

## MSc Thesis

### Research Collaboration with the Swiss National Park, WSL, Norwegian Institute for Nature Research, and Great Gobi B Strictly Protected Area in Mongolia

#### *Mapping Saxauls (Haloxylon ammodendron) in the Great Gobi B Strictly Protected Area system using Sentinel-1 and Sentinel-2 data*

#### Background

The saxaul is largely the only tree species that can be found in the Gobi Desert. Saxaul is a protected species in Mongolia, but it is felled illegally for firewood. The wood is extremely dense and burns at high temperatures. In particular, military camps along the Chinese border use saxaul wood for heating and cooking. The great number of car traces in the desert testify the illegal logging of such trees. Though in smaller quantities, nomads and inhabitants of small settlements also still use saxaul wood to some degree. An important ecosystem service provided by saxaul is the protection of soil from wind erosion and desertification. Furthermore, the trees provide a microhabitat for plants and animals and an important source of forage in an otherwise barren landscape. Wild ass, goats, camels and other ungulates regularly browse saxaul trees in winter, when other food sources are scarce.

Besides anthropogenic and biotic disturbance from browsing, changes in the biological water balance influence saxaul distribution and biological conditions, since its deep roots seasonally reach the groundwater.

However, outdated or largely missing data about saxaul distributions make it difficult to protect and manage the trees. In particular, the recent expansion of the Great Gobi B strictly protected area urgently requests for spatial datasets supporting management decision.

The Sentinel-1 and -2 satellite missions, with their high spatial and temporal resolutions, have the potential to close the knowledge gap produced by the limited data availability in such remote and unique environments. In particular, the data should provide a long-term monitoring of saxaul distribution and biological conditions.

#### Project aims

The aims of this master project are to:

- i) map saxaul distribution and conditions in the Dzungarian Gobi with Sentinel-1 and -2 data;
- ii) investigate the added value of using multi-temporal passive and active sensors;
- iii) compare the distribution with older maps derived from LANDSAT data;
- iv) provide a method that can be integrated in a long-term monitoring of saxaul biological conditions and change detection due to logging and browsing



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