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FACTSHEET

Biological Control

In a nutshell

Predators and parasites play an important role in ecosystems by regulating pests and diseases that are harmful to plants, animals and people.

1. Role for human well-being

The ecosystem service 'biological control' refers, on the one hand, to the regulation of human pathogens and diseases caused by vectors. This includes, for example, protection from cholera or [dengue fever transmitted by mosquitoes](#). On the other hand, it also refers to the activities of predators and parasites that regulate the impacts of pests and diseases affecting crops and livestock. Birds, bats, flies, wasps, frogs and fungi are all important as a natural control. Their benefits can be highly diverse, including higher yields and lower spending on pesticides in the agricultural sector, agricultural workers are less exposed to pesticides and end consumers benefit from fewer pesticide residues in vegetables and fruit. [Studies show](#) that birds provide biological control services worth millions of dollars in farmlands and forests.

2. Typical threats

A major threat to species that are crucial for biological control is the destruction of (semi-)natural habitats and reduced habitat diversity. In agricultural landscapes, increasing agricultural intensification and the use of pesticides are major drivers of declining predator species. Pesticide use not only leads to resistant pest species; it also degrades the capacity of agro-ecosystems to provide biological control. Further pressure on pest control species results from the introduction of pathogens and invasive species. Other threats include environmental pollution and changing environmental conditions caused by climate change. The loss of indigenous/traditional knowledge of agro-ecological interactions and potential pest-control species may also compromise this ecosystem service.

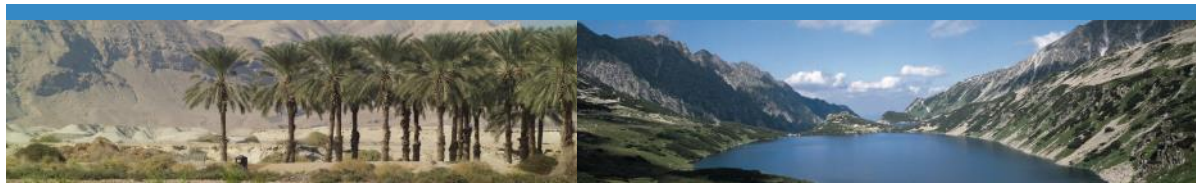
3. Example indicators

- Measuring the abundance of both pest species and pest controlling species can aid understanding of the current state of the latter. Trophic interactions among insects, birds and bats should be considered as well as effects from different management types on relevant species.
- The areas in which diseases or pests occur can be studied along with spatial changes over time.
- Changes in habitat quality can be indicated by the heterogeneity of habitats or the percentage of natural habitats in agricultural landscapes that sustain the lifecycle of pest control species.
- Human dependence on biological control for agricultural production or the control of human diseases and vectors in an area can be assessed using qualitative surveys. This is an indicator for the socio-economic importance of the biological control service.
- Health, agricultural and environmental statistics can be a helpful source for existing indicators related to the biological control service.





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Global sources available for national data:

- The [Global Biodiversity Information Facility](#) offers background information related to the species important for biological control, and some countries have their own biodiversity information facilities e.g. www.tanbif.or.tz/.

4. Example methods

For **assessing the value** of this ecosystem service:

- [Cost based methods](#) such as: Avoided damage costs, replacement and restoration costs
- [Factor income](#)
- [Survey for the local assessment of insect benefits](#) or other predators

For **assessing the condition** of this ecosystem service:

- The instruments typically used to measure biodiversity related aspects include assessing the [richness](#) or [diversity](#) of the relevant species and linking the results to changes in land cover or land use (e.g. structural changes in ecosystems, ecosystem fragmentation). [Mapping](#) is useful for this purpose.

5. Managing this service

Typical instruments for managing this service include:

Organic agriculture, natural management of agricultural and forest land, agro-forestry systems

- In [Japan, combining organic rice and duck production](#) in a smart way saves money otherwise spent on buying chemicals. It also helps diversify food production, generate higher incomes and conserve biodiversity.
- For case studies on the status of, and the needs to ensure a sustainable management of biodiversity for biological control in food and agriculture, see [FAO-Background Study Paper No. 38](#).
- Restoration and/or conservation of ecosystems of high importance as a habitat for pollinators in and around agricultural landscapes.

(Re)-introduction of predators and parasites in ecosystems

- In the [North American prairies](#) some very tough non-native weed species compete with valuable crop and forage plants, threatening many native plant species. Scientists are looking into biological control as a potential solution.
- Introducing predators or parasites into a new ecosystem can lead to unwanted effects on its ecological equilibrium. Before doing so, please consult [FAO - Code of conduct: Import and release of exotic biological control agents](#)
- The [International Organisation for Biological and Integrated Control \(IOBC\)](#) is a global voluntary organization that seeks to promote environmentally safe methods of pest and disease control.





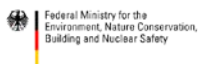
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Managing (semi-) natural ecosystems to improve human health

- In the [Inner Niger Delta, Mali](#) integrating health risks and opportunities into wetland management plans has helped to promote mutual understanding and to achieve an integrated assessment of the appropriateness of management options.
- [WHO: Water, health and ecosystems programme](#) provides a general directory of web-accessible resources such as [guidance](#) and [case studies](#) focusing on the links between health and healthy freshwater ecosystems.

On behalf of:



of the Federal Republic of Germany



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