Project title

Relationship between nitrogen deposition and vegetation in LTER sites

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1. Aim
a. Develop time series of biological parameters and use them in conjunction with environmental data;
b. Comparison with pressure indicators (Critical Loads)

2. Research questions and Hypothesis

Nitrogen deposition occurs in excess in many European countries and habitats and it has been shown that biodiversity is negatively impacted. Although many works has been done on that issue it is still not known, if long-term changes can be observed over a range of habitats and in relation to the strength of air pollution. We hypothesize that by using long-term, plot based data of species changes, shifts in composition and/or diversity can be related to 1) the sensitivity of habitats to nitrogen deposition (the critical load of nitrogen) and 2) the strength of nitrogen deposition during the last decades (the exceedance of the critical load). We further hypothesize that these changes occur for different organisms (vascular plants, lichens) and ecosystems (forests, grassland). The work will be done in cooperation with ICP Integrated Monitoring (UNECE) and will contribute to the knowledge of air pollution effects on biodiversity and will test the suitability of the SEBI 2010 headline indicator "Critical Load excedance of Nitrogen deposition" with in-situ long-term data.

3. Spatial and temporal coverage
Forest habitats across Europe
At least 10-15 years of past data

4. Parameters used/needed

Parameter group (theme)	Selected parameter	Details about the parameter	Should be taken from existing data (yes/no)	Feasibility/constraints regarding existing data	Should be recorded in field (A5 work) (yes/no)	feasibility/ constraints regarding field sampling
1) Climate and physical variability	Annual mean air temperature	standard meteorological method; annual mean values of as much as possible years	yes	no problem here because the accuracy is not so important	no	
	Annual precipitation sum	standard meteorological method; annual values of as much as possible years	yes	no problem here because the accuracy is not so important	no	
2) Biogeochemistry data	Nitrogen deposition	Only relevant for grassland; annual sum of total inorganic nitrogen (sum of NH3 and NH4) from fertilizer or lifestock	yes	Potentially a lot of problems with the exact measurement of total deposition but very high accuracy is not necessary; additionally EMEP modeled data can be used	no	
	Sulphur deposition	Annual sum of total sulphur in bulk deposition samplers for non-forest sites, for forest sites when available throughfall deposition	yes	Potentially a lot of problems with the exact measurement of total deposition but very high accuracy is not necessary; additionally EMEP modeled data can be used	no	
	Nitrogen input via fertilizers and/or lifestock and output via harvest and grazing	Only relevant for grassland; annual sum of total nitrogen from fertilizer or lifestock		estimates from statistical data or lifestock data	no	
	Soil C/N ratio	Soil organic layer C to N ratio as an average value for the habitat for which biological data is available	yes		no	

3) Structure and function of the ecosystems, communities and populations	EUNIS habitat type	EUNIS habitats are used to set Critical Loads for eutrophication effects (classification will be provided)			no	
	Species cover	Percent cover of each species (vascular plant, bryophyte, epiphytic lichen, etc.) per plot and per year of observation; in case of forests the vegetation layer is important; the entire observation period should at least cover 10 years with at least 2 observations but more observations are very welcome	yes	yes, with regard to different plot size and cover estimation and species identification; species reference list will be provided; the plot size has to be reported and can be very small (1 m²) or larg (100 m²)	yes	as a harmonization effort it should be recorded during the A5 file activities in the year 2012
4) Human population and economy	land use	depending on land use type (forestry, grassland management) different categories, will be provided	yes	none	no	

5. METHODS USED

Trend identification

6. EXPECTED RESULTS

- Comparing trends of single species with their site preferences (Ellenberg indicator values)
- Comparison with CL exceedances (Eutrophication and Acidification)

7. REFERENCES