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Grasslands: a precious good

- grassland is the dominant agricultural land use in the Alps and the foothills of the Alps (>one million ha)
- is an asset as it provides fodder for dairy and cattle farming
- fulfills important soil functions (Carbon and Nitrogen storage, water retention, biodiversity ...)

BUT:

- mountainous regions are especially vulnerable to climate change
- climate change imposes increasing pressure on sustainable use of grasslands and ecosystem functioning

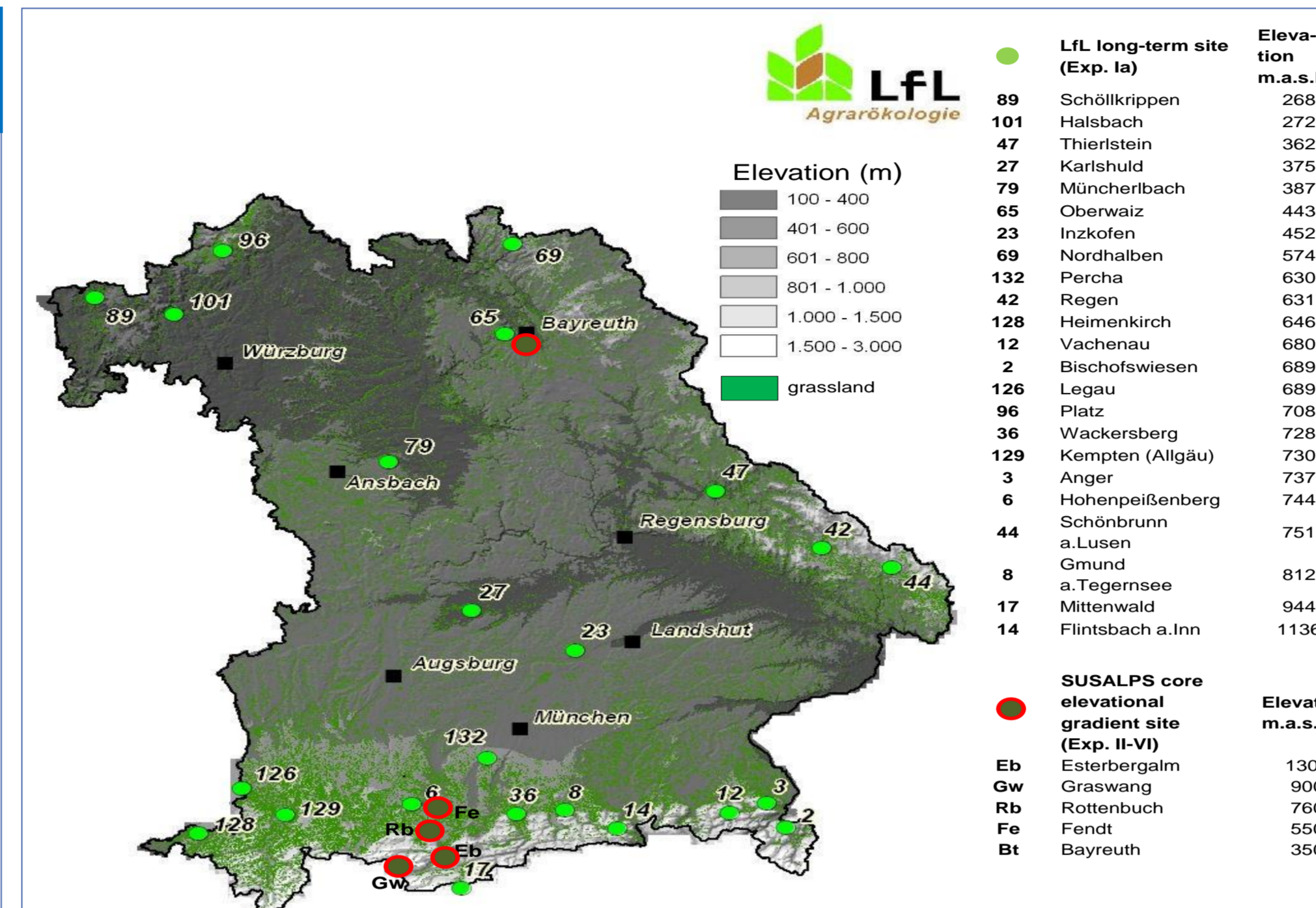


Fig. 1: SUSALPS sites in the state of Bavaria, Germany

Experimental Approach

To quantify impacts of climate and land management on

- plant and microbial diversity
- nutrient use efficiencies
- biomass production and quality
- soil C and N storage and turnover
- GHG emission and nutrient retention
- cost-benefit ratio of agriculture
- acceptance of technology

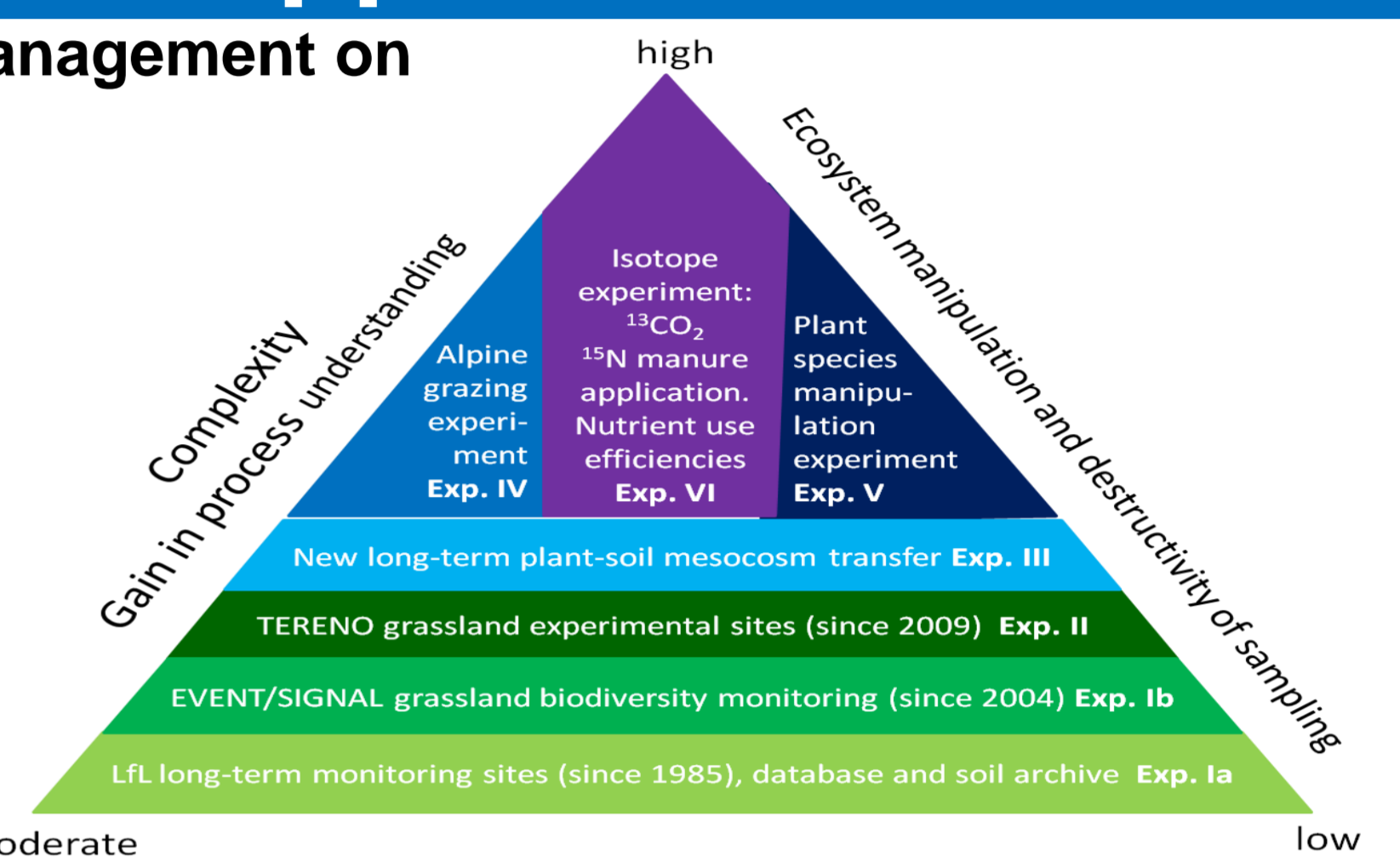


Fig. 2: Existing databases and infrastructure (Experiments Ia to II) as well as new experiments (Experiments III to VI) integrated by SUSALPS

SUSALPS

- builds on existing infrastructure of German grassland-ecosystem-research (Fig. 1 & 2) like the TERENO pre-alpine observatory sites, the EVENT and SIGNAL sites as well as long term sites operated by LFL (Bayerische Landesanstalt für Landwirtschaft)
- conducts space-for-time (soil core translocation) climate change experiments considering extensive and intensive management
- extends the elevation gradient spanned by existing infrastructure to comprise 300 – 1400 m a.s.l. by adding the site on Pürschling mountain in the Bavarian Alps
- links natural sciences and socio-economy

Research question and hypotheses

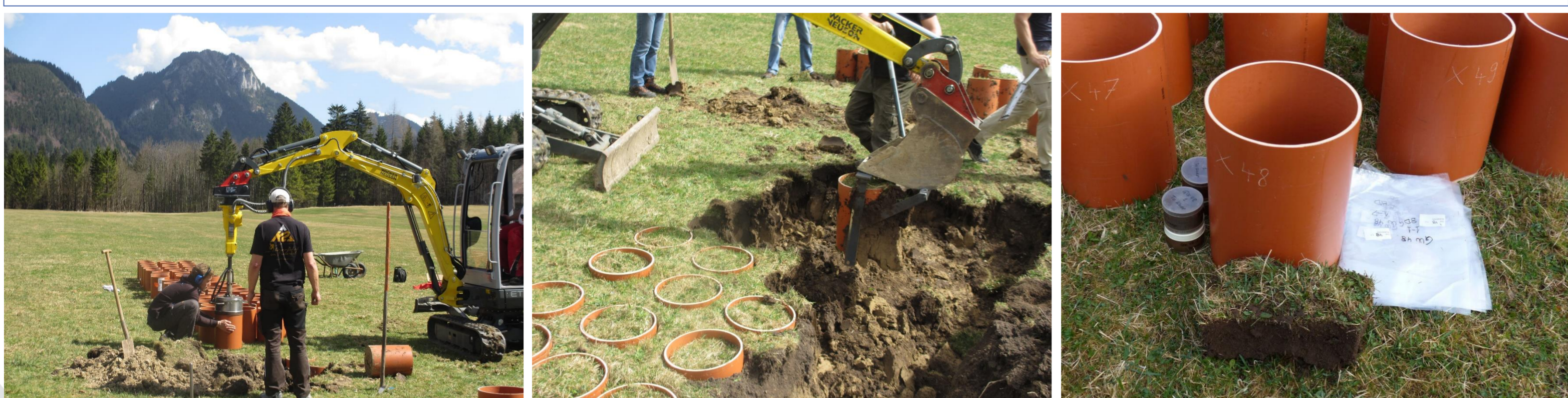
What are the impacts of climate and land management on key functions of montane grassland soils in the Alps and foothills of the Alps with regard to

- their role as Carbon and Nitrogen storage
- GHG (CO₂, N₂O, CH₄) exchange and nutrient retention regulated by plant and soil microbial processes
- soil and plant biodiversity, productivity and feed value
- socio-economic impacts driving farmers decision making

We hypothesize that :

- adapting timing and amount of manure application
- adapting timing and frequency of mowing
- manipulation of plant species composition

are workable solutions to make grassland soils fit for future environmental changes



Objectives

- evaluation of environmental and economic risks of current land management in a changing climate
- assessment of potential benefits of climate – smart management for grassland soil function and –productivity
- provision of applied recommendations for stakeholders and farmers considering economic constraints
- develop early warning systems (agri-ecological indicators)

Approach

- inform and validate a biogeochemical and a socio economic model
- develop a bio-economic model to evaluate best management options for sustainable use of grassland soils
- develop a simplified web-based decision support system (App) to practically help farmers and stakeholders in decision making

