Laurel Poplar (*Poplar laurifolia* L.) – Genetic diversity of a vulnerable population in Western Mongolia

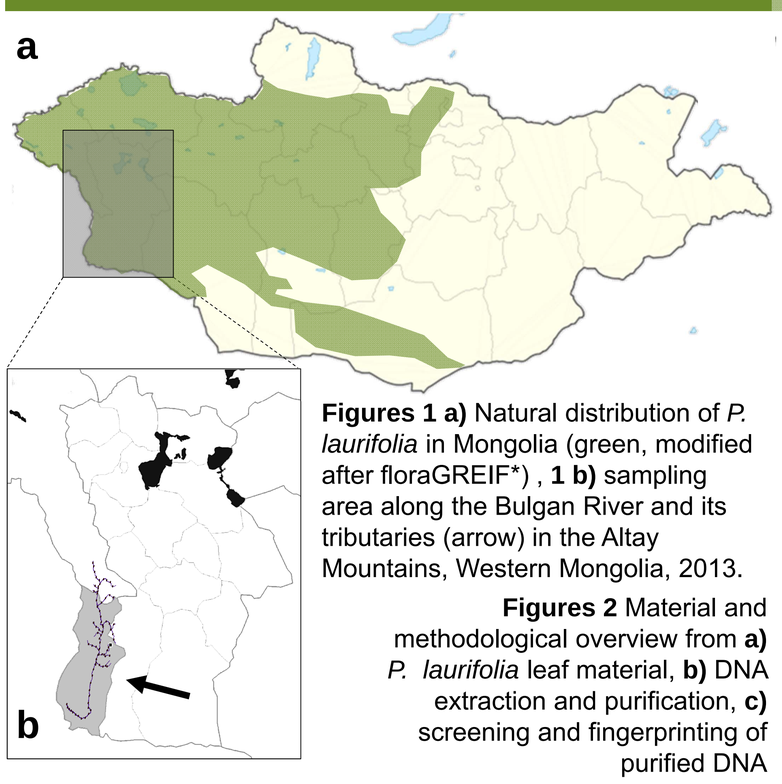
Martin Wiehle[1],Sven Goenster[1], Barbara Vornam[2] and Andreas Buerkert[1]

[1]Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics (OPATS), University of Kassel, Germany
[2]Forest Genetics and Forest Tree Breeding, Georg-August-University Göttingen, Germany

www.watercope.org

IFAD
Enabling the rural poor to overcome poverty

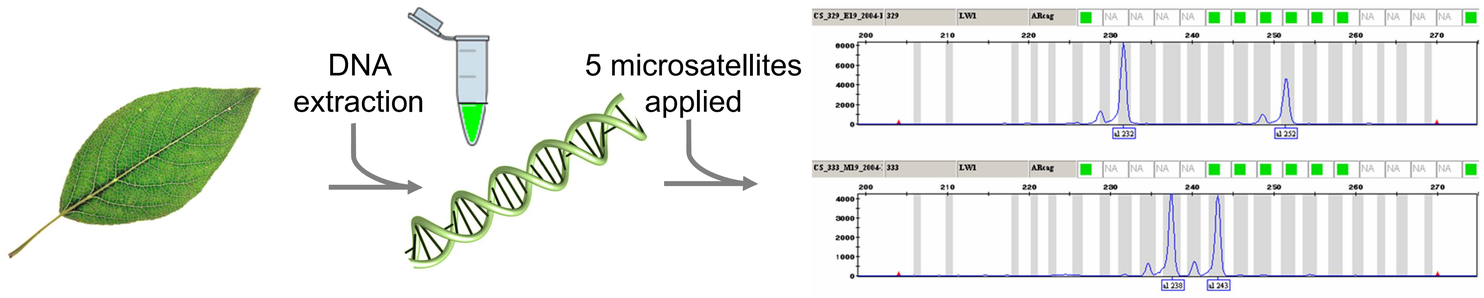
Introduction & Methods

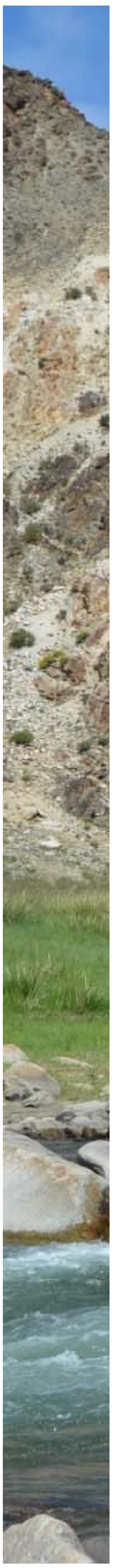


Figures 1 a) Natural distribution of *P. laurifolia* in Mongolia (green, modified after floraGREIF*) , **1 b)** sampling area along the Bulgan River and its tributaries (arrow) in the Altay Mountains, Western Mongolia, 2013.

Figures 2 Material and methodological overview from **a)** *P. laurifolia* leaf material, **b)** DNA extraction and purification, **c)** screening and fingerprinting of purified DNA

Riparian forest ecosystems belong to the most vulnerable ecosystems on our planet, but provide important ecological services. Over the last decades, human interventions (such as regulating and narrowing of streams, logging of trees, and over-grazing by livestock) have amplified these settings and therefore profoundly altered these riparian ecosystems within short times. To assess the vulnerability of these ecosystem, a study on the riparian tree species *Populus laurifolia* by recording dendrometric variables and evaluating genetic constitutions of pre-selected stands along the Bulgan River, Western Mongolia (Figs. 1), was conducted.





Results & Discussion

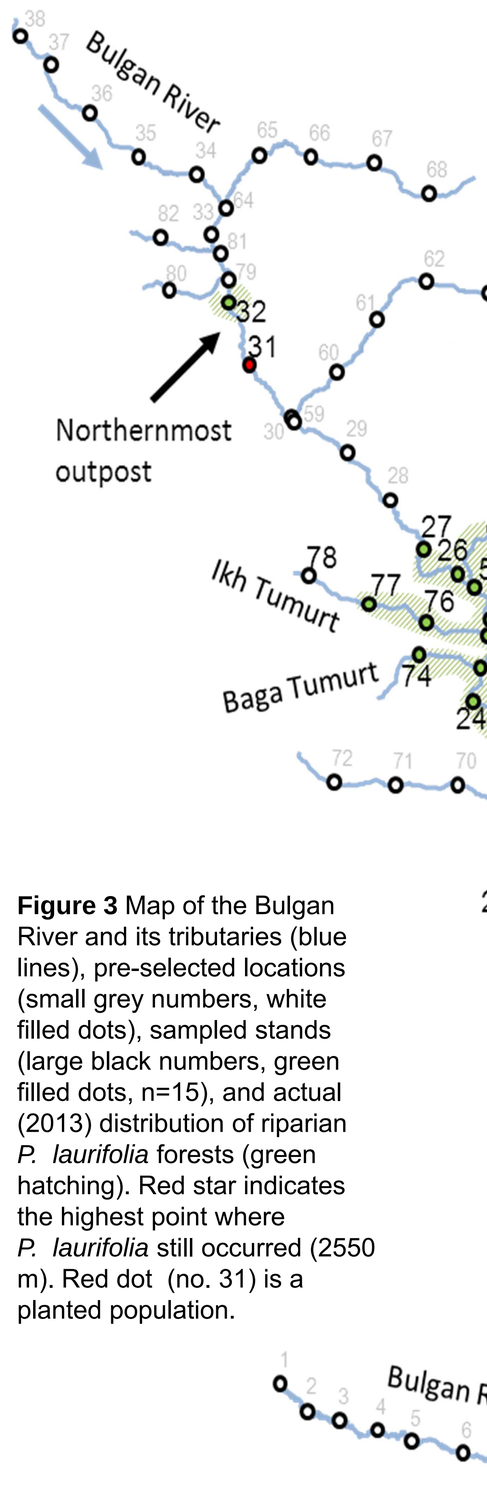
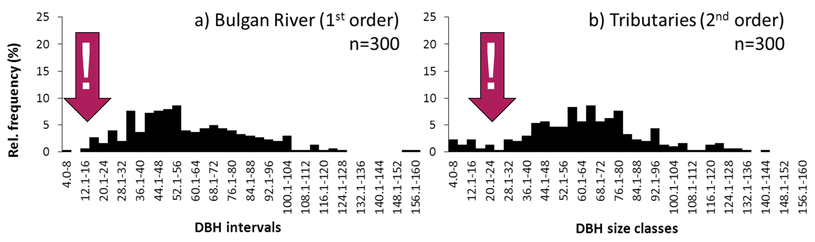


Figure 3 Map of the Bulgan River and its tributaries (blue lines), pre-selected locations (small grey numbers, white filled dots), sampled stands (large black numbers, green filled dots, n=15), and actual (2013) distribution of riparian *P. laurifolia* forests (green hatching). Red star indicates the highest point where *P. laurifolia* still occurred (2550 m). Red dot (no. 31) is a planted population.

Stand density:

- Adult trees: lowest along the tributaries (range 1-9 vs. 17 ha^{-1}, *P<0.05*)
- Root suckers/seedlings: highest along the tributaries (range 100-181 vs. 77 ha^{-1}, *P<0.05*)
- Patchy stands (Fig.3) and lack of young age classes (DBH≥4cm, Figs. 4)

Stand density was low compared to other Central Asian riparian forest ecosystems due to grazing and browsing of livestock.



Figures 4 a) and **b)** DBH (diameter at breast height) size class distribution along 1st and 2nd order streams. Arrows indicate the lack of young (small DBH) size classes.

Dendrology:

- Highest basal diameters in Dood Nariin, lowest in Baga Tumurt
- Highest canopy area in Ikh Tutmurt, lowest in Baga Tumurt

Variability of tree morphologies best explained by specific management regimes in the respective valleys (e.g. internal regulations in Dood and Deed Nariin).

Genetics:

- Large range of the number of identified clones (2-15 out of 15) per sampled stands
- Genetic diversity highest in downstream populations (range of expected heterozygosity 0.341-0.642)

Accumulation of genetic diversity downstream might indicate an assymetrical distribution of diversity.

References

*FloraGREIF - Virtual Flora of Mongolia, 2010 (http://greif.uni-greifswald.de/floragreif/). Computer Centre of University of Greifswald, D-17487 Greifswald, Germany. [15 June 2013].

Conclusions

The data show substantial fragmentation, over-aging and -grazing/-browsing patterns along the Bulgan River catchment area. These processes may hinder rejuvenation and subsequently may lead to the disappearance of this important regulating ecosystem.