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Measures and responses in Swiss and Austrian (alpine) grassland - comparison of two contrasting case studies (Mondsee (A) and Sempachersee (CH))

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This presentation compares the Mondsee (A) and the Lake Sempach (CH) and their catchments in the Austrian pre-alps and in the Swiss Plateau, respectively. Both lakes are of similar size (about 10 - 15 km²), and the catchments have comparable soil and climatic conditions. As a consequence the agriculture in both watersheds is grassland-dominated. Despite these similarities, the intensities of animal production differ substantially with a low stocking density in the Mondsee catchment (1.4 LSU/ha) and fairly high values in the Lake Sempach catchment (up to 2.4 LSU/ha in critical subcatchments). The reason for the differences is the intensive pig production that has been developed in the region of Lake Sempach since the 1970s. Due to import of feedstuff the P cycle got out of balance. This is clearly reflected in vastly differing soil P status in the two areas. While the soils in the Mondsee catchment are predominantly very low in available P a large proportion of the Sempach area has a P excess.

The intensity in agriculture is clearly reflected in the water quality of the two lakes. While the Mondsee never experienced P total concentration > 35 mg m⁻³, the values in Lake Sempach peaked at 170 mg m⁻³ in the mid 1980s being partially due to sewage input as well. To recover an acceptable status of water quality for lake Mondsee, it was - at least until present sufficient to massively reduce point pollution sources. In contrast higher concentrations caused severe negative eutrophication effects in Lake Sempach, including massive fish kills that called for action. Apart from finishing sewage treatments plants, internal lake measures as well as measures concerning agriculture have been implemented. In critical subcatchments for example, the P surplus could be converted into a negative P balance due to subsidizing P-reduced pig feed. Overall, mitigation was rather successful and P concentrations have dropped since 2004 below the water quality threshold of 30 mg P total m⁻³ that has been derived for Lake Sempach in the 1980s. Despite this steady decline of P concentrations over two decades internal lake measures are still in place due to the critical role of lake sediments that continue to release P into the water column. The developments of Lake Sempach and its neighbouring Lake Baldegg demonstrate that mitigation of lakes requires an integrated understanding and management not only of the catchments but also of the complex processes within the lakes themselves.