

Project title

Birds communities as indicators of ecological integrity in LTER sites

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1. Aim (for EnvEurope and LTER)

- a. Create a cross-domain monitoring program for the assessment of ecosystem integrity through the analysis of the composition of avian assemblages, vegetation structure and landscape composition;
- b. Develop a new time series related to the target group and integrate it with other existing environmental datasets.

2. Research questions and Hypothesis (500 words)

Birds are considered good indicators because of their high detectability compared to other groups, their widespread presence and diversity in most habitats (Bibby, 2002) and sensibility to natural and anthropogenic environmental alterations (Fleishman & Mac Nally, 2006). Furthermore, the fact that this group includes several charismatic species makes their inclusion into monitoring programs an effective way to increase awareness of biodiversity threats (Gregory *et al.*, 2008).

The study of this group could allow the creation of a cross-domain monitoring protocol, investigating the value of the different sites as breeding and/or wintering sites and for migratory routes. Given the high number of different species with different requirements that may be found in the considered environments (e.g. forests and freshwater bodies), birds allow the study of the effect of landscape heterogeneity on community parameters and guilds, and the individuation of sensitive subgroups (Devictor & Robert, 2009). The integration of the surveys into a systematic sampling will allow the study of trends at several spatial scales at the same time (Nielsen *et al.* 2009). The explicatory variables will include vegetation structure parameters (site scale) and variables describing the land use of the area (landscape scale). The monitoring program design will require the creation of conceptual models (Lindenmayer & Likens, 2009), specific for each environment, to integrate and harmonise the recorded diversity patterns. Besides, the contemporaneous inclusion of several sites will allow the investigation of regional environmental gradients. The specific question that will be addressed are:

- ✓ How do different species and guilds respond to local and landscape variables?
- ✓ How does the integrity of an ecosystem influence the degree of specialisation of a community?
- ✓ Is the richness of specialist and generalist species determined by different variables?
- ✓ Do breeding, non-breeding and wintering species respond to the same habitat and landscape variables?

3. Spatial and temporal coverage

The monitoring will be carried out both locally and at the landscape scale, in order to include the heterogeneity of the sites. Replicates will be performed in homogeneous areas of the same site for statistical purposes. The single year is the basic unit, and during every year of monitoring will include three repetitions.

4. Parameters used/needed* (if not only aquatic habitat are to be selected then the parameter group could be enlarged)

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	Basic climate of the site	Ranges, interannual variability, extremes, etc.				
2) Biogeochemistry data						
3) Structure and function of the ecosystems, communities and populations	Bird species list	Full species list with number of individuals, distinction of functional groups	No		Yes	Apply a standardised and accepted method
	Vegetation structure	Random positioned plots, number proportional to site size				
4) Human population and economy	Land use in the surroundings of the site		Yes	Corine land cover data		

5. METHODS USED

The cross-domain monitoring program requires the integration of different field methods:

Terrestrial ecosystems

Bird communities will be sampled using 10 minute point-counts, where all bird species heard and seen will be recorded, including a distance estimate (Bibby *et al.*, 1992). The monitoring will be repeated three times per year, one time in winter and twice during the breeding season (beginning and end), in favourable weather .

Freshwater ecosystems

At each site the look-see method will be used to count all the present species (Bibby *et al.*, 1992). Appropriate observation points will be localised in all suitable habitats, and sample effort will be standardised to allow between sites comparisons. The monitoring will be repeated three times per year, one time in winter and twice during the breeding season (beginning and end), in favourable weather

The relationship between bird species presence, absence and abundance and environmental variables will be studied with multivariate statistic methods. To explain the observed patterns of species presence, absence and abundance, the relationship between these parameters and species life history and ecological traits will be studied (Cofre *et al.*, 2007), since it has been suggested that bird guilds may have different responses to disturbance (Gray *et al.*, 2007). To select the traits, the approach presented by Barbaro and van Halder (2009) will be applied and partially modified. The traits characterising the recorded species will be derived from specific literature (e.g. Cramp, 1998). The “community specialisation index” (Mouysset *et al.* 2012) will be used to detect trends in the composition of the assemblages related to the integrity of the ecosystems.

6. EXPECTED RESULTS

- Identification of sensitive species and guilds.
- Provide an analysis of regional species richness variation.
- General public awareness.
- Maintain existing monitoring schemes integrating them in long-term studies.

7. REFERENCES

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