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Project AProWa: a national view on managing trade-offs between agricultural production and conservation of aquatic ecosystems

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Swiss agriculture is legally committed to fulfill several, partially conflicting goals such as agricultural production on the one hand and the conservation of natural resources on the other hand. In the context of the research project AProWa ("Agricultural Production and Water"), the relationships between the production aspect and the conservation of aquatic ecosystems is analyzed with a holistic approach.

Agricultural production and the protection of water resources have high potential for conflicts: Farmers use ground and surface water to irrigate their fields. On the other hand, drainage systems enable the production on otherwise unfavorably wet soils. These in turn often affect ground water recharge and divert precipitation directly into surface waters, which changes their hydrological regime. Typically, drainage systems also elevate the input of nutrients and pesticides into the water bodies. In general, applied fertilizers, plant protection products, veterinary drugs and phytohormones of cultivated plants are introduced into the ground and surface waters through different processes such as drift, leaching, runoff, preferential flow or erosion. They influence the nutrient cycles and ecological health of aquatic systems. The nutrient and pesticide loss processes themselves can be altered by tillage operations and other agricultural practices. Furthermore, the competition for space can lead to additional conflicts between agriculture and the protection of aquatic ecosystems. For example, channelized or otherwise morphologically changed rivers do not have a natural discharge pattern and are often not suitable for the local flora and fauna; but naturally meandering rivers need space that cannot be used for agriculture.

In a highly industrialized and densely populated country like Switzerland, all these potential conflicts are of importance. Although it is typically seen as a water-rich country, local and seasonal overexploitation of rivers through water extraction for irrigation can already be documented. Due to drier summers induced by climate change, this phenomenon is expected to gain more importance in the future. Related to water quantity and quality it is crucial to think about the diverging interests between the supply of the population with national agricultural products and the preservation of the water bodies, their ecological value and their other ecosystem services (e.g. drinking water supply).

The project AProWa attempts to elucidate trade-offs of national goals for water protection and agricultural production in Switzerland by involving stakeholders from agricultural administration (Federal Office for Agriculture, FOAG), agricultural research (Agroscope), water research (Swiss Federal Institute of Aquatic Science and Technology, Eawag) and environmental protection (Federal Office for the Environment, FOEN). This is done by applying multi-criteria decision analysis facilitating consensus regarding goals and possible activities and alternatives to reach these goals. This is followed by an evaluation of main conflicts and prioritized research gaps. We present preliminary results from workshops and interdisciplinary discussion groups that encompass an objectives hierarchy reflecting agricultural production and water conservation goals. Furthermore, an inventory of agricultural practices and water protection measures is presented, enabling their evaluation for the provision of agricultural production while sustaining aquatic ecosystems.