REDD+ OUTSIDE THE TROPICS

Using spatial analysis to inform planning in Mongolia's boreal forests

[1] UNEP World Conservation Monitoring Centre, Cambridge, United Kingdom

[2] Department of Plant Sciences, University of Cambridge, Cambridge, United Kingdom

[3] Information and Research Institute of Meteorology, Hydrology and Environment, Ulaanbaatar, Mongolia

W. Simonson[1,2], Z. Narangerel[3], G. Nandin-Erdene[3], C. Hicks[1], L. Miles[1] and X. de Lamo[1]

Background

Located at the southern end of the vast Siberian taiga, Mongolia's **boreal forests** cover over 12 million hectares and play an important role in supporting local community livelihoods and several sectors of the national economy (for instance, through the provision of timber and non-timber forest products or forest-based leisure tourism). However, forests have been affected by severe degradation processes over the last few decades.

To reverse this trend, Mongolia is pursuing a green development pathway, including through **REDD+**, aiming to protect forests, biodiversity and the ecosystem services they provide. Mongolia is the first country with significant boreal forest cover to join the UN-REDD Programme*.

To help plan for this, decision-makers need information on ecosystem services in an **accessible form** that supports the design of policies that promote **multiple benefits** and reduce **potential risks**.

Khovsgol aimag

Tov aimag
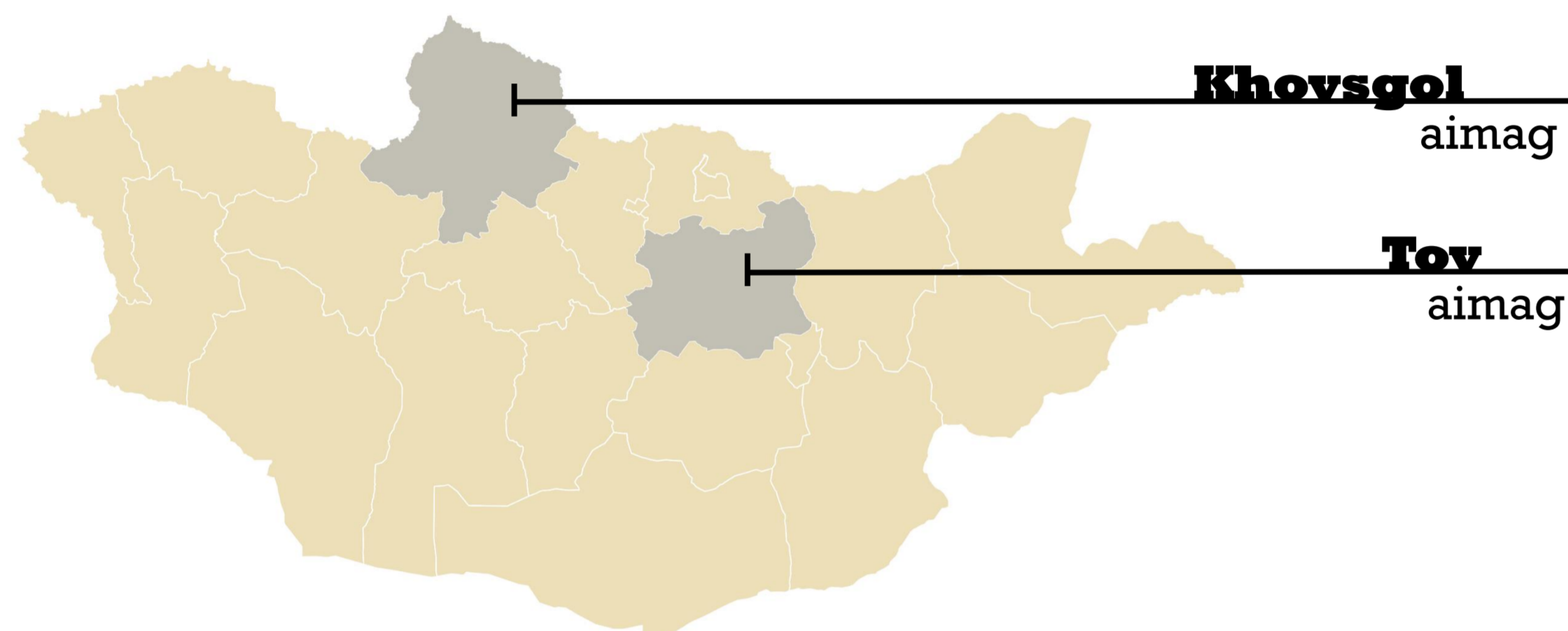
Methods

The study was undertaken at two scales - for the overall boreal forest region of Mongolia and for two prioritised forested *aimags* (provinces), shown above.

Stakeholder consultation workshops were carried out in order to identify and prioritize the values of forests as perceived by local stakeholders.

A range of **spatially-explicit datasets** were compiled in order to generate and map indicators or proxies of the prioritized forest values, as well as drivers of forest loss and degradation (which were identified through a separate analysis).

In order to **build in-country technical capacity** to develop maps to support REDD+ planning, spatial analyses were conducted in joint technical working sessions using **open-source** software and modelling tools.

Photo Credit: shutterstock.com

Results

The maps produced examine **pressures** on forests and forest **values**. In this way, they highlight where **REDD+ actions** could deliver the greatest potential benefits. Some examples are included below.
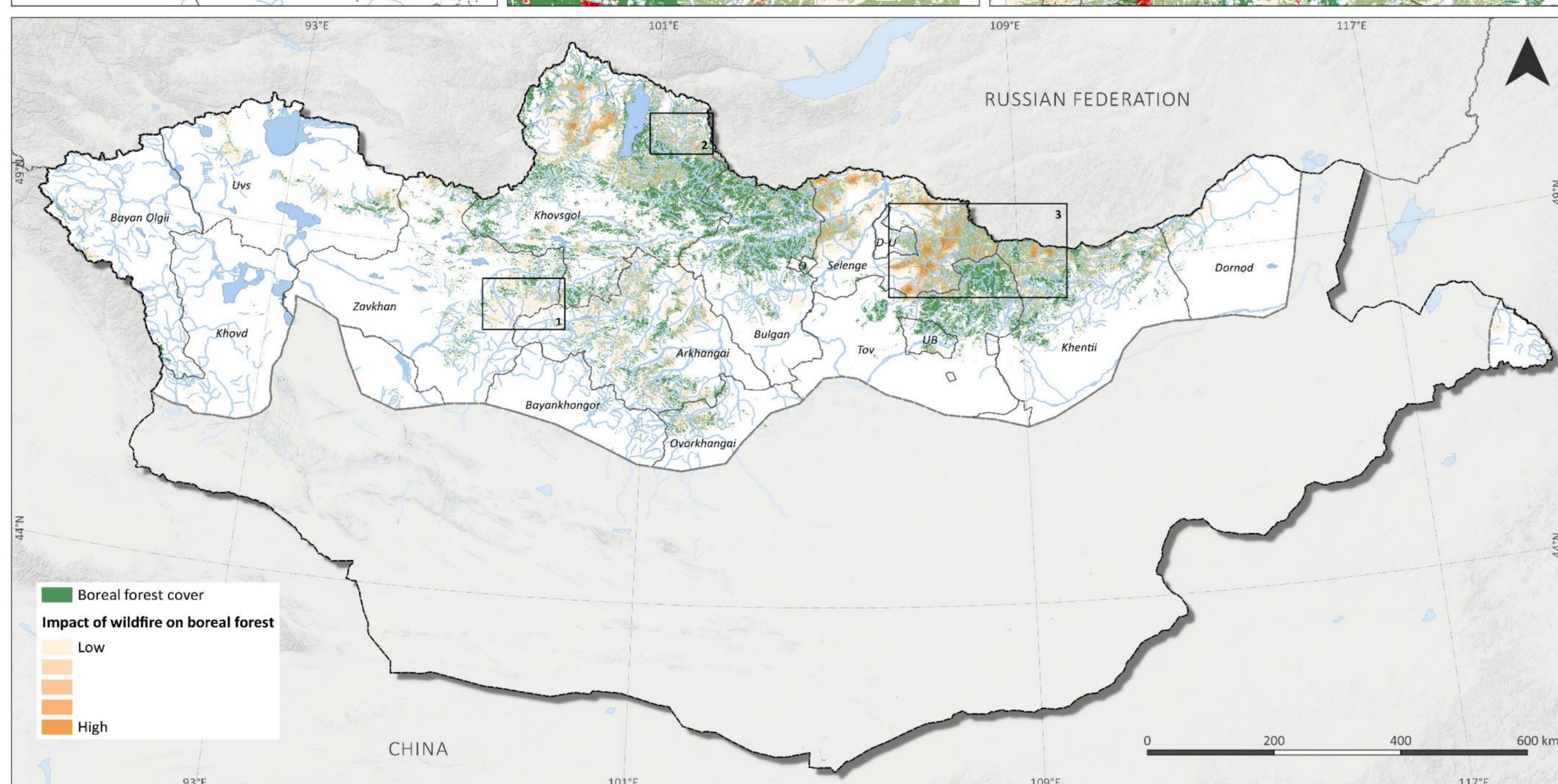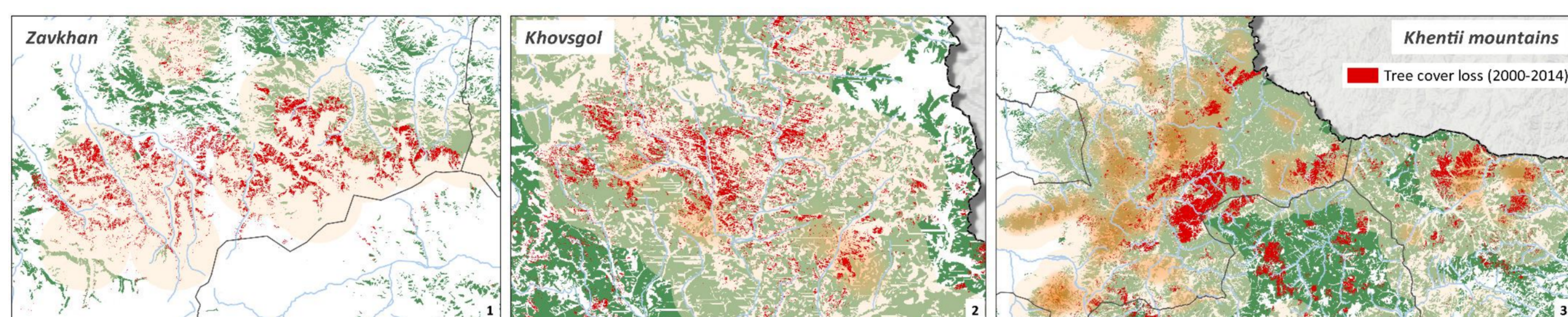
Fire

Observational records indicate an increase in fire activity in Mongolia in the last 50 years. This compromises the capacity of the country to meet REDD+ objectives. Knowing the location and intensity of fires is useful for targeting and designing REDD+ policies and measures.

Photo Credit: fire.uni-freiburg.de

PRESSURE ON BOREAL FORESTS FROM FIRES

Overlaying the density of National Forest Inventory plots, where clear visual evidence of recent **fire damage** had been recorded, with the areas affected by tree cover loss according to Hansen *et al.* (2013), suggests that fire is the most important driver of **forest loss** in the country.

Zavkhan

Khovsgol

Khentii mountains — Tree cover loss (2000-2014)

RUSSIAN FEDERATION

CHINA

Boreal forest cover
Impact of wildfire on boreal forest
Low
High

IN WHICH AREAS COULD REDD+ PROVIDE MORE BENEFITS?

We combined layers on individual pressures and benefits in order to examine forest areas where REDD+ activities could deliver **multiple benefits**. The example maps below show where areas important for providing freshwater, biodiversity conservation and climate change mitigation benefits **overlap** in the two focal *aimags*.

KHOVSGOL

TOV

Other forest areas*
Number of potential benefits
1
2
3
* They may contain other types of benefits

Livestock grazing

Mongolia has a long tradition of raising livestock, and pastoral nomadism is the prevailing form of land use in the country. Livestock grazing, although not a primary driver of deforestation in Mongolia, makes extensive use of forests and, if practiced unsustainably, may interact in a complex manner with other drivers to gradually degrade forests and negatively impact natural regeneration and reforestation efforts.

Photo Credit: UN Photo Library

RUSSIAN FEDERATION

CHINA

Boreal forest cover
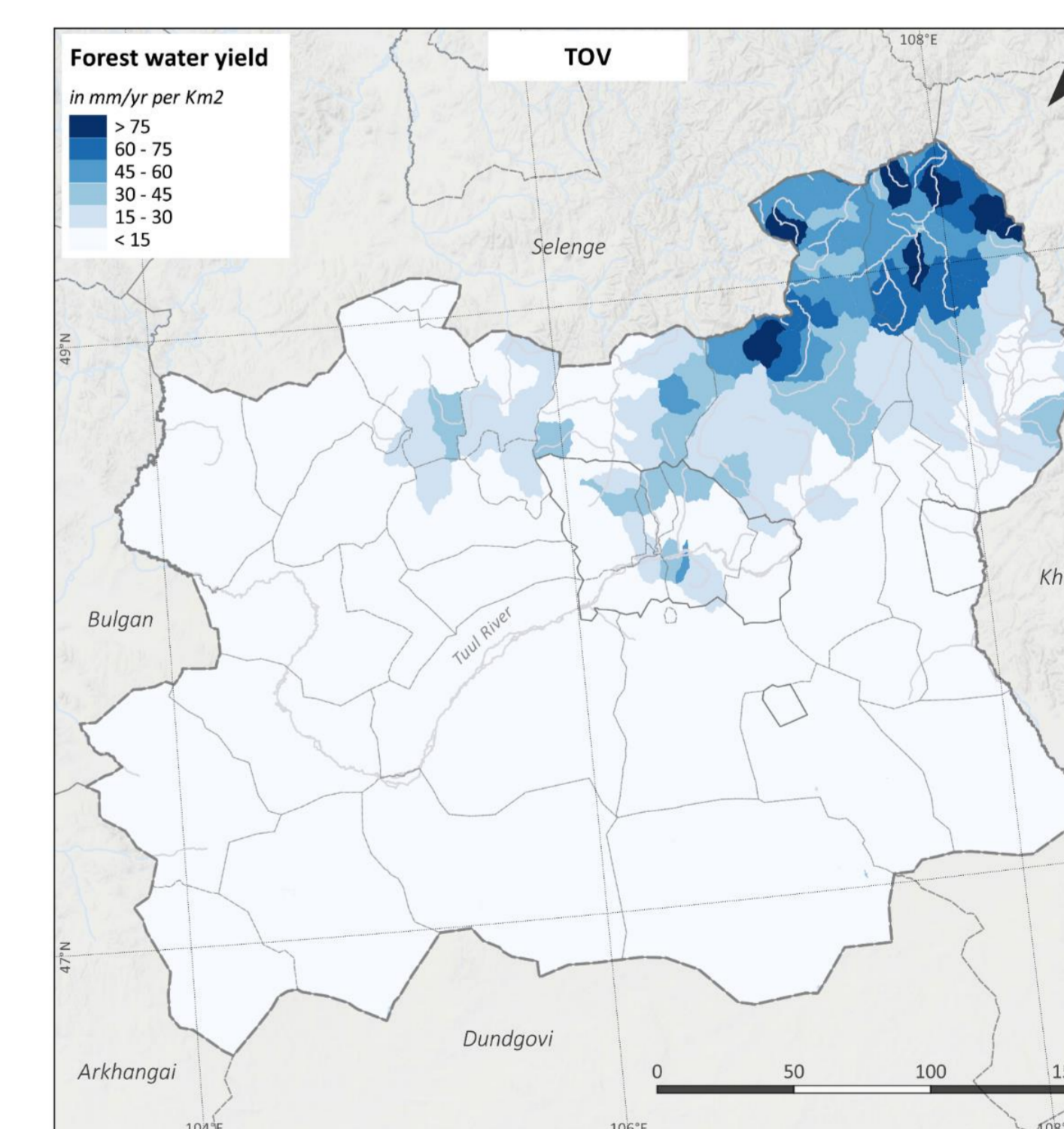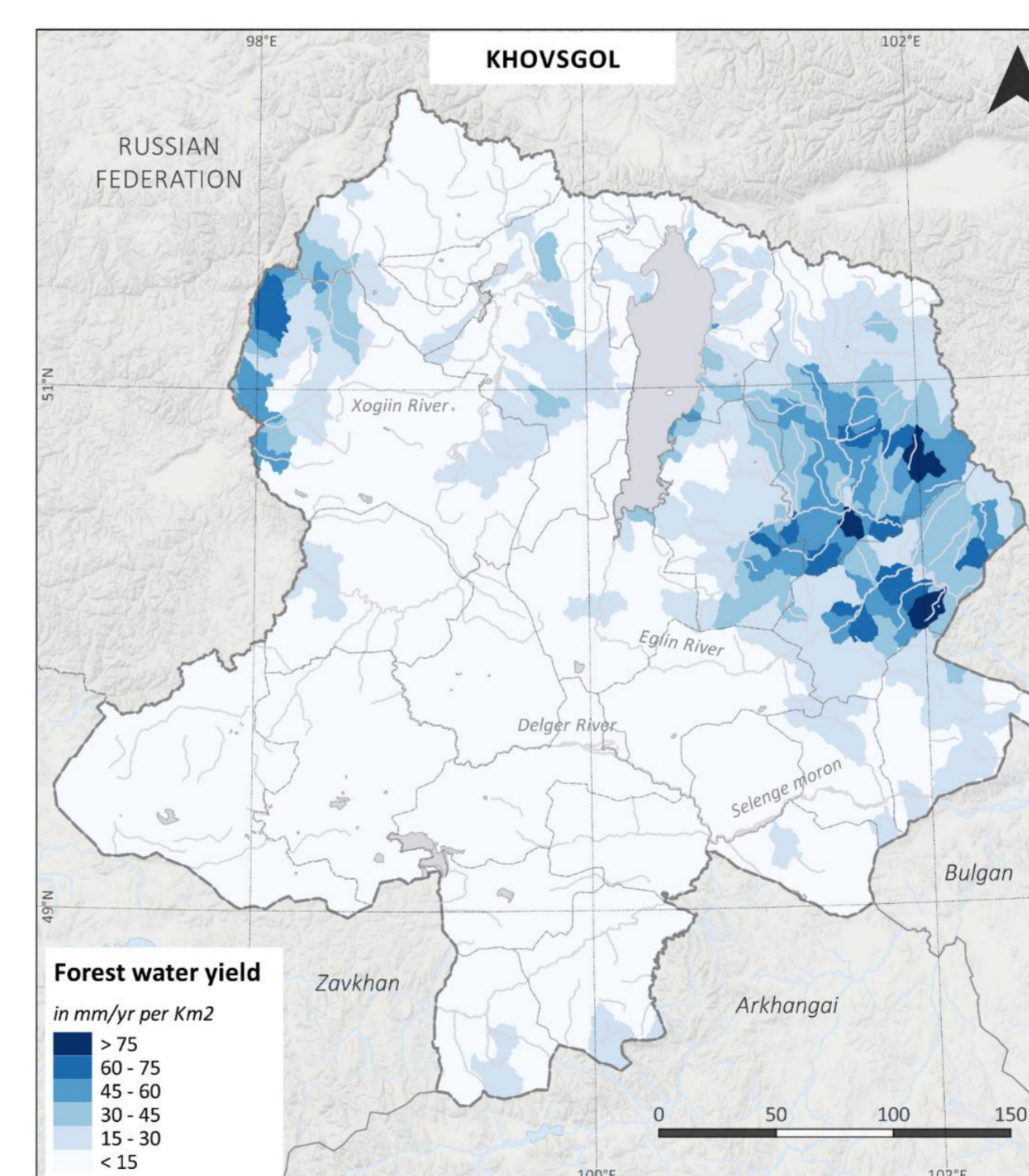Impact of livestock grazing on boreal forest
Low
High

LIVESTOCK GRAZING IN FORESTS

The density of forest plots from the **National Forest Inventory** that have visual records of medium to heavy grazing impact suggests that the areas located in the far **west** of the country, where forests are sparse and found at high altitudes, are the **most affected** by livestock grazing.
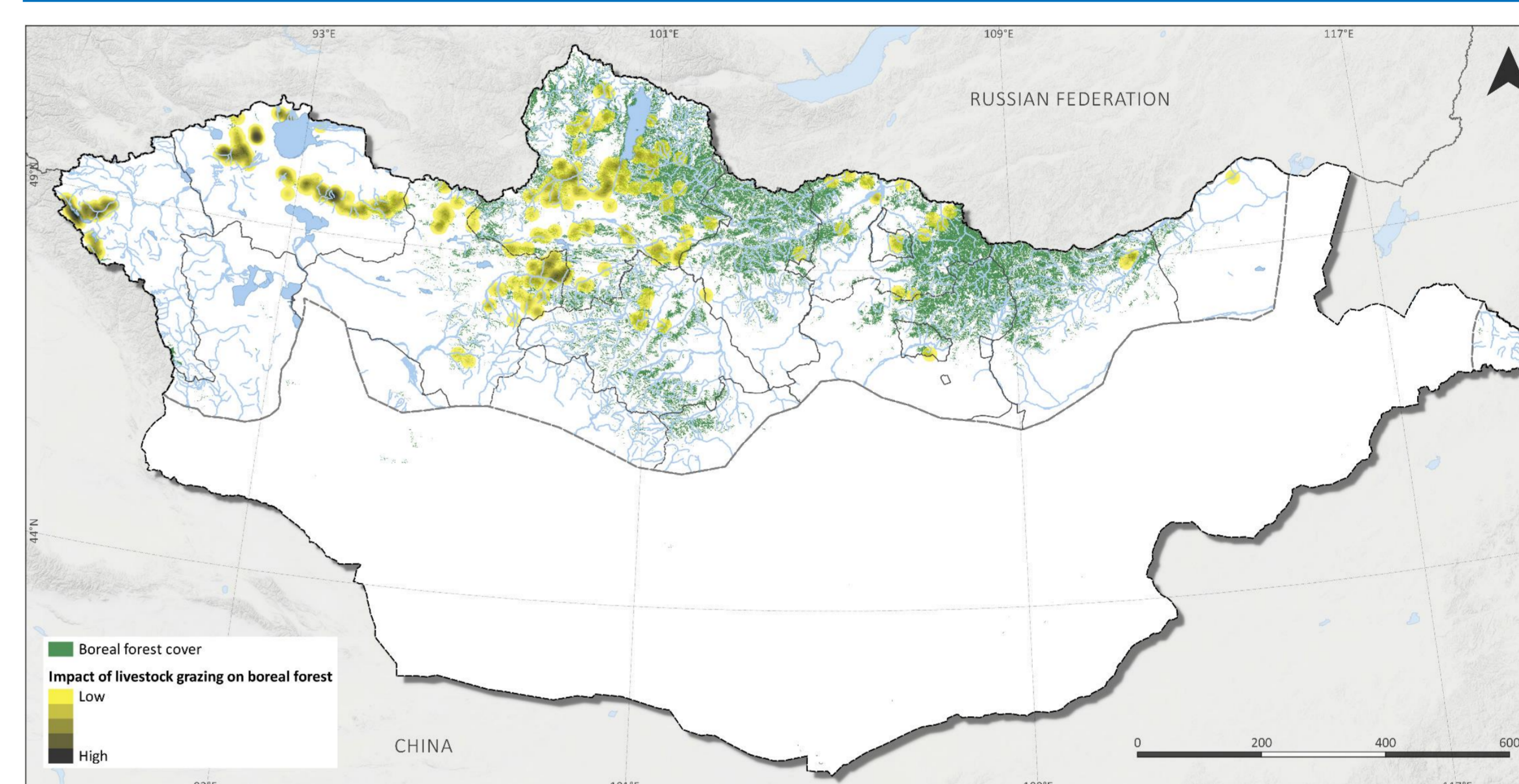
Hydrological services

Forests play an important role in the local landscape in terms of controlling water balance and run-off, as well as reducing soil erosion, which can be exacerbated by the removal of forest cover. Results from consultation workshops indicated that freshwater provision is one of the most valued services provided by forests.

KHOVSGOL

Forest water yield
in mm/yr per Km2
> 75
60 - 75
45 - 60
30 - 45
15 - 30
< 15

TOV

Forest water yield
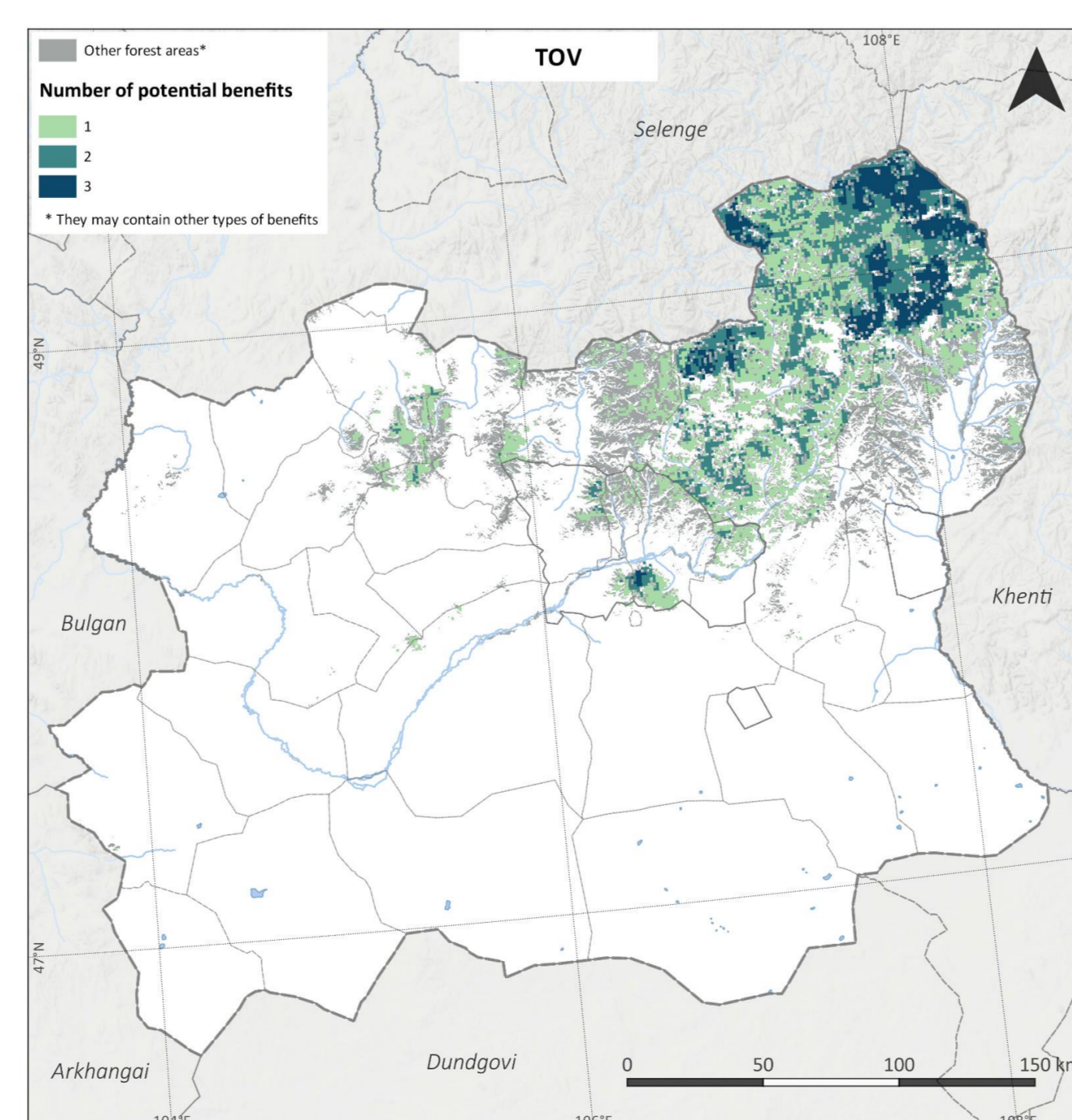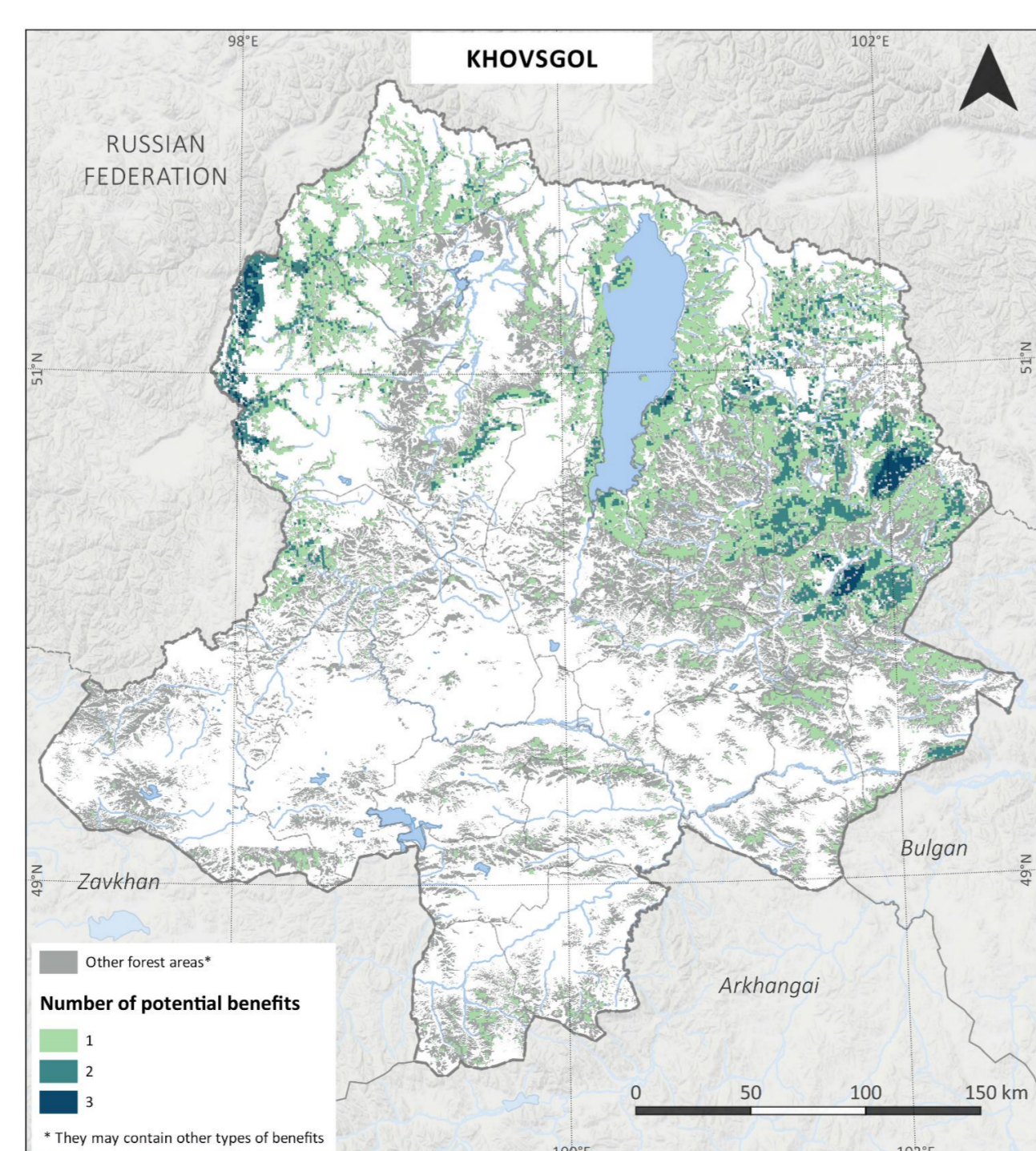in mm/yr per Km2
> 75
60 - 75
45 - 60
30 - 45
15 - 30
< 15

FOREST WATER YIELD

The contribution of forests to annual **water yield** was estimated using an open-access hydrological modelling platform. Results suggest that a reduction of forest cover **would reduce** water availability as a result of a decrease of **fog capture** by the trees.

Conclusions

With **competing demands** for land in Mongolia for meeting economic, social and environmental objectives, detailed land-use analysis and planning is critical to help address and reduce threats and impacts. The results of this work show how **spatial analysis** can help to inform REDD+ planning in Mongolia. The maps presented here are a way of making information available to stakeholders and **decision-makers** on areas where REDD+ actions may have the potential to deliver multiple benefits. We encourage the incorporation of the spatial analysis into planning on areas and **targets for REDD+ implementation**.

For further information, go to www.reddplus.mn

GOVERNMENT OF MONGOLIA — MINISTRY OF ENVIRONMENT AND TOURISM — UNEP — WCMC

2016