for:

- sustainable sources of energy (climate change mitigation)
- economic development in the region

vs.

Conservation of:

- Ecological connectivity
- Biodiversity (species, ecosystems)
- Ecosystem services

Questions

o What could be the impact of development of RE on the habitats of animals and plants?

o How do they affect land use and soil quality?

o How much renewable energy can reasonably be used?

Expected results

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- Assessment of the status quo of Alpine renewable energy production and of potential (with maps)

- Trade-off analysis (RE production vs. biodiversity conservation/ecosystem services)

- Decision-support system for RE development considering ecological trade-offs and economic dimensions
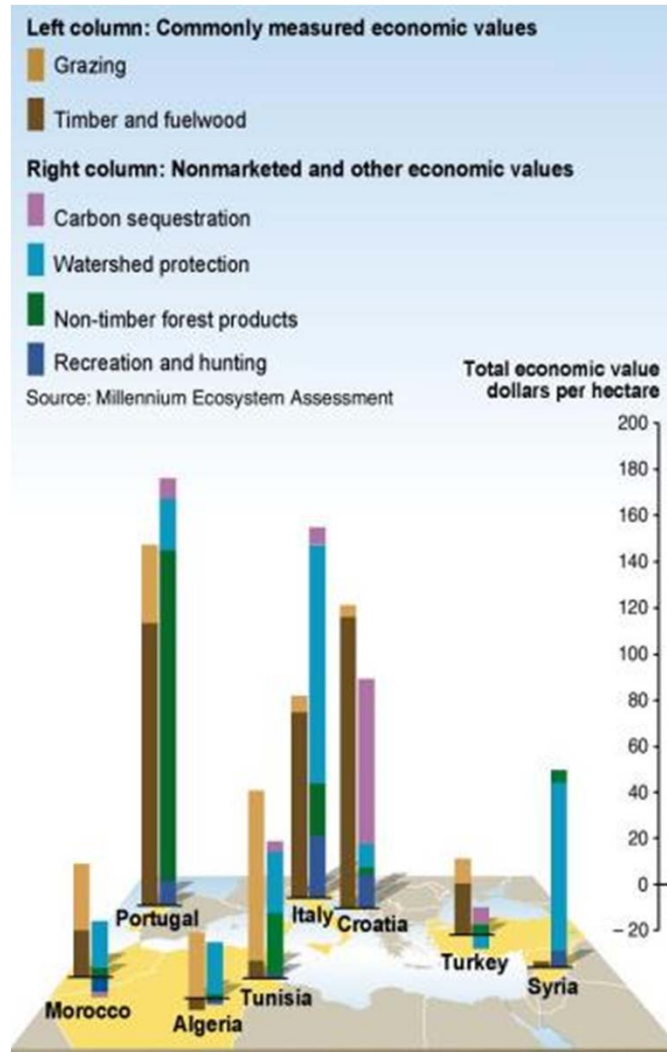
Photo Leo Setä (CC)

What are ecosystem services? recharge green

Ecosystem services are the multiple benefits provided by ecosystems to humans.
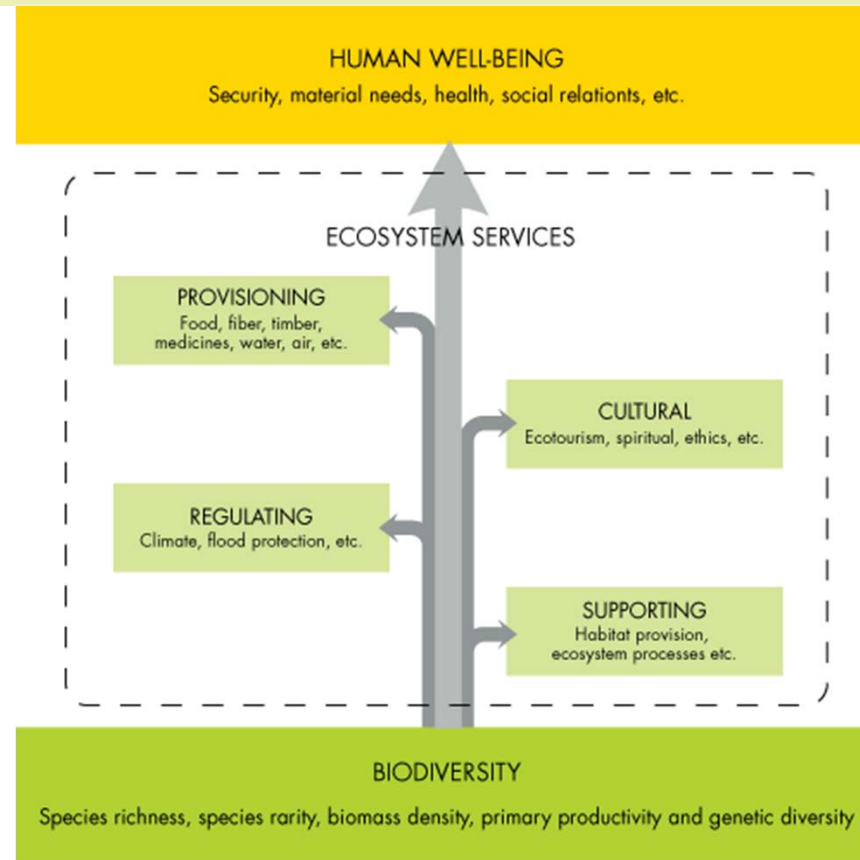
Source: Ewing B., D. Moore, S. Goldfinger, A. Oursler, A. Reed, and M. Wackernagel. 2010. The Ecological Footprint Atlas 2010. Oakland: Global Footprint Network.
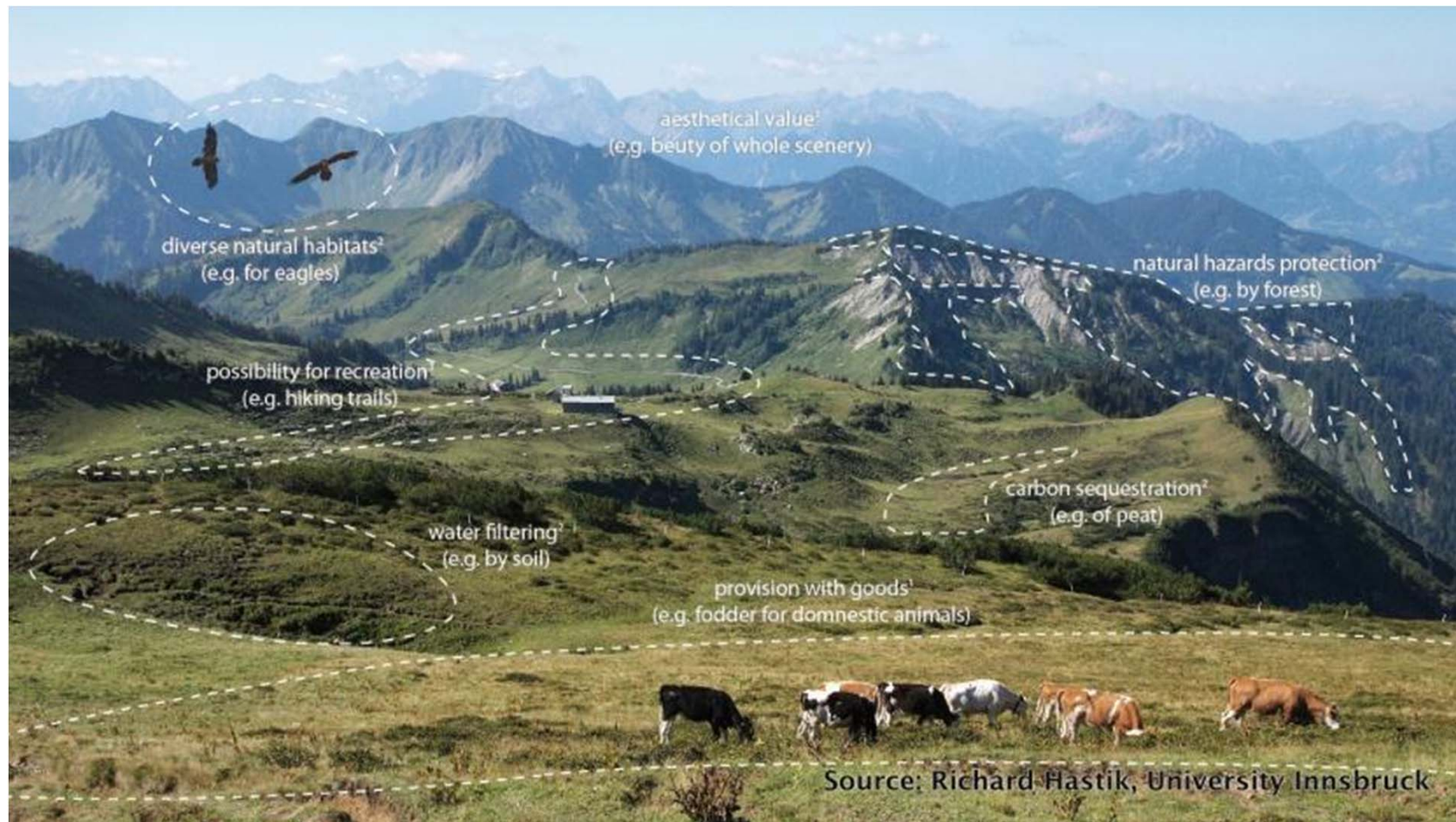
So what´s the problem?

Left column: Commonly measured economic values
- Grazing
- Timber and fuelwood

Right column: Nonmarketed and other economic values
- Carbon sequestration
- Watershed protection
- Non-timber forest products
- Recreation and hunting

Source: Millennium Ecosystem Assessment

Total economic value dollars per hectare

Ecosystem services in the Alps

First steps...

Different tools being tested

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Different paths can be taken to achieve similar goals (no "one-size fits all" solutions.
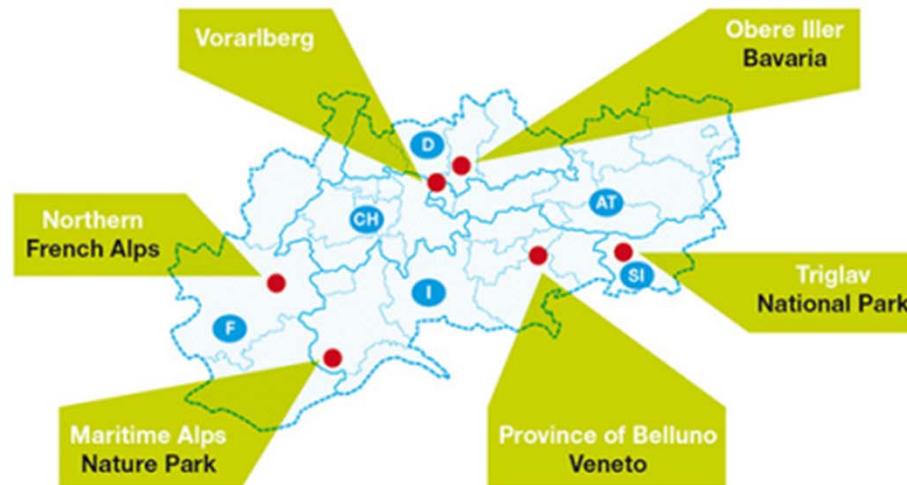
→ We are testing various methods in different regions.

More important than the particular method:

<u>thinking holistically</u>.

Pilot Areas

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o For „ground-truthing" (feedback on the tools)

Different emphases in pilot areas:
- Woodland biomass vs. biodiversity (Maritime Alps, Triglav)
- Hydropower vs. biodiversity (Maritime Alps, Bavaria, Belluno)
- All forms of RE vs. ecosystem services (Vorarlberg)
- Hydropower & water resource management (Northern French Alps)

Economic bioenergy potential
## (Austrian Partner IIASA)

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- Bioenergy is competing with other energy production types (i.e. costs of fossil fuels).

- Economic supply: (heat & electricity) met by both scenarios.

- Significant local difference of harvesting intensity.

BeWhere

➢ These graphs show the first results for recharge.green from IIASA's BeWhere and G4M models, optimizing the location of bioenergy plants to maximize either carbon sequestration (top) or bioenergy production (bottom). The gradiant of green colors shows the amount of carbon storage over the landscape, while the red boxes (and according gradient in red) show the harvesting intensity in different harvesting areas.

Harvesting intensity/cell (1,000 m³/ yr)
0 – 12
13 – 32
33 – 60
61 – 87
88 – 141

Carbon sequestration scenario

tC/ha

1,000 m³
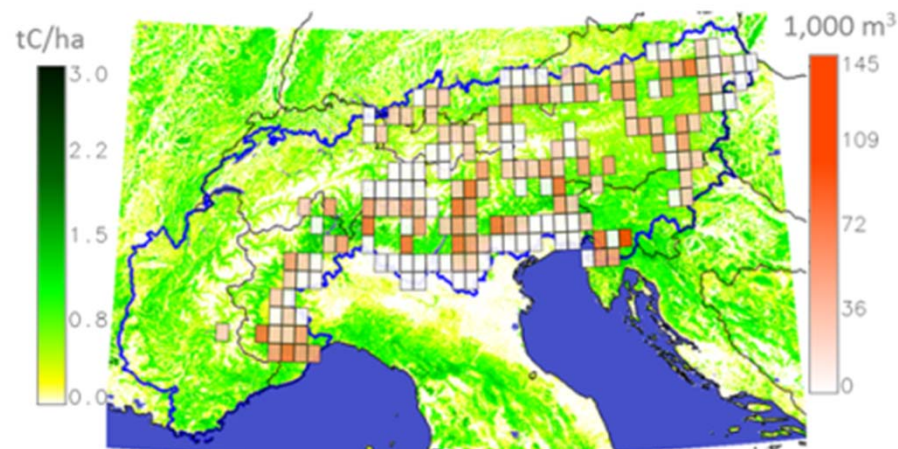
Biomass production scenario

tC/ha

1,000 m³
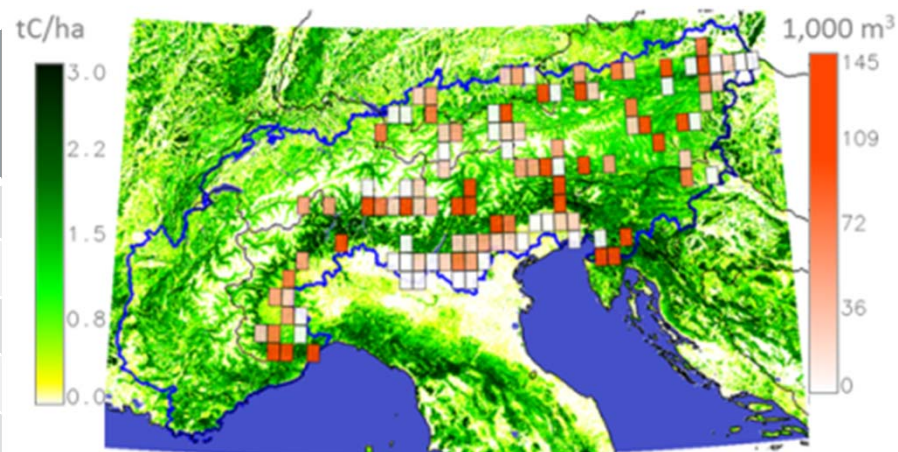
Source: BeWhere www.iiasa.ac.at/Bewhere
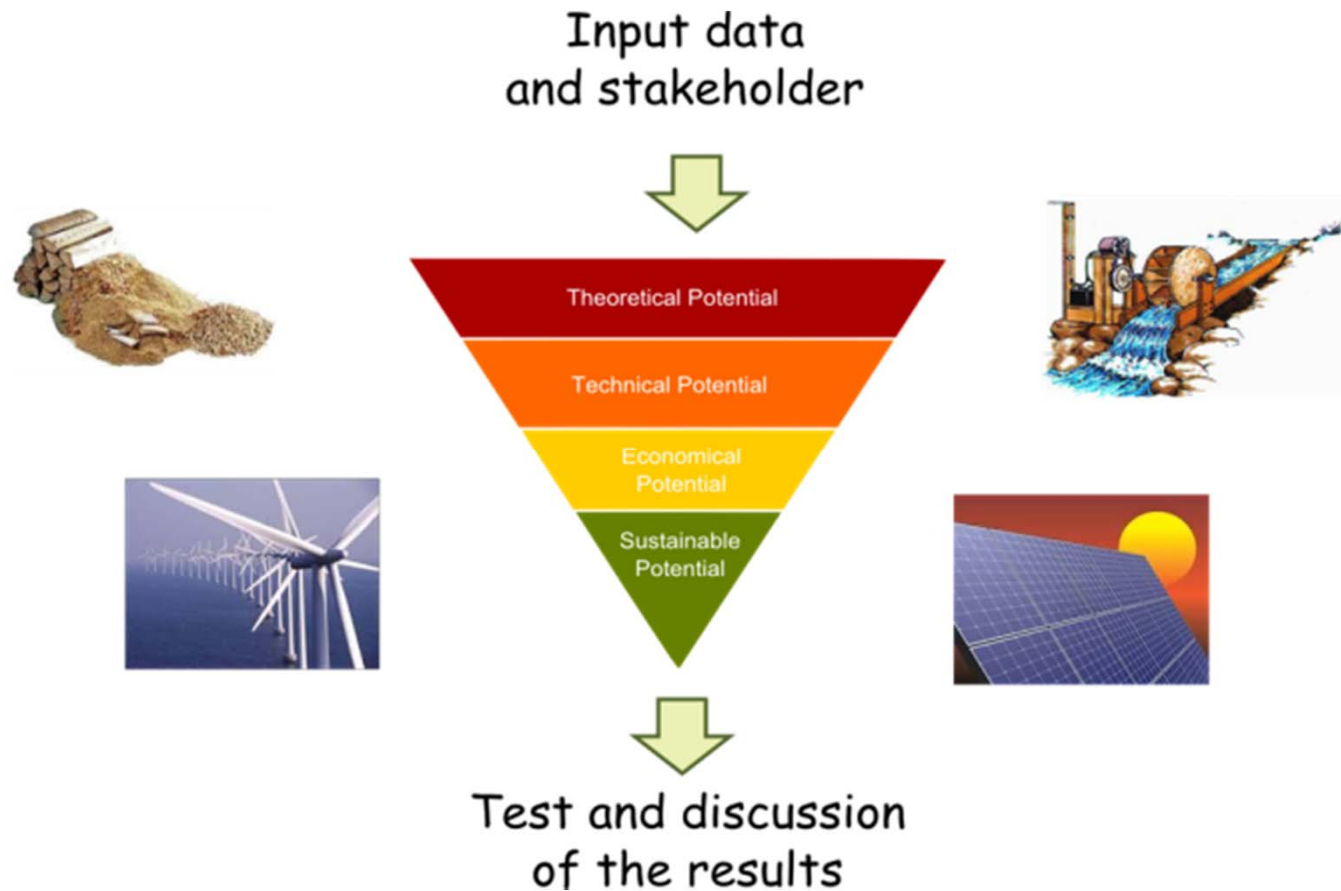
This shows...

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Similar energy demand can be met under different scenarios. However, -sequestration maximization does not allow for lower cost high-intensity harvesting practices.

The pros and cons of bioenergy production have to be weighted against each other in an integrated and systematic manner while considering trade-offs with ecosystem services such as carbon sequestration or biodiversity.

Future work:

- o Further collection and assimilation of high-resolution input data for Pilot Areas.
- o Integration of other RE sources: Hydro, Wind, Solar.
- o Weighting RE production against the protection of key biodiversity hotspots.

Italian partner (EURAC): Analysis of renewable energy potentials in pilot areas

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Input data and stakeholder

Theoretical Potential
Technical Potential
Economical Potential
Sustainable Potential

Test and discussion of the results

Source: EURAC

Example – hydropower potential

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Hydro potential map

Legend

Hydro Potential [GWh/year]
- 0 - 71
- 71 - 226
- 226 - 436
- 436 - 795
- 795 - 1278
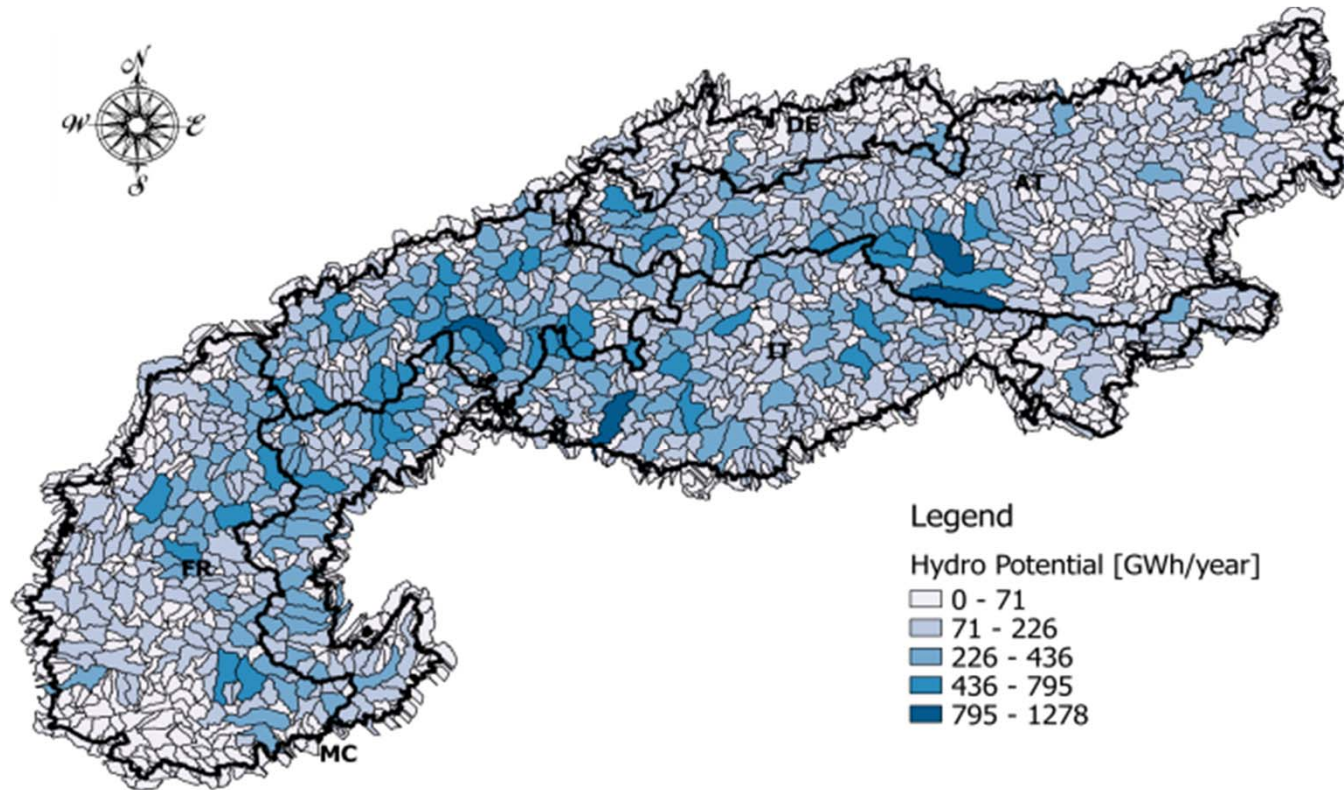
Source: processed by EURAC

Example from Italy:
Hydropower in Belluno Province
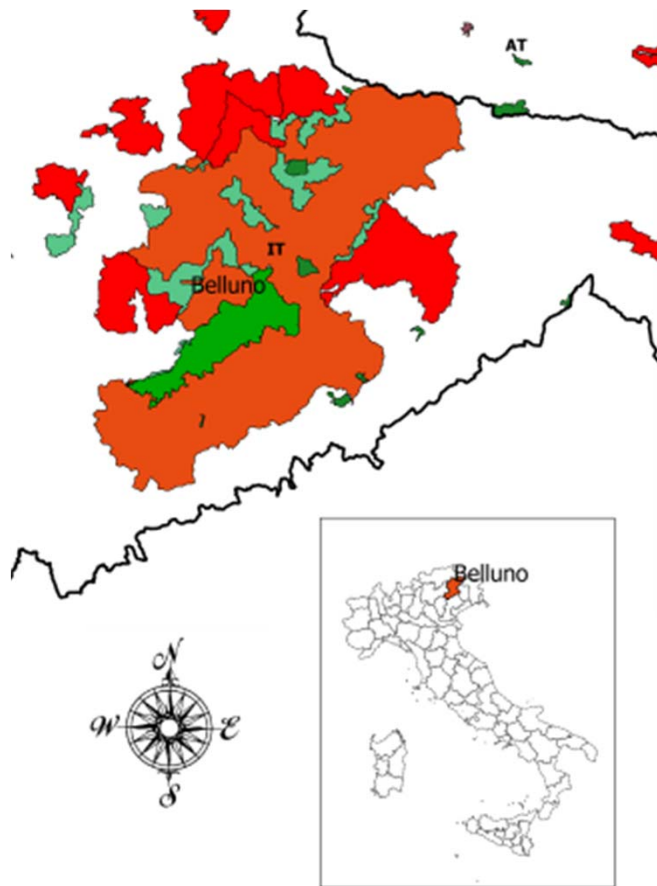

1. Natural potential 4 262 GWh

2. Enipedia production 2 230 GWh, GES production
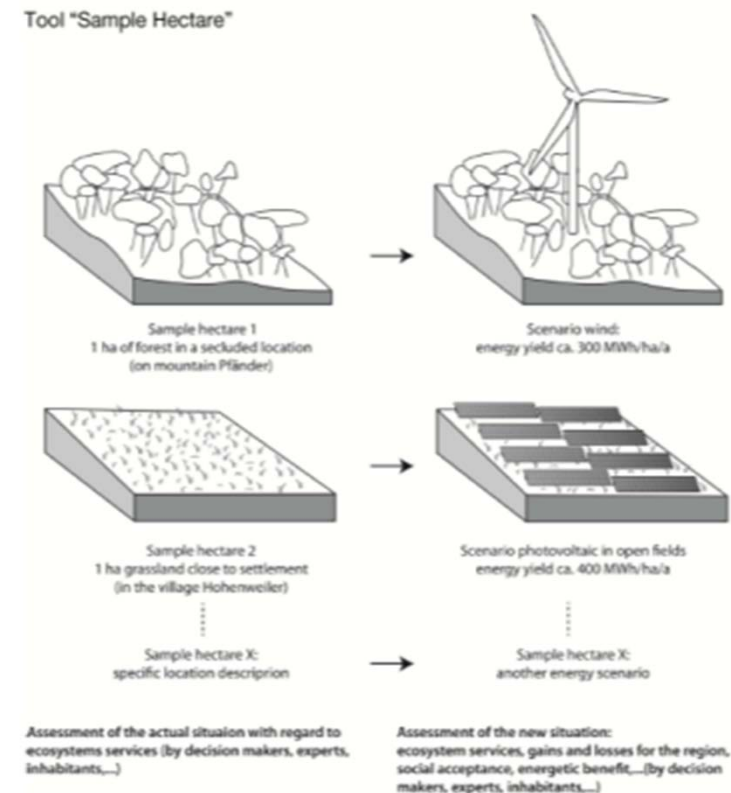
   2 010 GWh

   Technical, economical and environmental constrains 50%!

   Source: processed by EURAC

Example from Austria:
„Sample hectare" method in pilot area Vorarlberg (Leiblachtal)

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Decision support tool „sample hectare" is a schematic representation of trade-offs between ecosystem services and renewable energy forms.

- Evaluated by participants in workshops
- Results compared against expert interview results and scientific knowledge
- Allows a balance of integration of public interest in planning procedures without disregarding technical expertise

Tool "Sample Hectare"

Sample hectare 1
1 ha of forest in a secluded location
(on mountain Pfänder)

Scenario wind:
energy yield ca. 300 MWh/ha/a

Sample hectare 2
1 ha grassland close to settlement
(in the village Hohenweiler)

Scenario photovoltaic in open fields
energy yield ca. 400 MWh/ha/a

Sample hectare X:
specific location descriprion

Sample hectare X:
another energy scenario

Assessment of the actual situaion with regard to ecosystems services (by decision makers, experts, inhabitants,...)

Assessment of the new situation:
ecosystem services, gains and losses for the region, social acceptance, energetic benefit,...(by decision makers, experts, inhabitants,...)

Source: Richard Hastik, Univ. Innsbruck

Social network analysis

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The data of questionnaire allowed the analysis of the importance of stakeholders in the network in relational terms (relational social capital) for each pilot region
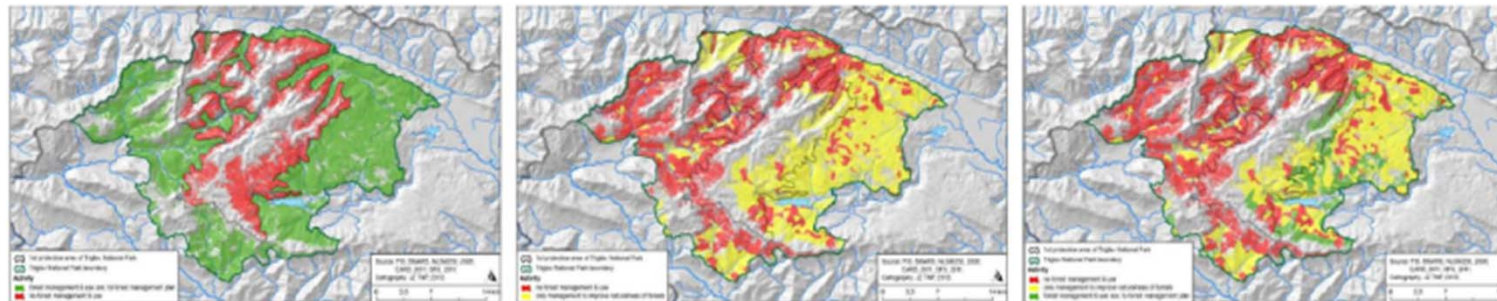
Leiblachtal pilot region: ego-network

Source: Miotello & Paletto, CRA, Italy

Example from Slovenia: Biomass use scenarios for Triglav National Park

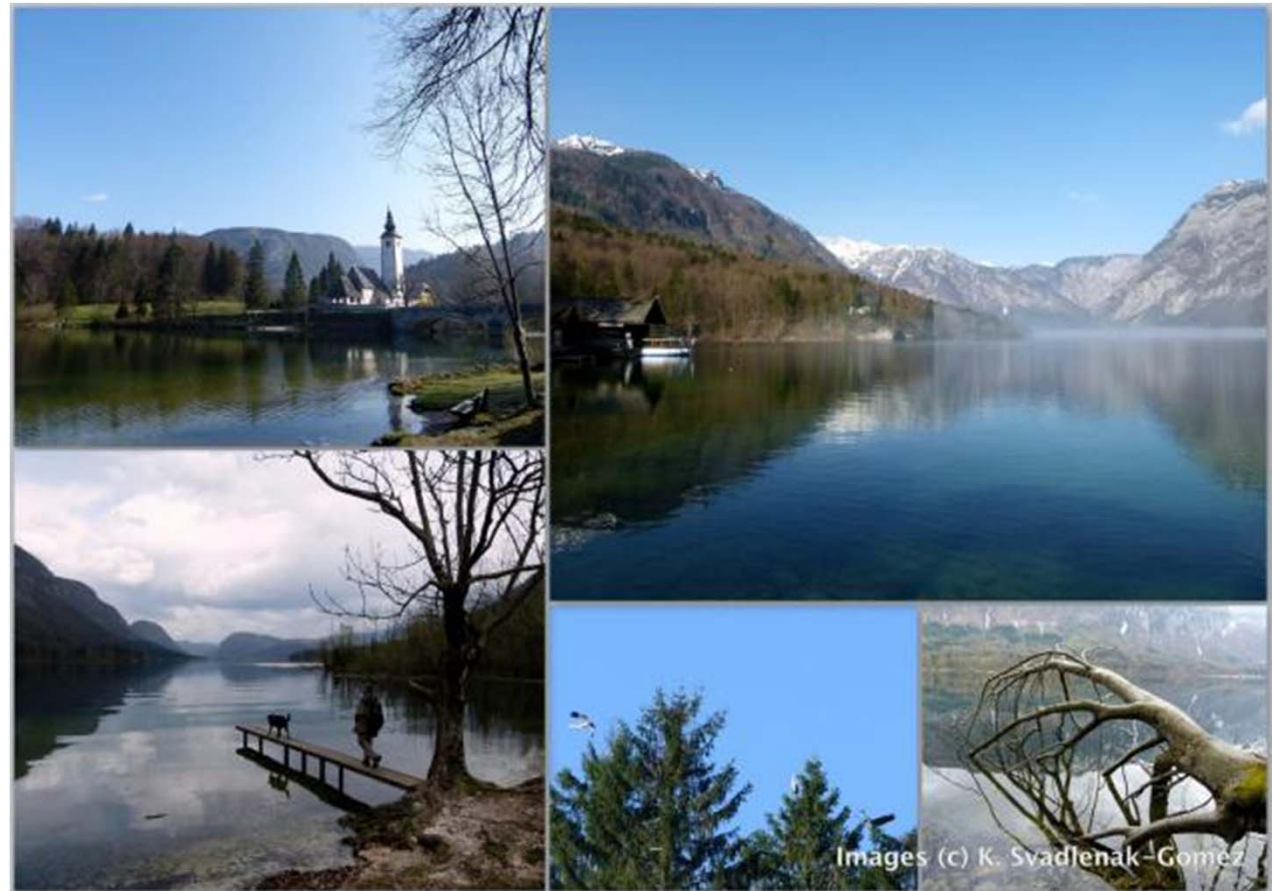recharge green

Draft scenarios using the WISDOM modeling tool

Scenario 0	Scenario 1	Scenario 2
Business as usual	**Promotion of natural components and supporting services 1**	**Promotion of natural components and supporting services 2**
No forest management and use in TNP 1st protection area	Protection of naturally structured forests in entire TNP	As S1 together with active management to improve natural structure
Conflict: use of forest biomass vs. other ESS, especially nature conservation	**Conflict:** with production function	**Conflict:** with production function

Common interests

Why does this matter for greenAlps?

Biodiversity & ecological connectivity are very relevant themes for recharge.green:

- Many ecosystem services depend on connectivity
- We will produce geographically explicit models to optimize setting of bioenergy production plants that include the consideration of biodiversity "hotspots" and other relevant indicators.
- Decision support system – tools are examples that can be applied to any context (proof of concept)

Images (c) K. Svadlenak-Gomez

Thank you!

Any questions?

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Alpine SPACE

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