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Mainstreaming Biodiversity in Agriculture: The Experience of Switzerland

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Swiss Agriculture

- The role of Swiss agriculture is specified in Article 104 in the Federal Constitution, which was adopted in 1996. It specifies that agriculture:

  - **ensures food supplies** for the population;
  - **maintains the natural resources and preserves the countryside;**
  - maintains a **decentralised settlement** pattern in rural areas.

Swiss Agriculture

- Agriculture, forestry and fishery shape Switzerland;

  35% of total surface is **agricultural area** and **30%** of territory is **covered by forest**

Status of biodiversity in Switzerland

- **High diversity of natural habitat**; spatial and climatic variability and the diversity of rocks and soil.
- **Traditional extensive agricultural practices** have created a multitude of structures and biotopes that **provide habitats** for many species
- **Diverse landscape** and many **small-scale differences** among habitats in CH have promoted the development of a **high genetic diversity** of cultivated and domesticated species

Threats to biodiversity in Switzerland

- The **intensification of land use and expansion of urban area and land abandonment** are primarily responsible for habitat loss and threatened species.
- **Tendency** of agricultural systems towards **intensive management** affect the associated **biodiversity negatively.**

Biodiversity ⟺ Agriculture

- **Agriculture plays a crucial role** for biodiversity in Switzerland as almost **1/3** of the total area is used for agriculture
  - → The high share of the existing diversity **was developed through and is dependent** on maintenance of traditional agricultural systems.
- **Biodiversity is a resource for agriculture**;
- Important **contributions of biodiversity** for food and agriculture: improve productivity, food security and nutrition, livelihoods, ecosystem services, sustainability, resilience and sustainable intensification;

Agricultural Policies in Switzerland

National Policies and programmes that support conservation and sustainable use of biodiversity and the provision of ecosystem services:

- **Agricultural Policy 2014 – 2017**
- **Swiss Forest Policy 2020**
- **Fishery Management in Switzerland**
- **Swiss Biodiversity Strategy**

Direct Payment System in Switzerland

One pillar of the Agricultural Policy in Switzerland is based on a direct payment system.

To receive direct payments, farmers have to adhere certain ecological requirements:

Proof of Ecological Performance (PEP)

- Basic requirements for any direct payments since 1999 includes:

  balanced use of fertilizer, adequate share of biodiversity acreages, a planned and strict crop rotation, soil protection, choice and application of pesticides as well as adequate livestock farming;
- Minimal requirement of 7% of farmland as biodiversity priority areas.

1. Biodiversity Priority Areas (BPA)

- Protect and restore ecosystems close to their natural state;
- to set aside 7 % of the farmland as BPA;
- includes 16 different types of extensively used grassland, hedgerows and bushes, wild flower strips or other elements;
- accounts for 12 % of total agricultural area in CH

2. Biodiversity Contributions

Revision of the Agricultural Policy 2014-2017 contains different instruments to **strengthen the sustainability** and **conservation of biodiversity** for food and agriculture:

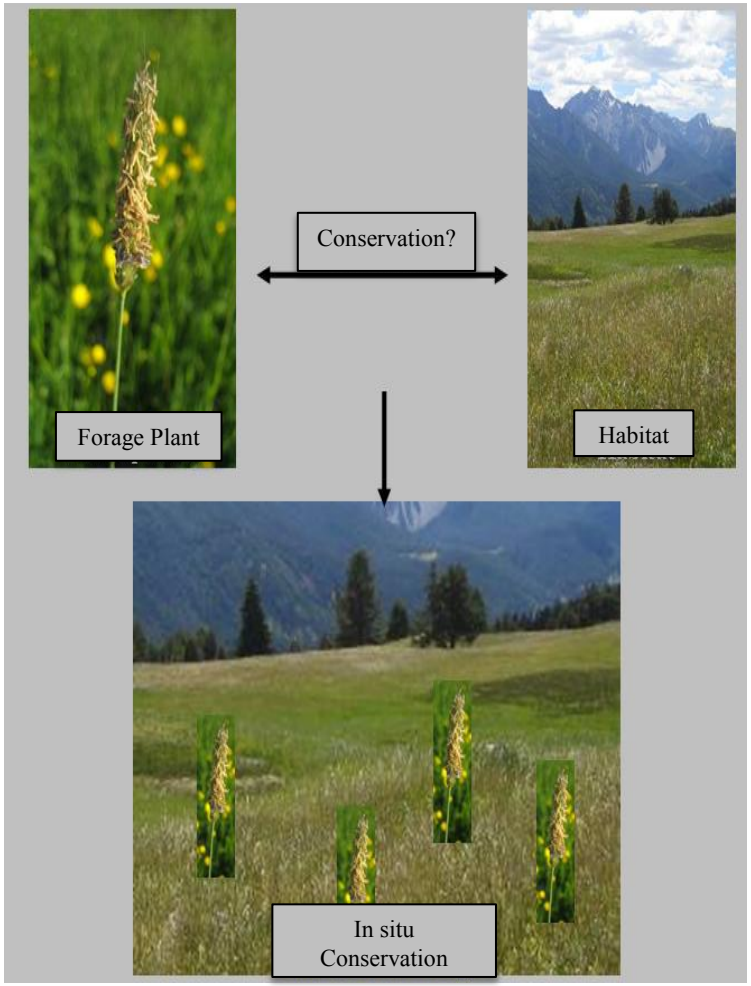
Biodiversity contributions:

- are targeted **to specific farming practices or biodiversity outcomes** (Art. 55 Federal Constitution);
- promote and improve the diversity of species and the **quality of biodiversity** through the **differentiation of quality levels,** including through the **linking of habitats.**

→ **Appropriate** sustainable agricultural **techniques** can help **to sustain and use** local species

Example: Conserving the Genetic Diversity of Forage Plants

- Switzerland has a **high diversity** of forage plants that originates from the high habitat diversity, different climatic conditions and agricultural practices.
- Forage plant genetic diversity faces **threats** by distinctive changes in **land management** and the use of **modern varieties**.



- To preserve and promote the genetic diversity of forage plants, the following measures are adopted:

  - Support the **on-farm management** of natural grassland to maintain the genetic diversity of forage plant in **designated fields across the country**
  - Gain practical experience with the use of **regional varieties** for sowing to evaluate and promote the sustainable use of famer's forage plants varieties
  - Develop a **molecular tool** to evaluate and monitor the genetic diversity in grassland and the **efficiency** in preserving the same with the two measures above
  - **Mainstream** the conservation of forage plants in **future agricultural policy** based on the results achieved.

Example: Regional Nature Parks
(NHG 23e to 23m)

- Regional Nature Parkts are **partly populated** rural areas, characterized by high nature and landscape values. In the regional nature parks the **quality** of nature and landscape is **preserved.**

- **Linkage of maintenance** and **sustainable** management and **use** of the rural area;

- Focus on striking a **balance** in the level of support between **nature conservation, tourism** and **the regional economy** on a long-term basis.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International Governance
CBD Aichi Targets

11 By 2020 reserves are increased to 17 % of the entire national territory

Current state in CH:
The area of reserves increased from 0.7 % to 6.2 % of Switzerland's territory between 1991 and 2013

13 By 2020 the genetic diversity in agriculture is maintained (plants, animals and wild relatives)

Current state in CH:
Successful efforts to inventory and conserve the genetic diversity of cultivated plants and farmed animals are in progress (FOEN 2014)

Outlook: Globally Important Agricultural Heritage Systems (GIAHS)

GIAHS: UN Partnership Initiative on conservation and adaptive management since 2002

- Definition: Remarkable **land use systems** and landscapes which are rich in **biological diversity** evolving from the **co-adaptation of a community with** its **environment** and its needs and aspirations for sustainable development.
- Goal: to promote
  - **dynamic conservation** of agricultural heritage systems;
  - the **in-situ conservation of agricultural biodiversity**;
  - emphasizing a **balance** between **conservation**, **adaptation** and **socio-economic** development.

Outlook: Efforts of stronger cooperation at the international level

Strengthening of the **cooperation between the IT PGRFA and the CBD** in Resolution 4/2015 on Sustainable Use:

"[…] collaborate with other relevant initiatives, in particular with regard to the Convention on Biological Diversity, on interaction between genetic resources, community and farmer led system activities and protected area systems […]"

In the Vision of the Programme of Work on Sustainable Use of PGRFA **linkage to CBD's Aichi Targets**:

[Goal 4]: "To strengthen collaboration and partnerships among stakeholders participating in projects and programmes relevant to the sustainable use of plant genetic resources for food and agriculture, taking into account the CBD's Aichi Biodiversity Targets."

Outlook: Efforts to revitalize PoW on Mountain Biological Diversity

1. Revitalize the programme of work on mountain biological diversity

2. Ensure that COP regularly reviews the implementation of the programme of work on mountain biological diversity

3. Request countries to give adequate political attention and investment to protect mountain biodiversity.

Thank you for your attention

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- Federal Office for Agriculture (FOEN) ed., 2014: Biodiversity in Siwtzerland. Summary of Switzerland's Fifth National report under the Convention of Biological Diversity.

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Federal Constitution

Art. 104 Agriculture

[1] The Confederation shall ensure that agriculture makes a major contribution through sustainable production geared to market demands to:

a. ensuring food supplies for the population;

b. maintaining the natural resources and preserving the countryside;

c. maintaining a decentralised settlement pattern in rural areas.

[2] Further to a reasonable degree of self-help in the agricultural sector and, when necessary, notwithstanding the basic principle of economic freedom, the Confederation shall support land-based agricultural farms.

[3] The Confederation shall devise measures in such a way as to ensure that the agricultural sector is able to fulfil its multifunctional tasks. It shall be given in particular the following powers and tasks:

a. It shall supplement farmers' incomes through direct payments aimed at ensuring an appropriate remuneration for the services provided, on condition that proof of ecological performance is provided.

b. It shall promote methods of production that are close to nature, environmentally acceptable and animal-friendly through economic incentives.

c. It shall issue regulations concerning declaration of origin, quality, production methods and processing methods for foodstuffs.

d. It shall protect the environment from the harmful effects of the excessive use of fertilisers, chemicals and other auxiliary substances.

e. It may promote agricultural research, extension and training as well as supporting investment.

f. It may issue regulations for consolidating agricultural property.

[4] For this purpose it shall use specific agricultural funds as well as general federal funding.

Status of biodiversity for food and agriculture according to sector

Livestock diversity:

- Government has funding program to promote livestock breeds of Switzerland → number of breeds registered has been increasing

Crop Diversity:

- Status of conservation is assessed within the National Plan of Action, the National Gene bank and the Swiss National Database (BDN): NAP; 4th phase targeting ex- and in-situ conservation of genetic resources

Forest diversity

- According to altitude and region various changes; between 1000m and timberline has increased; at this altitude forest covers 60 %.
- More forest which is not managed leads to a more natural composition of tree species and increase of forest as a habitat for species

Aquatic diversity:

- 54% of CH watercourse are in natural or near-natural state whereas 20% the condition is classified as insufficient

Drivers of change

- Change in **land use** between 1985 – 2009 affected 15% of CH's surface
- Agriculture Area: 5.4 % loss of agricultural area between 1985 - 2009 (1.1 m^2 per second) due to increased urbanization, land abandonment and increased forest coverage;
- Organic Farming steadily increased to 11% of total agricultural area (although the total area decreased)
- Trend persist but pace has decreased

- Air pollution mainly through nitrogen compounds
- Soil degradation of arable land, which are highly loaded with nutrients

Agricultural practices negatively impacting biodiversity in Switzerland:

- Overuse of artificial fertilizer / external inputs; balance between input and uptake is not even.
- Over-use of chemical control mechanisms. Quantities sold declined strongly, however the new ones are more effective and used in smaller quantities. Environmental impact uncertain.
- Practices leading to soil and water degradation (soil compaction)

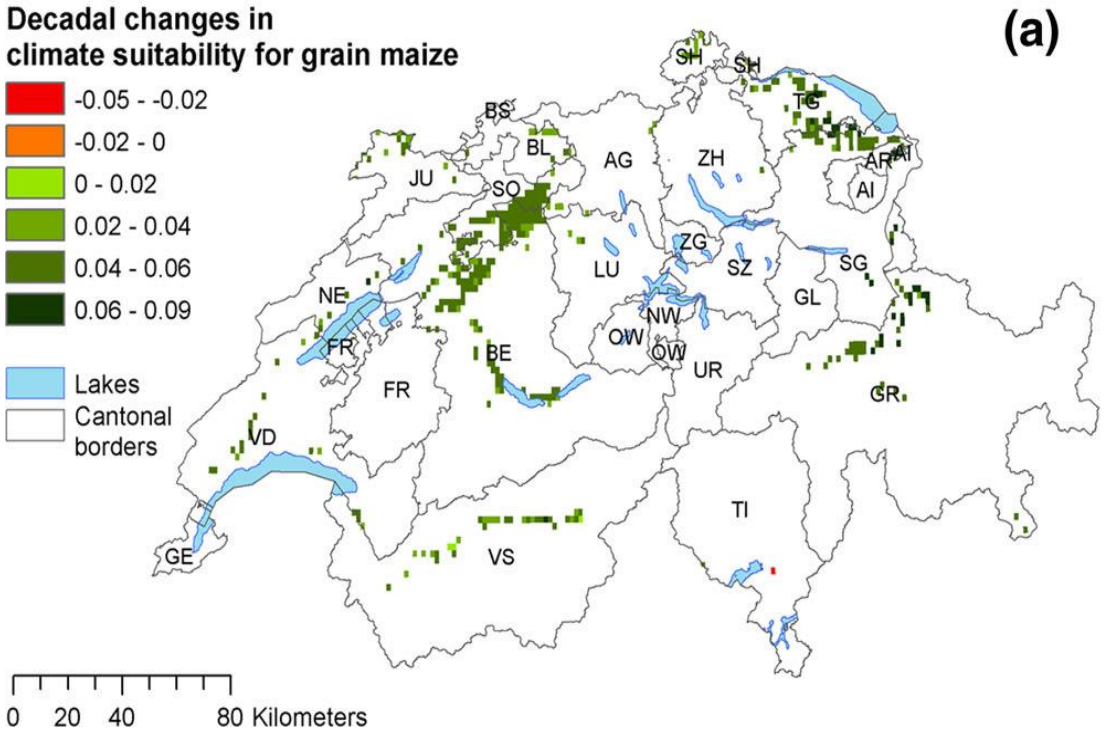
Swiss Biodiversity Strategy (SBS)

- Developed in 2012 in light of the Global Strategic Plan for Biodiversity and its Aichi Biodiversity Targets, with a special focus on mainstreaming biodiversity into all policy sectors and on ecosystem conservation. SBS includes ten priorities:
  1. the sustainable use of biodiversity;
  2. the development of ecological infrastructure;
  3. the improvement of the conservation status of national priority species;
  4. the conservation and promotion of genetic diversity;
  5. the evaluation of financial incentives;
  6. the recording of ecosystem services;
  7. generation and dissemination of knowledge;
  8. promotion of biodiversity in settlement areas;
  9. strengthening of international commitment; and
  10. the monitoring of changes in biodiversity.

Climate Change

- Rise in temperature most impressive indicator of climate change in recent decades; from 1864 – 2011 **temp increase in CH of 1.7°C** (global average 1.1°C);
- The **retreat of the glaciers** and the melting of the permafrost frequently illustrate the **direct impacts**;
- Moderate warming of less than **2 – 3°C** may have a **positive** effect on agriculture in CH → **longer vegetation period;**
- **Water supply** may decrease in summer and damage caused by extreme events may increase.

Changes in Climate Suitability for Maize and Wheat in CH 1983-2010



Source: Holzkämpfer et al., 2014

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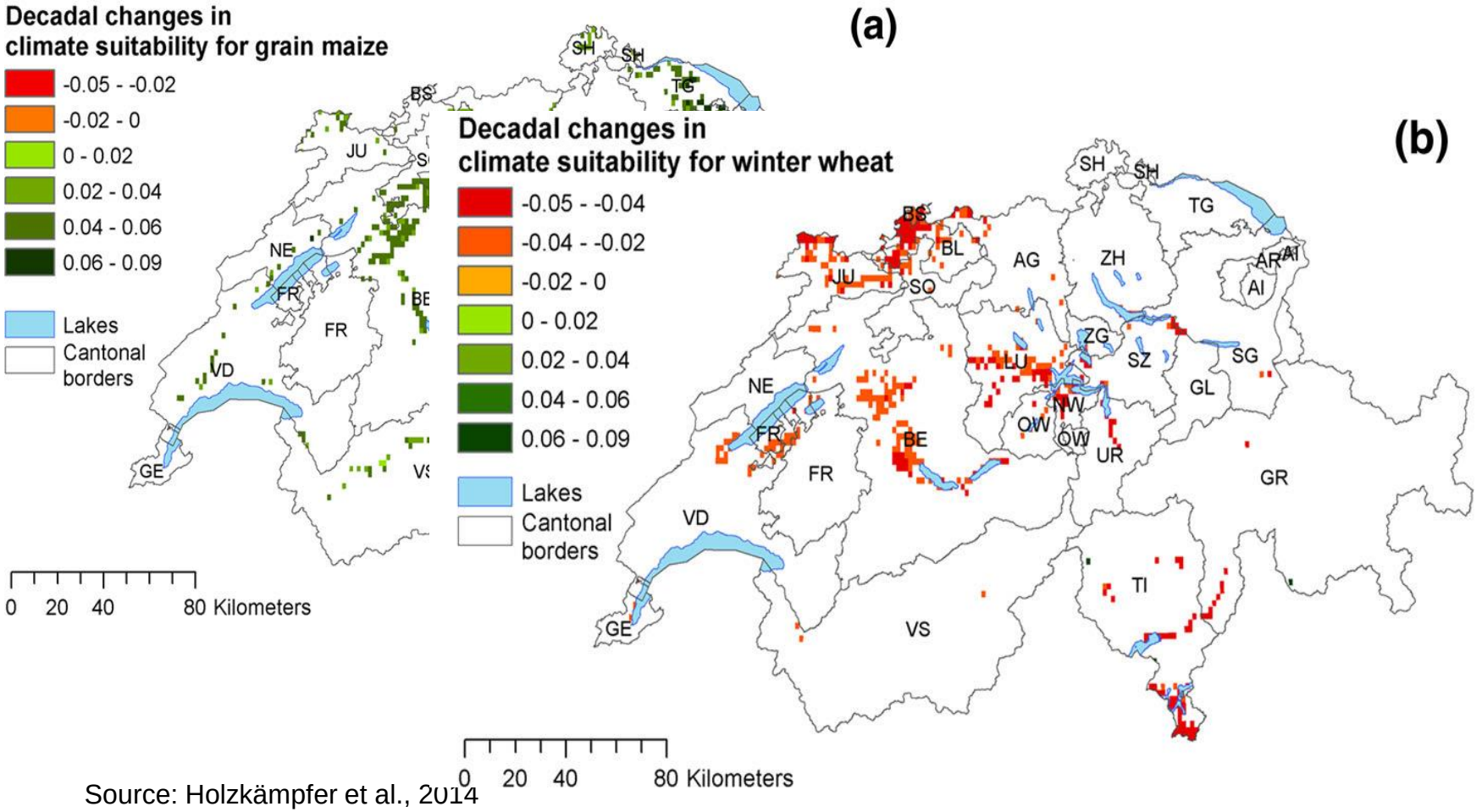

Source: Holzkämpfer et al., 2014

Changes in Climate Suitability for Maize and Wheat in CH 1983-2010

Trend of maize and wheat development patterns may continue:

- In a short-term perspective: **maize may increase** whereas winter **wheat cultivation** may decrease;
- **In a mid-term perspective: other limitations may determine growth, e.g. water availability, heat stress.**

- **High diversity** enables agricultural production **systems to cope with** changing environmental conditions;

→ Choice of suitable cultivated plants, cultivation methods and management will support the adaptation of agriculture in CH.

3. Conservation of Agrobiodiversity through Sustainable Use

- The CBD promotes Sustainable Use in its 2nd Goal:

  "the **sustainable use** of the components of **biological diversity** [...]"

- The International Treaty of Plant Genetic Resources for Food and Agriculture (IT PGRFA) defines in Art. 1.1:

  "The objectives are the **conservation and sustainable use** of plant genetic resources for food and agriculture [...] "

3. Conservation of Agrobiodiversity through Sustainable Use

- Conservation of biodiversity contains risks: **ex-situ collections** are mainly cultivated plants and the genetic features remain **rather static.**
- **In-situ conservation,** as a **dynamic** process, enables species to develop further and **adapt to changing** environmental conditions. However, external conditions, such as natural disasters or mismanagement may lead to a loss of genetic diversity
- Therefore, in situ and ex situ conservation are **complementary activities**.