

The value of biodiversity for agriculture

How to both promote biodiversity and support the agricultural sector?

Agriculture and biodiversity are inextricably linked:

- **Productivity** depends on the stable flow of ecosystem services. Those key to agriculture are soil fertility, soil erosion and water regulation as well as pollination to provide for food production.
- **Biodiversity** depends on a diversity of habitats, and farmland habitats provide for a specific type of farmland biodiversity. In addition, biodiversity requires habitats for those species that are wild and which are not reliant on agriculture (this is why the concept of networks of biodiversity corridors was developed via the CBD- Convention on Biological Diversity). It needs land beyond agriculture, hence other public and private land.

Often, the different needs of productivity and biodiversity are confused, and in spite of many efforts via the CAP or Nature Conservation Directives, biodiversity is still in decline. Thus the question remains, why efforts to 'green' agriculture and, for example, ever more stringent pesticide regulations, have not achieved more positive results?

There are different aspects to be considered in answering this question:

1. Agriculture and biodiversity are subject to **pressures** from population growth, consumption patterns, including waste creation, urban expansion, an increased level of extreme weather events due to climate change and invasive alien species, to name but a few. These pressures have increased and are increasing, thus rendering the task to find solutions more difficult.
2. Traditionally legal frameworks (policies and regulations) in general focus on risk management to regulate their avoidance. This may have led to an inadvertent focus on 'negatives' over time, rather than on weighing out/striking a balance between risks and benefits (socio-economic aspects), or the integration of resilience, which is the systemic environmental quality enhancement approach. **Resilience**¹-building is required ever more urgently to address environmental upheaval coherently, because in summary: we have been good at pollution control but not at enhancing environmental quality! In other words currently we protect biodiversity, but do not support its enhancement.
3. In future the pesticide regulation will need to continue to focus on risk mitigation and management. Agriculture and nature conservation policies should however emphasize more strongly the

¹ The concept of resilience is being applied in many areas; it can be defined as the ability of systems, such as ecosystems, social systems, organisms or humans, to recover, adapt or reorganize after disturbance. The term has recently been used in responses to the increasing impacts of climate change on agricultural production, for which solutions are sought.

resilience-building aspect. It is an evidently more challenging approach, as it considers complex ecological interrelationships and interdependencies of species and ecosystems and addresses increasing pressures at the same time. Therefore **aligned and complementary policies and regulations** should be built and our success will depend upon the extent to which the resilience aspect is recognized and emphasized within these frameworks in the long run.

Resilience-building within agro-ecosystems has traditionally been addressed through:

- The **efficient natural resource management** of water, land, and energy, which leads to efficient crop production through e.g., precision farming techniques or the use of pesticides which save up to 40% of land.
- The use of **innovative technologies** (e.g. higher yielding (hybrid), quality increasing seeds, stress-tolerant or drought resistant varieties), which also support adaptation to changing environments.
- The implementation of **GAP- Good Agricultural Practices** - like crop rotation, catch crops, reduced tillage measures.

More recently, however another resilience-building element has been raised - it is referred to here as **Environmental Enhancement Measures (EEM)**. These measures can be applied within managed fields to by for instance *extensively cultivating slopes* or the establishment of *buffer zones* to prevent soil erosion or regulate water flow. They can include the planting of *flower strips* to provide pollination services by insects while also providing refuge for birds and small mammals or encompass leaving *uncropped areas* in wet or dry areas or for “squaring up” land to reduce workload, while being both supportive of ecosystem services and agriculture.

The increasing numbers of EEM and the different names given to the same measure have however also led to confusion amongst farmers: which measures support those ecosystem services farming depends upon? and which ones “merely” provide natural habitats to protect “iconic” species without directly benefitting farming? Clearly farmers will be more motivated to integrate EEM, which contribute to the viability of their farms. Thus it may be wise to first inspire farmers to apply these measures. They also do not have to be applied on highly productive land and often are even better suited for less fertile land like wet areas. These at the same time provide specific biodiversity habitats and can be supportive of water regulation in fields.

Again agricultural productivity depends on the stable flow of ecosystem services, which both **maintain (risk protection)** and **enhance (environmental resilience)** ecosystem services. Hence including a variety of resilience-building elements of which EEM are key, is crucial for both productivity and biodiversity to thrive.

The value of biodiversity / ecosystem services for agriculture is clear, and as productivity relies on the natural capital to thrive promoting them clearly supports agriculture. In this context enhancing ecosystem services through EEM to foster resilience rather than sticking to risk management only is a key tool in “the how”, it can be done. This “how” will also have to be supported by respective complementary and fit-for purpose policy frameworks.