A systematic approach to assess the impact of climate change on European protected areas

A case study in Triglav National Park

Tanja Menegalija

HABIT –CHANGE

Objectives of the project :

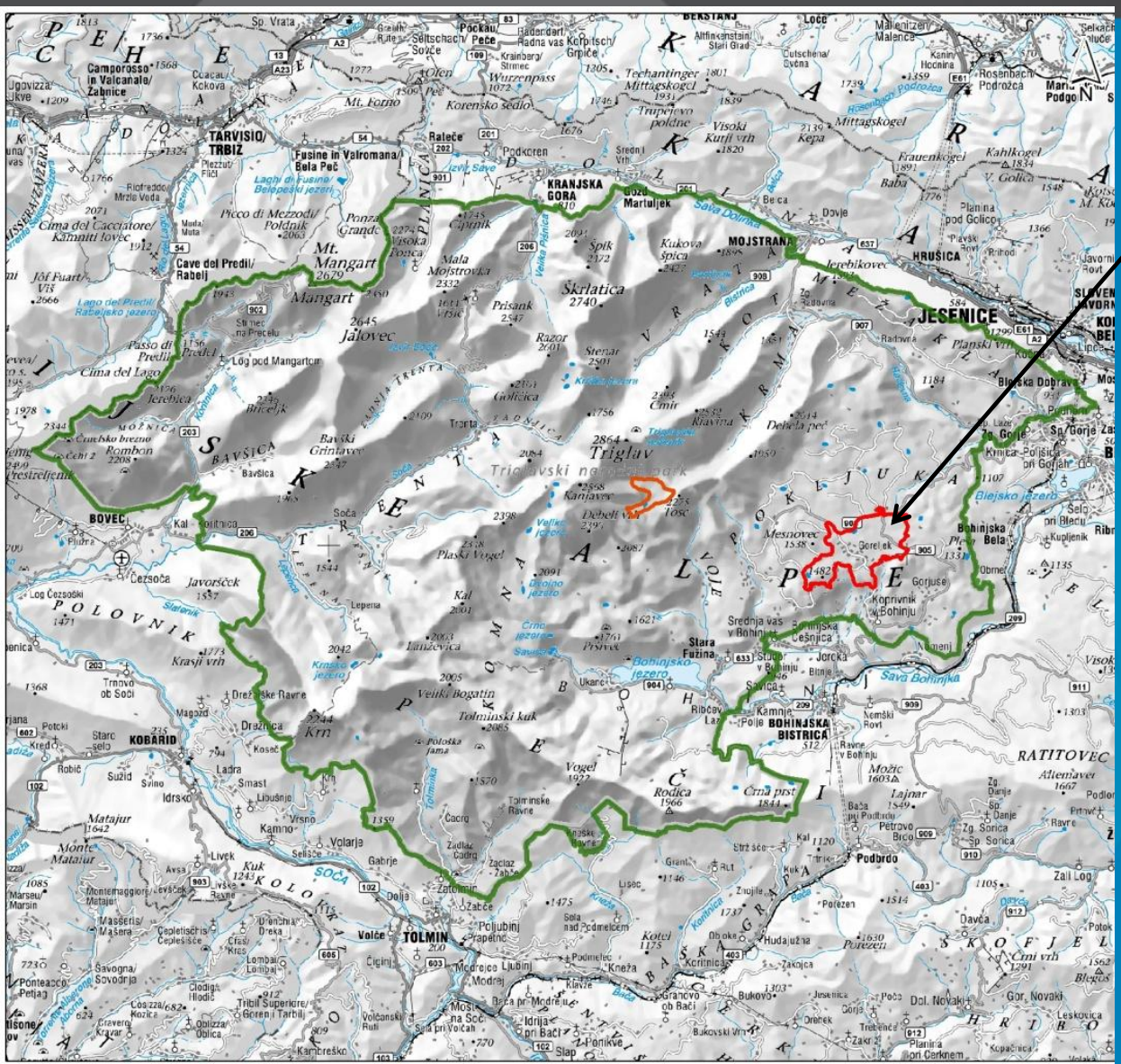
- Identification of potential CC induced threats,
- Evaluation of existing management practices,
- Establishing monitoring measures based on earth observation data
- Modeling regional climate change effects and risks for protected areas,
- Supporting protected site authorities with decision support tool,
- Fostering awareness rising on the demand for adaptive management,
- Recommendations for CC adapted guidelines regarding protected areas on national and EU-level.

Aims of the study in Triglav National Park:

- Main goal was to develop an effective approach to assess habitat sensitivity and potential impacts of projected climate change on local scene

Hypothesis: habitats react differently concernig temperature and moisture changes

STUDY AREA



-the asseement of sensitivity and potential impacts was carried out on Natura 2000 site located on Pokljuka plateau

-ranging from 1000 to 1500 m

-the main habitat type is secondary sub-alpine spruce forest (*Piceetum subalpinum*)

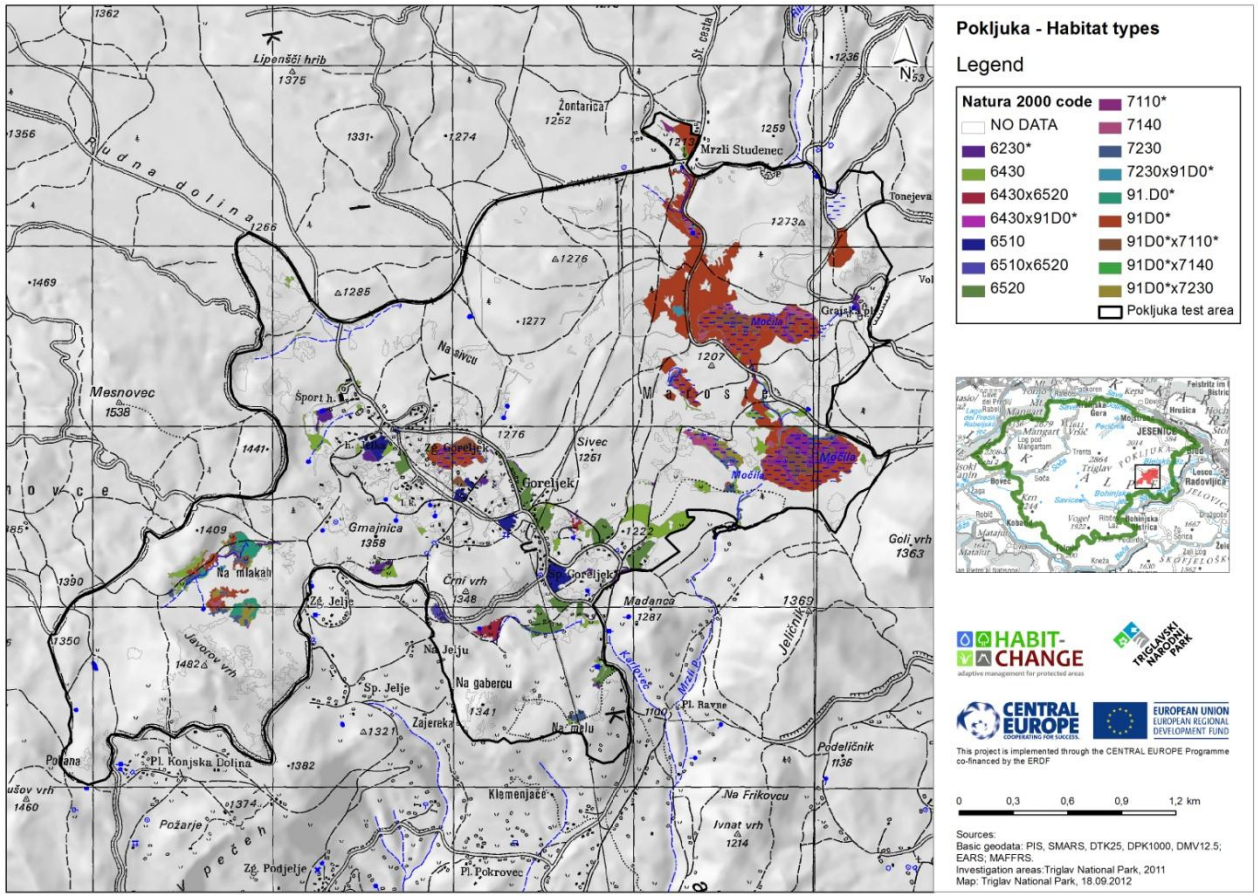
-besides the spruce forest raised bogs and transitional mire forests are common (peat bogs on Pokljuka reach the southernmost distribution in Europe)

DETERMINATION OF SENSITIVIY AND POTENTIAL IMPACTS

The assesment was developed and established in 7 steps

1. Identification of habitat types
2. Identification of the main pressures of projected climate change on the habitat types
3. Assessment of habitat and species traits concerning their climatic and moisture conditions
4. Assessment of species and habitat sensitivity to main pressures of projected climate change
5. Assessment of non-climatic habitat features that influence habitat sensitivity
6. Integration of habitats´ climate – change sensitivity and habitats´ non-climatic sensitivity to an aggregated habitat sensitivity
7. Assessment of the potential impact of projected climate change

STEP 1. HABITAT TYPES

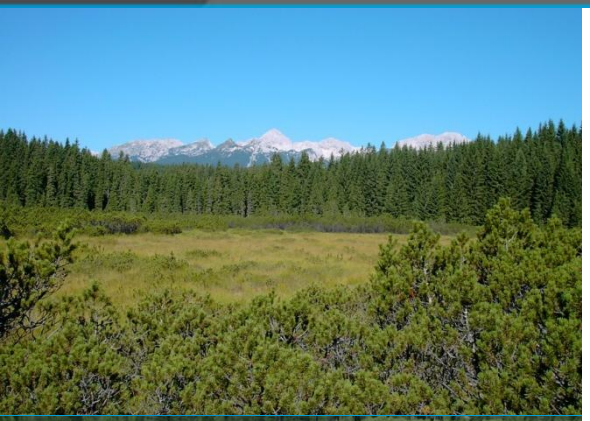


-21 different habitat types were mapped according to HABITATNI TIPI SLOVENIJE

-Habitat types were converted to 8 Natura2000 types according the Iterpretation Manual of European Union Habitats

-430 plant species

Natura 2000 habitat types

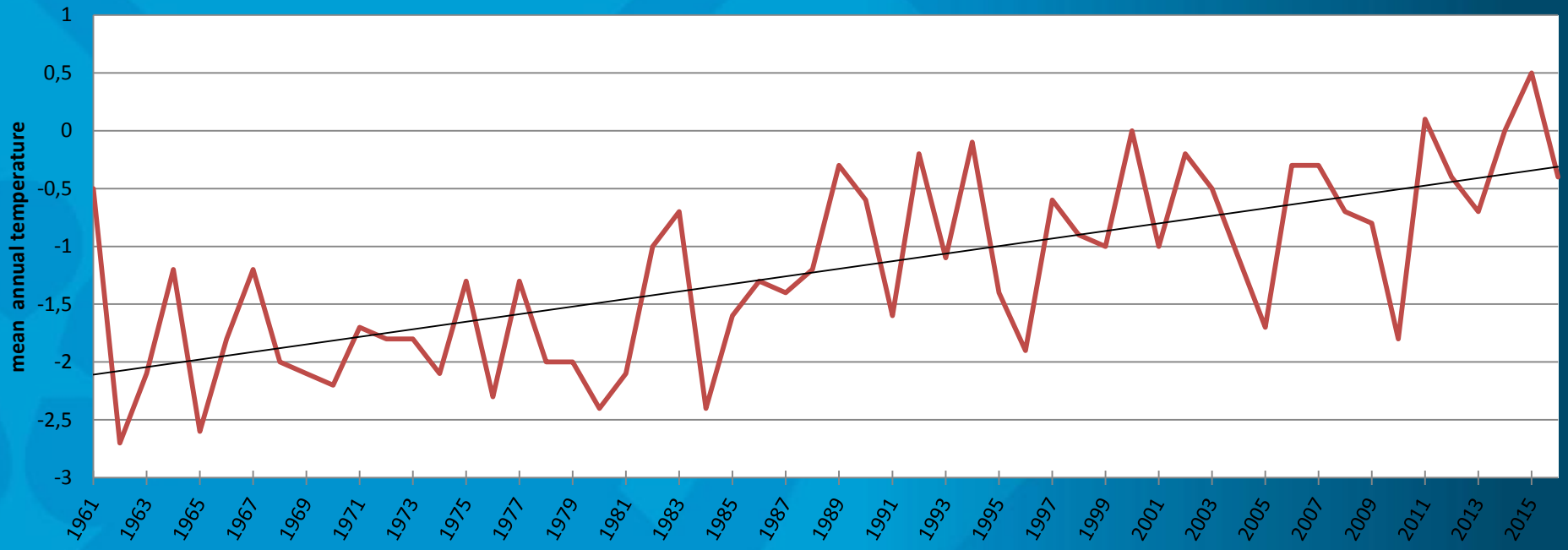


- **6230***: Semi-natural dry grasslands and scrubland facies:
  Species rich Nardus grasslands on siliceous substrates in mountain areas.
- **6430:** Semi-natural tall-herb humid meadows:
  Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels.
- **6510**: Mesophile grasslands:
  Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis).
- **6520**: Mesophile grasslands:
  Mountain hay meadows.
- **7110***: Raised bogs, mires and fens:
  Sphagnum acid bogs: Active raised bogs.
- **7140**: Raised bogs, mires and fens:
  Sphagnum acid bogs: Transition mires and quaking bogs.
- **7230**: Calcareous fens: Alkaline fens.
- **91D0***: Forests of temperate Europe: Bog woodland.

-the asteriks identifies habitats of high priority according to Habitat Directive

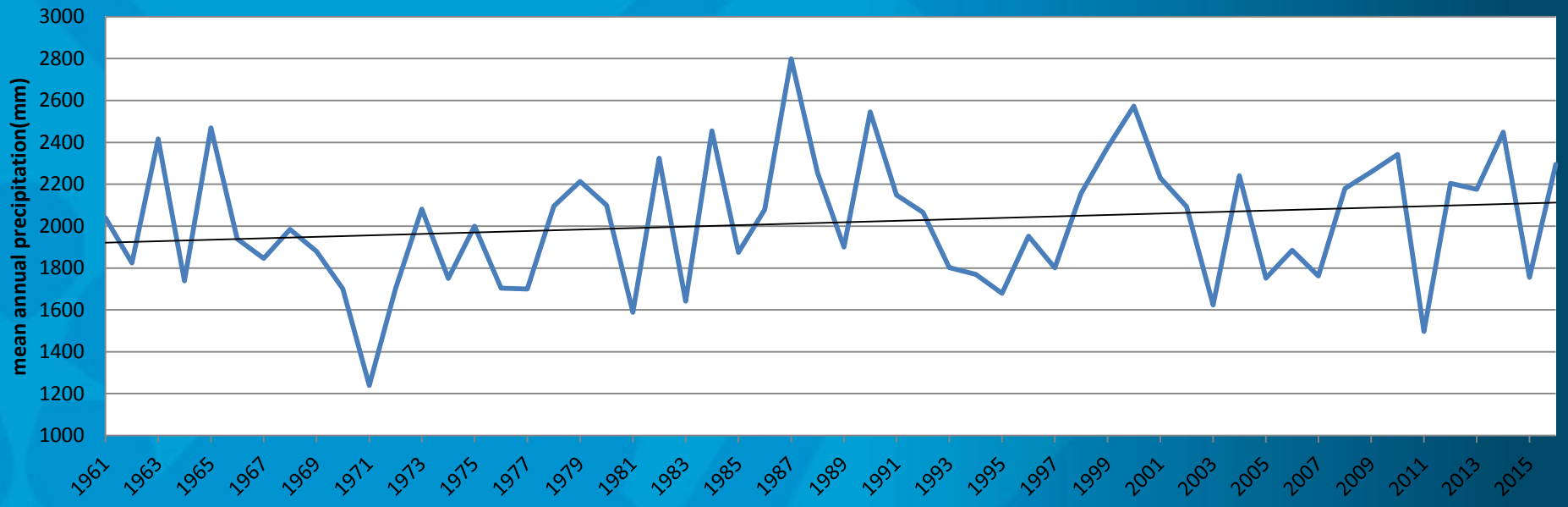
Considering local climate data 2 basic scenarios were identified:

A). an increase a mean air temperature (already visible in local climate data)



Annual mean temperature 1961 – 2016 and linear trend.
Meteorological station Kredarica, Triglav National Park

B). a decrease of plant-available moisture during the growing period due to projected decreases in summer precipitation



Annual mean precipitation 1961 – 2016 and linear trend.
Meteorological station Kredarica, Triglav National Park

STEP 3: ASSESMENT OF HABITAT AND SPECIES TRAITS CONCERNING THEIR CLIMATIC AND MOISTURE CONDITIONS

A.) LANDOLT INDICATOR VALUES

Table 1: Definition of Landolt temperature (T) values. Source: LANDOLT ET AL. (2010)

Landolt Temperature value T	Mean air temperature during vegetation period
1	Alpine and nival
1,5	Lower-alpine and upper-subalpine
2	Subalpine
2,5	Lower-subalpine and upper-montane
3	Montane
3,5	Lower-montane und upper-colline
4	colline
4,5	Warm-colline
5	Very warm-colline

Table 2: Definition of Landolt moisture (F) values. Source: LANDOLT ET AL. (2010)

Landolt Moisture value F	Mean moisture during vegetation period
1	Very dry
1,5	Dry
2	Moderately dry
2,5	Fresh (frisch)
3	Moderately moist
3,5	Moist
4	Very moist
4,5	Wet
5	Under water / flooded

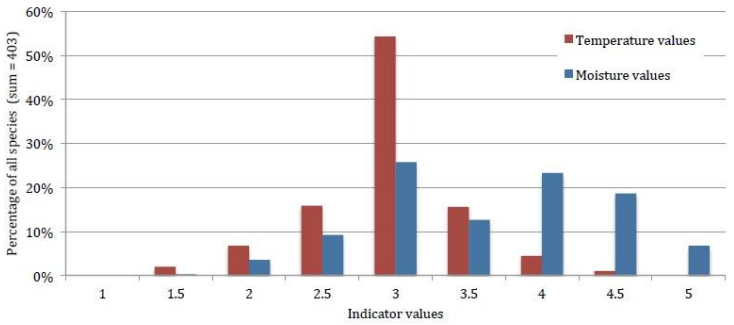


Figure 6: Landolt indicator values for temperature (red) and moisture (blue) of all species recorded (sum = 402) at the 21 biotope types. Author´s preparation. Data: Triglav National Park, LANDOLT ET AL. (2010).

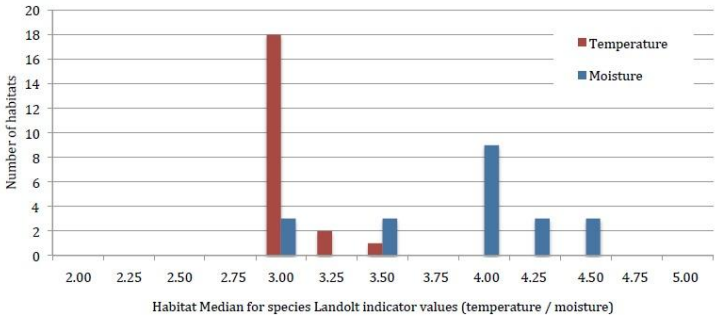
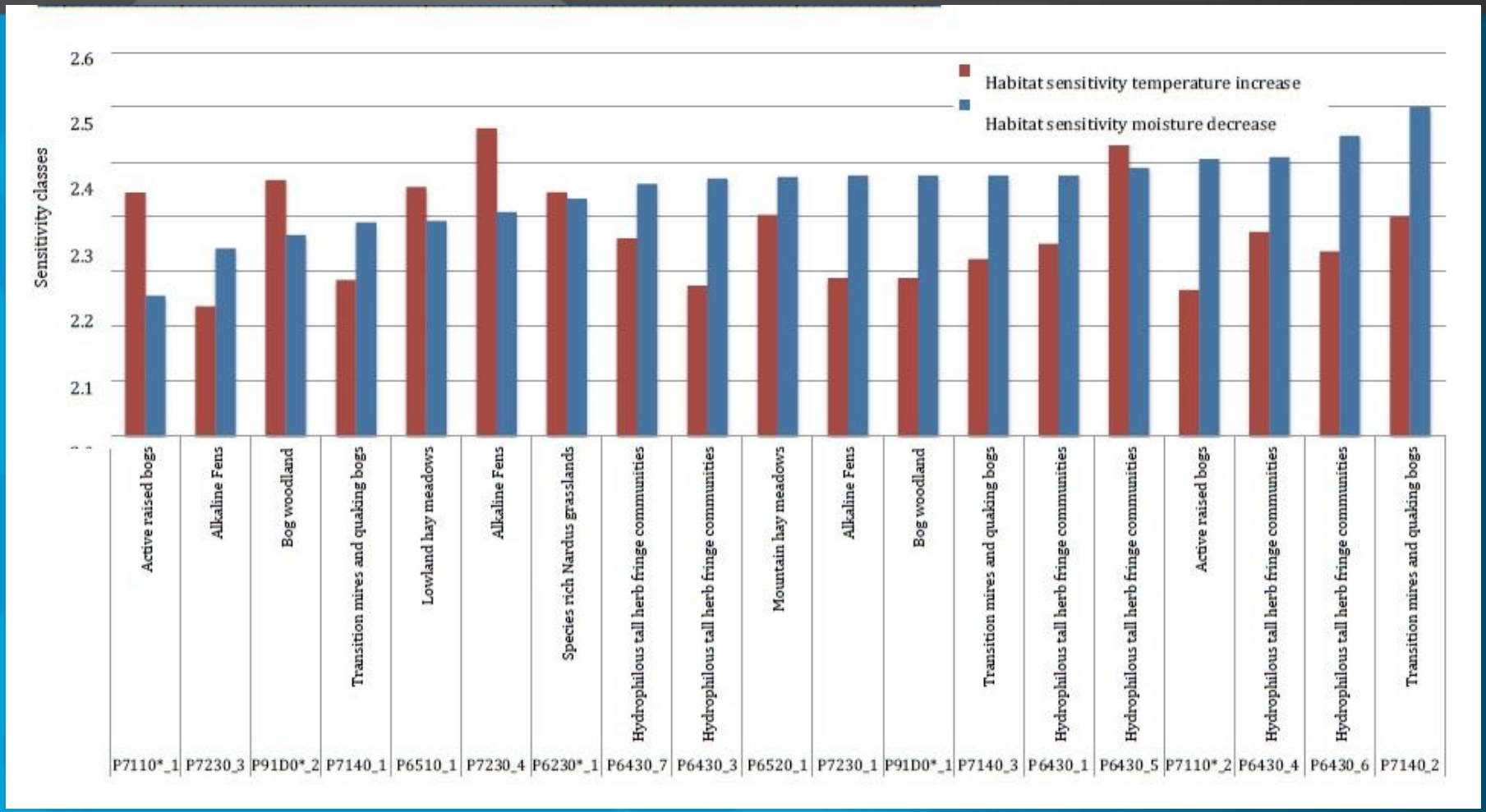


Figure 7: Habitat medians of species´ temperature (red) and moisture (blue) indicator values. Author´s preparation. Data: Triglav National Park, LANDOLT ET AL. (2010).

-most of the 430 plant species held a temperature indicator value of 3 (typical for species of the montane life zone

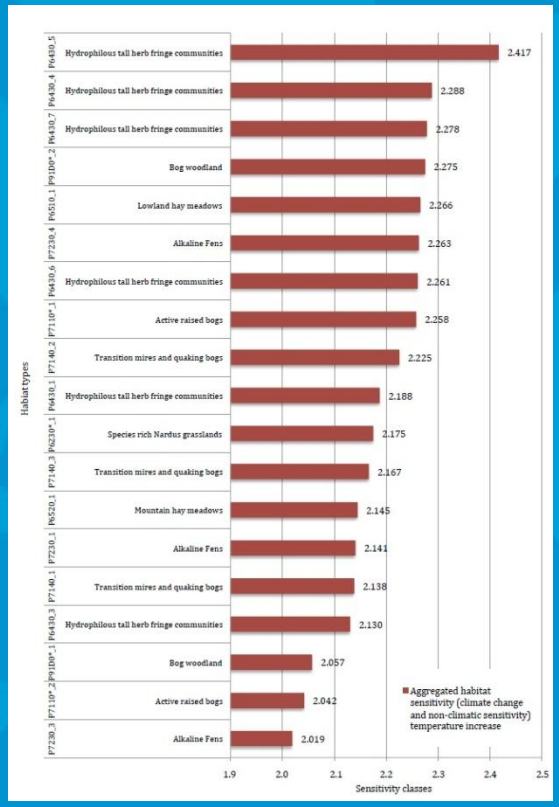
STEP 4: ASSESMENT OF SPECIES AND HABITAT SENSITIVITY TO MAIN PRESSURES OF PROJECTED CLIMATE CHANGE

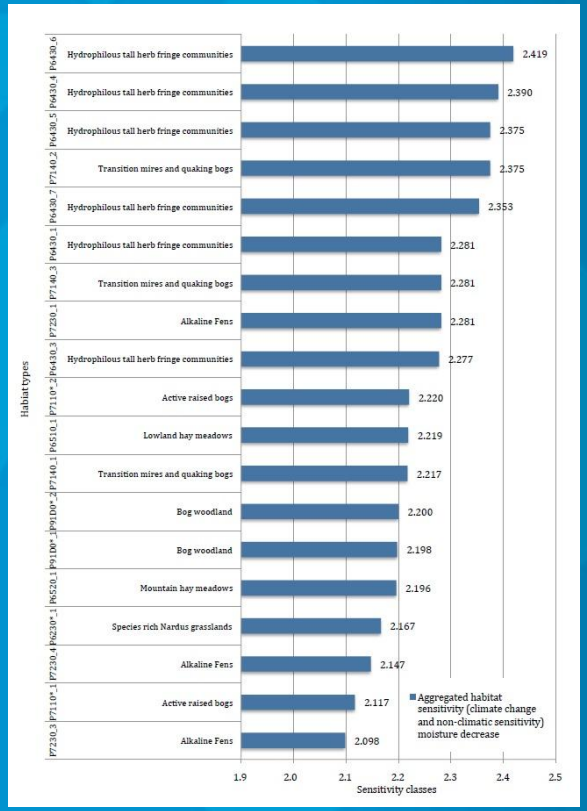


Comparing the habitats´ combined sensitivity regarding the different scenarios, most of the habitats (68 %) showed a higher sen. towards moisture decrease then towards T increases. Only 6 H.T. (21%) showed showed a higher S. towards temperature increase.

STEP 5. ASSESMENT OF NON-CLIMATIC HABITAT SENSITIVITY

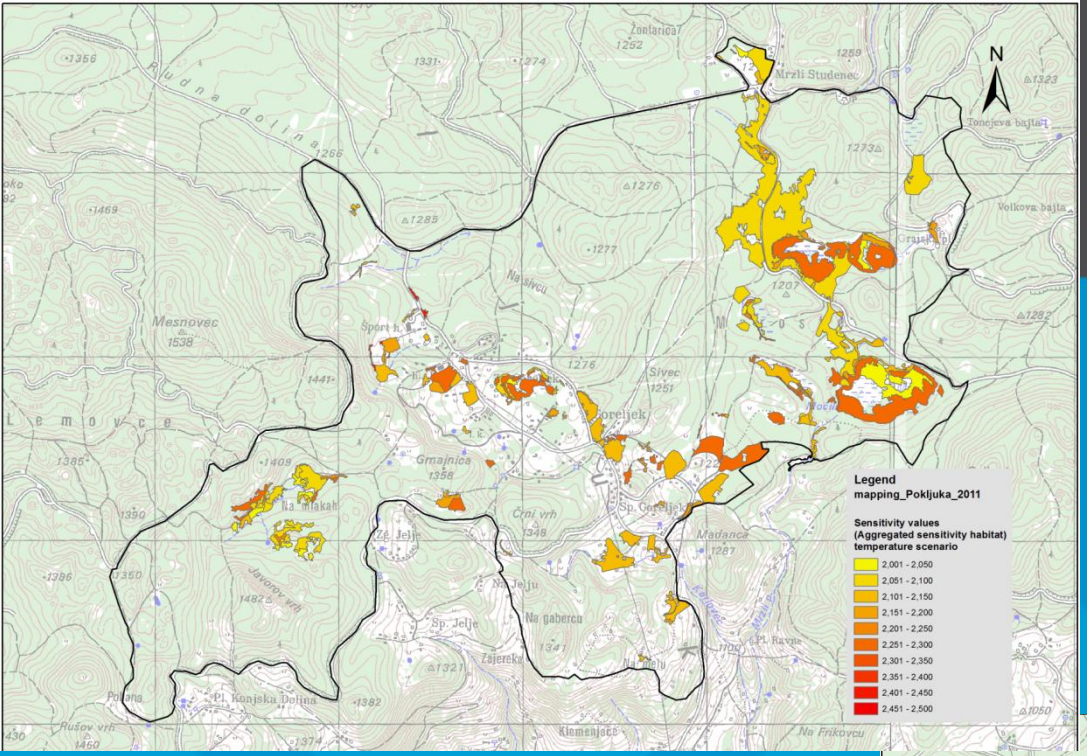
- Habitat ability to regenerate
- The horizontal and vertical distribution of habitats
- The influence of neophytes in a habitat
- The dependency on ground or surface water



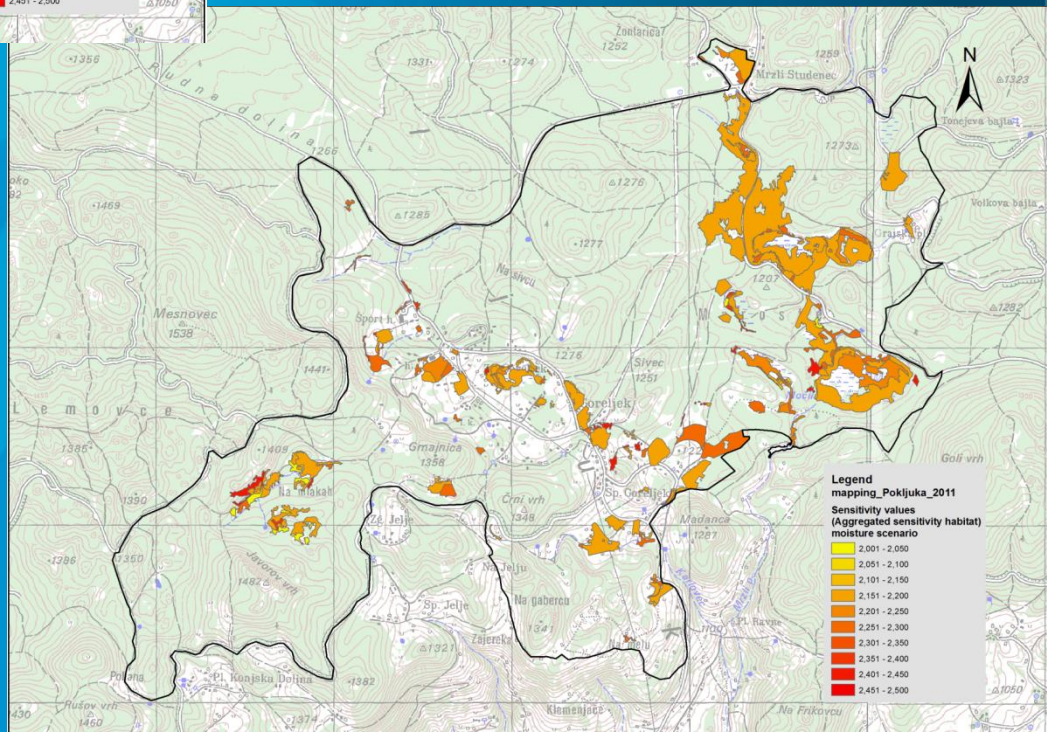


The most sensible are Hydrophilous tall herb fringe communities to both scenarios

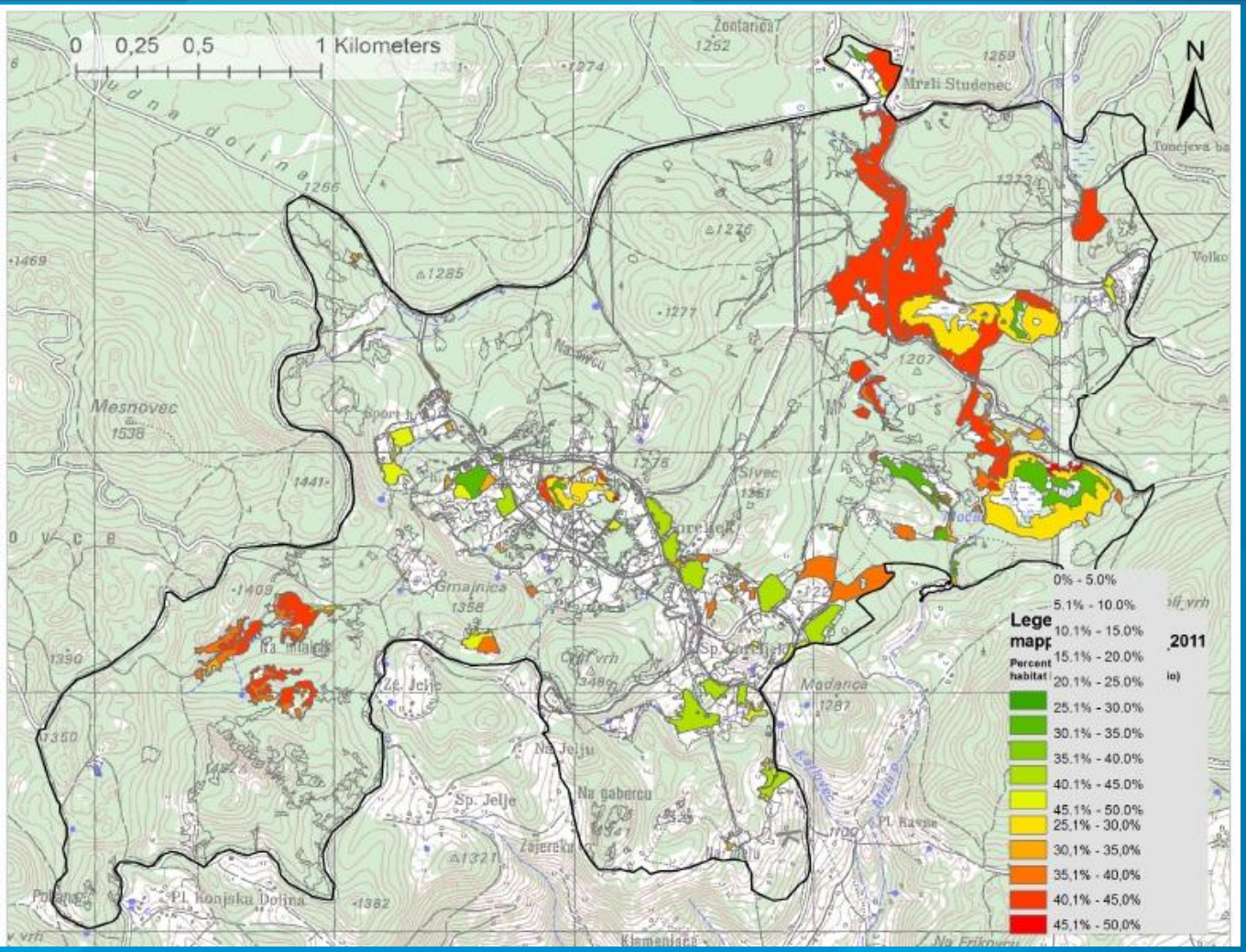
STEP 5: INTEGRATION OF HABITATS´ CLIMATE – CHANGE SENSITIVITY AND HABITATS´ NON-CLIMATIC SENSITIVITY TO AN AGGREGATED HABITAT SENSITIVITY



Like results showed for the climate change sensitivity before, also for the aggregated sensitivity the majority the habitats show a higher S. to moisture decreases then to temperature increseas



STEP 7: ASSESSMENT OF THE POTENTIAL IMPACT OF PROJECTED CLIMATE CHANGE TO SPECIES



-regarding the temperature scenario , the percentage of species that either might be extinct ranged from 0% to 31 %

-regarding the moisture scenario , the percentage of species that either might be extinct ranged from 5% to 50 %

Comparing this two scenarios, a higher projected loss of species for moisture scenario is obvious

CONCLUSIONS

- Moisture dependent habitats show higher sensivity values towards moisture decreases
- Some grassland and meadow habitats show higher sensitivity values towards temperature increase

THE BIODIVERSITY OF ECOSYSTEMS ON THE STUDY AREA IS PRIMARILY THREATENED BY A REDUCTION IN PRECIPITATION AND NOT BY AN INCREASE IN MEAN TEMPERATURE

http://www.habit-change.eu

THANK YOU FOR YOUR ATTENTION!