Impact of climate change on wildbees and pollination service

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Background

- Pollinator communities are declining and land-use and climate change are the key drivers[1].
- Around 75 % of the world's crops benefit from the pollination service and the estimated economic value is 341 million CHF/year[2].

Objectives

- Assess the impact of climate change on wild-bees and pollination service.
- Develop decision-support tools and adaptation measures.

Index of pollination potential and service

The InVEST pollination model[3] (Figure 1) uses relative species abundance, estimates of availability of nest sites and floral resources within the flight ranges and activity period to derive an *index of pollination potential*. Additionally the *index of pollination service* is a proxy for the contribution of wild-bees to agricultural production and is based on crop's dependence on pollination.

Data sets used:

- Relative species abundance: estimated species distribution for 72 wild-bee species for present and future climate (CHclim25)[5]
- Availability of nest sites and floral resources: (a) downscaled Land use and –cover map with 74 categories at 25 m spatial resolution[4], (b) Expert knowledge on bee life-history traits[6]
- Verification with Agroscope project data

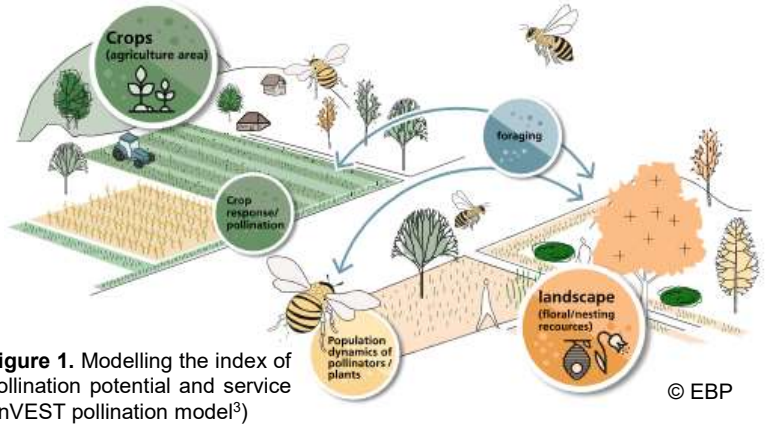

Figure 1. Modelling the index of pollination potential and service (InVEST pollination model[3])

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Results and Discussion

- Adaptation of the InVEST pollination model for Switzerland and verification with field observations from projects.
- Impact of climate on the *index of pollination potential* varied depending on species (Figure 2) and regions (Figure 3).
- Contribution of wild-bees to apple, cherry and rapeseed production (*index of pollination service*): preliminary results do not yet show a clear climate signal on the national scale.

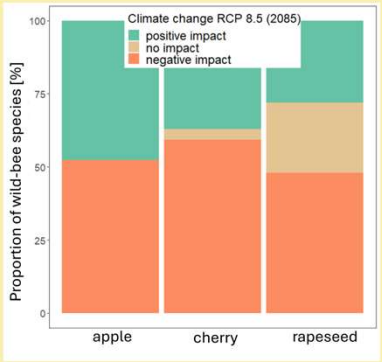

Figure 2. Impact of climate change on the *index of pollination potential* in spring for wild-bee species. RCP 8.5 (2085).

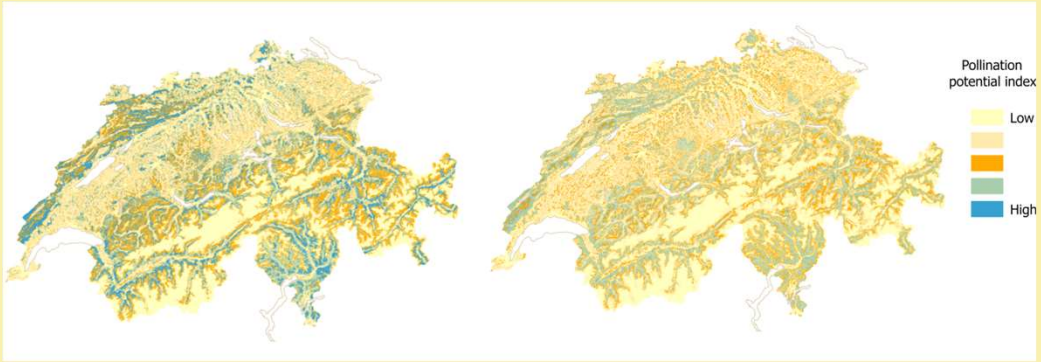

Figure 3. The *Index of pollination potential* in spring for *Andrena strohmella* will decrease by 23 % assuming climate scenario RCP 8.5 (2085) compared to present climate (1980-2021).

Next steps

- Interpretation, validation and update of the *index of pollination potential and service* for apple, cherry and rapeseed.
- Impact of land-use change on pollination potential.
- Development of decision-support tools.
- Identification of adaption measures with stakeholders.

NCCS-Impacts: Ecosystem services

- Cross-sectoral overview of climate change on ecosystem services
- User-oriented decision-support tools such as a digital knowledge platform or fact sheets.
- Selected ecosystem services: pollination service, tree species distribution, carbon storage, grassland and water yield.

Literature

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