Balancing biomass and biodiversity in protected areas; the Triglav National Park case study (Slovenia)

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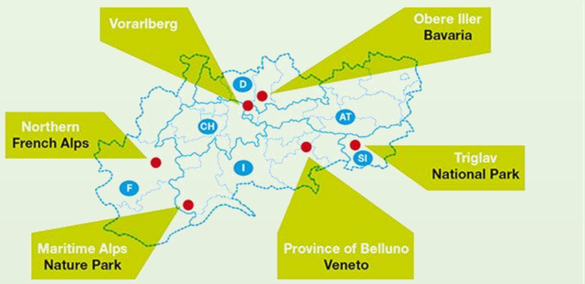
BALANCING ALPINE ENERGY AND NATURE
The RECGARGE.GREEN project

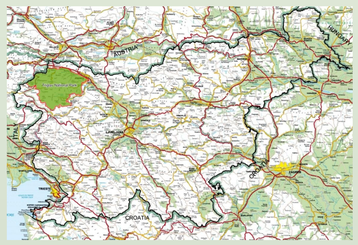
The Alps have great potential for renewable energy use and may valuably contribute to climate change mitigation. However, the renewable energy use may also increase the pressure on nature. What could be the impact of energy use changes on the animal and plant habitats? How do they affect land use and soil quality? How much renewable energy can reasonably be used?

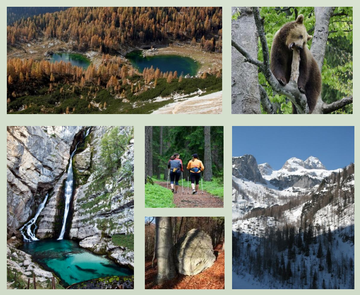


The Recharge.Green project brings together 16 organizations and institutions from six Alpine countries to develop strategies and tools for decision-making on such issues. The analysis and comparison of the costs and benefits of renewable energy, ecosystem services, and potential trade-offs is a key component in this process. The project will last from October 2012 to June 2015 and is co-financed by the European Regional Development Fund in the Alpine Space Programme.

Pilot area: TRIGLAV NATIONAL PARK

Triglav National Park (TNP) is the only national park and the largest protected area in Slovenia. It was named after Triglav, the highest Slovenian mountain (2,864 m). TNP extends along the Italian border and close to the Austrian border in the north-western part of Slovenia. Its territory occupies almost the entire area of the Slovenian part of the Eastern Julian Alps. It covers an area of almost 840 km^2 or nearly 4% of the Slovenian surface. TNP is among the first European national parks; it was established in 1924 as the first protected area, the Alpine Conservation Park.





The park's landscape is characterized by glacier-shaped valleys, mountain plateaus and steep mountain ridges above the tree line. It is a typical mixture between unspoiled nature areas and cultural landscape. Forest covers two thirds of the park's territory. The park provides a variety of ecosystem services (ESS) such as nature conservation, environment and cultural heritage protection, recreation and tourism. In addition, agriculture and forestry are important economical activities for people living in the park. Among the various renewable energy sources, woodland biomass has the greatest potential for sustainable use.

SCOPE OF THE STUDY

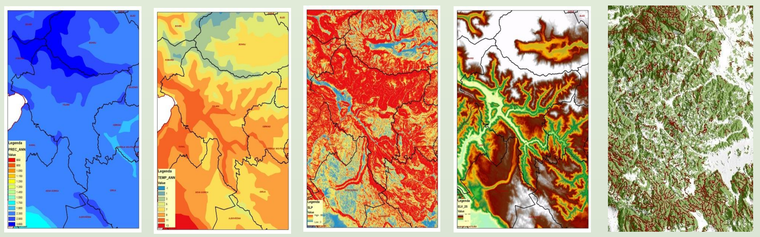
In Central Europe, national parks are mainly designed as protected areas where traditional use of forests is allowed. Sustainable forest management provides also wood for biomass heating, which is in line with the aim of protection and low-carbon society. For successful balancing between forest exploitation and nature conservation of spatial patterns of biomass demands need to be understood. In this research a WISDOM decision support system were used to evaluate four different scenarios in the Triglav National Park from biomass production and biodiversity conservation view.

MODEL

The "Wood fuel Integrated Supply/Demand Overview Mapping" (WISDOM) is a spatial-explicit method for highlighting and determining wood fuel priority areas: (www.wisdomprojects.net). The main idea and WISDOM principles were developed in a partnership between the FAO and the Institute of Ecology of the National University of Mexico (Masera et al., 2006, Drigo & Veselič, 2006).

The WISDOM model consists of several modules with vector and raster layers:

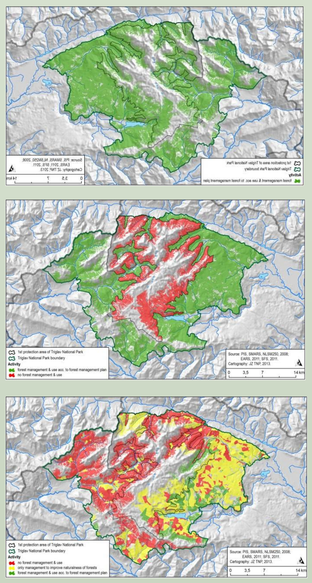
- SUPPLY (direct: forests, agricultural areas, abandoned areas and indirect: sawmill residues, municipal landfills, import);
- CONSUMPTION (residential, industry, export);
- INTEGRATION (supply/consumption balance raster maps);
- PRIORITY AREAS (woodshed analyses for current biomass consumption, planning locations for new plants /distance heating systems, priority areas for new road infrastructure).



SCENARIOS

The WISDOM tool was used to evaluate three scenarios of possible biomass supply in the study area:

- Scenario S1: business as usual with sub-scenarios: Current (S1a) and planned (S1b) supply.
- Scenario S2: nature protection. No felling in the core protection zone, felling in the secondary protection zone only where the naturalness of forests is highly changed and felling in the tertiary protection zone only where the forests are changed or highly changed.
- Scenario S3: biomass production scenario
  In tertiary, secondary and core protection zone 100%, 70%, and 30% of increment is cut.

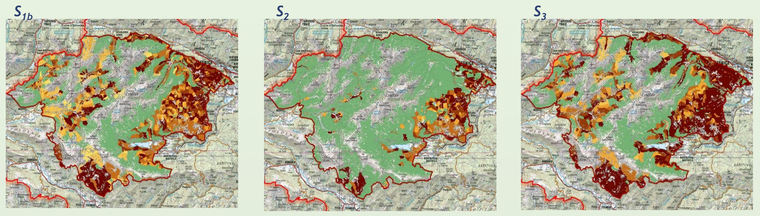


Additionally, we considered increasing demands for biomass use by simulating new biomass plant in Jesenice city with annual biomass consumption of 5,000 t, 20,000 t, and 30,000 t, respectively.

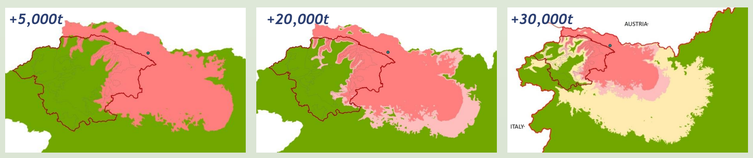
RESULTS

The preliminary results show that current demands for woody biomass energy within the park are relatively small and they could be entirely covered under any of the scenarios. If we consider also the demands for the energy from the bordering towns and cities, the estimated demand is much higher, but could still be covered by the planed cut in the management plans (scenario 1b) and by the increased use of forest (scenario 3). The current cut scenario (scenario 1a) and nature conservation scenario (scenario 2) would cover approximately 50 % of energy needs.

Scenario	Description	Supply (t/year)	Demands TNP (t/year)	Demands TNP+ nearby willages (t/year)
$S1_a$	current cut (year 2012)	12.250	2.940	19.940
$S1_b$	planned cut (management plans)	24.950		
S2	focus on the protection of nature (no felling allowed in the first zone, in the 2nd zone felling is planned only where the preservation of forests highly changed and in the third zone felling is planned only where the forests are changed or highly changed)	10.050	2.940	19.940
S3	increased use of forests, (in 3rd zone 100%, in the 2nd zone 70% and in the 1st zone 30% of increment is cutted)	35.400	2.940	19.940



Increased demands (e.g. new biomass plant) could be covered by biomass supply from much broader region. Supply areas corresponding to increased demands for woody biomass in case of establishment of new biomass plant in Jesenice with annual consumption of 5,000 tons (dark red), 20,000 tons (light red) and 30,000 tons (yellow) are presented in figure below. Alternatively, increased demands for biomass could be covered by increased production in the nearby area, which could cause conflicts with the conservation goals of park.



CONCLUSIONS

- Fuel wood production could be in accordance with management objectives of the protected areas, if properly planned and having well-stocked forests.
- To reduce risks of biodiversity loss and to avoid contradictory management objectives in the park, careful planning and appropriate management regimes are needed.
- Close-to nature forestry and adaptive approach with constant monitoring, planning and evaluation of realized measures could be the most appropriate one.
- Within the Recharge.green project current information on forests were complemented with additional information on soil, vegetation, birds, fungi and invertebrates, which allows better evaluation of forest management and biodiversity monitoring in the Triglav National Park.

Acknowledgement

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References

Masera et al. 2006. WISDOM: A GIS-based supply demand mapping tool for woodfuel management. Biomass and Bioenergy 30, 7: 618-637.

Drigo R., Veselič Ž. 2006. WISDOM – Slovenia. FAO Forestry Department, Wood Energy: 58 p.

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