Trade-offs between biodiversity conservation and agricultural production targets: the case of Castro Verde's avifauna

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Introduction

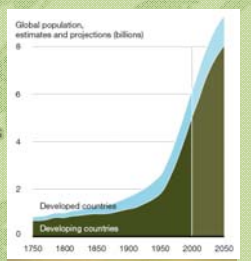
- Biodiversity is declining worldwide: between 10% and 50% of well-studied higher taxonomic groups are currently threatened with extinction; 12% of bird species, 23% of mammals, and 25% of conifers...
- Causes: habitat destruction, fragmentation and degradation, desertification, waste and pesticide pollution, climate change, overexploitation, the introduction of exotic species and disease;
- Human activities in general have been pointed out has being responsible for a vast majority of current habitat loss;
- The human population is predicted to rise between 8 and 10 million, with the United Nations estimating a possible peak of 9.2 billion around 2075;
- Agriculture remains one of the most important activities interacting with nature, generating benefits and pressures:

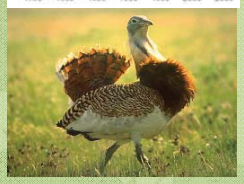
Intensification

- a result of human population growth and changing dietary patterns;
- development of techniques that allow the increase of yield of harvested material per hectare of land used + continued expansion of cropland by conversion of natural habitats + the optimization of food or feed energy efficiency from production to consumption;
- impacts: reduction in the number of crop and/or livestock species; increase in conversion of forest, grasslands and other land uses; on a local scale may lead to loss of small scale habitats such as field margins and permanent pastures; on the global scale, it connects to the worldwide issue of deforestation;

Abandonment

- "abandoned land": "land no longer used either by agriculture or any other rural economic activity" or the change in land use from the traditional or recent pattern to another, less intensive pattern;
- events such as wars or the Black Death plague has lead to the expansion or shrinking of agricultural land area and the abandonment of whole regions;
- widespread in eastern North America since 1920 and constant in Western Europe since 1950;
- the causes that lead to abandonment are diverse in nature, but are also generally based on social factors and on economic, technological and policy change;
- consequences: a series of changes take place and may involve elements of simplification or modification of traditional practices, afforestation of previous agricultural land or physical abandonment of land; the sequential nature and direction, or scale, of these changes is highly variable and unpredictable due to local circumstances and influences;
- if diversity is taken as a single criterion, measured for example by a Shannon index, then abandonment may initially increase habitat and landscape diversity as abundance of components increases, but progressive abandonment would ultimately reduce diversity as certain elements dominate the habitat or landscape.





Zonal Program of Castro Verde, Portugal

- agri-environmental program
- 64,000 ha in Southern Portugal
- mosaic referred to as cereal steppe or pseudo-steppe
- last refuges for many steppic birds with unfavorable conservation status:
great bustard (*Otis tarda*)
little bustard (*Tetrax tetrax*)
lesser kestrel (*Falco naumanni*)

Current Policy

- National level
(e.g. Rural Development Programme)
- European level
(e.g. Common Agricultural Policy reform)

Fischer et al. (2006)

Zonal Program of Castro Verde, Portugal

- avifauna

Economic valuation of biodiversity, ecosystem services and agricultural production

Pereira et al. (2004)* model:

- demographic model;
- regional database of life-history traits;
- sensitivity analysis

Dynamic Energy Budget (DEB) Theory

Scenarios

"Wildlife-friendly farming" versus "Land-sparing"

Policy Recommendations

Dynamic Energy Budget (DEB) Theory

- aims to identify simple quantitative rules for the organization of metabolism of individual organisms that can be understood from basic first principles. The word "Dynamic" refers to the life cycle perspective of the theory, where the budget changes dynamically over time,

- the difference between species can be reduced to differences in a set of parameter values;

-with its primary and secondary scaling relationships, may allow for estimations based on volumetric length differences.

Costs and Benefits

- Biodiversity
- Production
- Economy

•Pereira, H.M., Daily, G.C., Roughgarden, J., 2004. A framework for assessing the relative vulnerability of species to land-use change. Ecological Applications, 14, 730-742.

** Fischer, J., Lindenmayer, D.B., Manning, A.D., 2006. Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes. Frontiers in Ecology and the Environment, 4, 80-86.