

## Project Update: January 2023

The project's fieldwork activities began in June 2022. Almost all of *Picea omorika*'s natural habitats were visited during the fieldwork activities. Each fieldwork was planned in collaboration with the local Forestry Department and protected area managers and rangers, who provided valuable advice and assistance in spotting locations and assessing terrain that could not be assessed with standard equipment. The opportunity to collaborate with local authorities and residents has allowed us to further develop our basic idea (project objectives) and learn more about *omorika* conservation, management capacities, potential difficulties associated with natural population renewal, and ideas for establishing a seed orchard on Tara Mt. In addition, some ideas for improvement and future collaborations in this area have been initiated. During 5 months of intensive fieldwork, we sampled as much plant material as was required for comprehensive analyses and insights into population differences.

The current state of populations was also recorded, and it can be summarized as follows:

All *P. omorika* sites in Serbia are protected *in situ* with strict protection measures (without active intervention), resulting in the development of untouched forests. With regard to recent and distant fire events, burned populations can be expected to recover through passive restoration, i.e. natural rejuvenation and succession. Furthermore, all post-fire biological legacies (structures, organisms, patterns, and processes that link pre- and post-disturbance ecosystems) have been incorporated into the recovering ecosystem. The population at the "Kanjon Brusnice" site, which was established after the great fire in 1946, is the only one in Tara National Park that has been restored with autochthonous vegetation.



**Locality Kanjon Brusnice:** The forest structure, which has been developing over the last 70 years, has all of the characteristics of middle-aged stands. In these forests, *omorika* has the greatest increase in volume, while fir, spruce, beech, and black pine have much smaller increases. This indicates that this habitat is suitable for *omorika*, and its presence

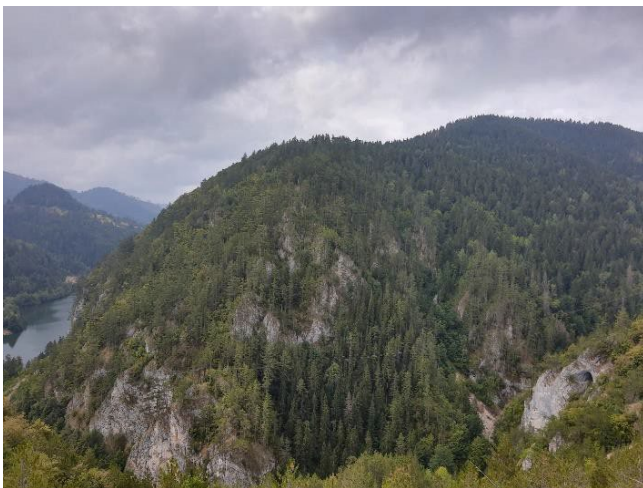
may increase in the future.

There was no evidence of a fire history in the other populations. Some sites are near watercourses (Zmajevački potok, Vranjak), while others do not have surface or underground watercourses (Studenac, Bilo), and the drying of trees is observed in Crvene stene location.



**Locality Studenac:** Forest community is *Omorikae – Piceto – Abieto – Fagetum pinetosum mixtum*. According to genetic evidence, this is the original habitat and community of omorika. These are the ancestors of all omorika populations in Serbia.

The presence of many poly-dominant species on this site is due to the preservation of the environment and the level of physiological maturity. The site is dominated by adult omorika specimens that occur in larger or smaller groups.



**Locality Vranjak:** Forest community is *Omorikae-Piceeto-Abieto-Fagetum pinetosum*, with presence of following species: *Picea omorika*, *P. excelsa*, *Pinus nigra*, *P. silvestris*, *Fagus moesiaca*, *Populus tremula*, *Rhamnus falax*, *Erica carnea*, *Anemone hepatica*, *Valeriana montana*, *Hieracium transylvaticum*, *Calamagrostis valaria* and others. Omorika's rejuvenation is quite successful.



**Locality Zmajevački potok:** Omorika appears in groups and as an individual tree in higher parts. Although its regeneration from seeds is good, an interesting phenomenon has been observed: omorika regenerates vegetatively from the laid down lower branches. In addition, successful omorika regeneration was observed on old, rotten, and semi-rotten black and white pine stumps. This site is a rare omorika habitat on serpentinites in Tara, forming a mixed relic community with spruce, *Omorikae-Piceeto-Abieto-Fageto-Pinetum mixtum* on serpentine, on skeletal brown soil.



**Locality Bilo:** This is a forest community with autochthonous omorika, which is of particular concern for the preservation of the omorika gene pool, as well as other species of flora and fauna that constitute this forest ecosystem.

Around the centre of the site, beneath a large block of limestone rock (which emerges on the surface), is an almost pure stand of omorika, which is represented here by nearly 80% of young specimens. The community is in good health, with no phytopathological or entomological diseases threatening it, and biological stability has been achieved in the protected area.



**Locality Crvene stene:** This forest ecosystem belongs to the relic type of poly dominant forests, *Piceetum omorikae-abietis calcicolum* subass. *pinetosum* Gajić et Vasiljević and it is one of the richest sites of omorika on Tara. Except for the drying of *Picea* sp. specimens, the population's overall condition is satisfactory. Despite the previous strict protection regime, a large number of omorika trees have dried up in the protected area.



**Locality Trenice:** Mixed Forest of black and white pine with omorika and spruce (*Piceetum omorikae - abietis serpentinum* Gajić et Stanić 1992), with omorika individuals in good health. This location is also one of ten experimental sites (four in Serbia and six in Bosnia and Herzegovina) where environmental parameters can be monitored.

Our work was presented at the International Meeting of the COST action "Fire in the Earth System: Science & Society" in Antalya, Turkey. This was an opportunity to promote the Rufford Small Grants Programme and to make new connections with forest conservation and fire protection professionals and practitioners.



Our presentation attracted the attention of many colleagues with various levels of experience working in forest conservation. It resulted in fruitful discussions and the development of ideas for future collaborations among academics and institutions. We intend to organise additional project promotions that will be adapted to a broader audience (school children, students, etc.).

The winter months have been reserved for examining the obtained material, performing laboratory experiments, and preparing the manuscript for publication in the SCI-ranked international journal.



Morpho-ecophysiological parameters that were determined were: needle length, weight, thickness, width, flatness, volume, area, density, moisture content, chemical composition.



Flammability experiments were performed on a large number of samples that provided empirical evidence about differences between populations.

Pictures from the field show that the sites were difficult to access and sample because of the steep and congested terrains, and the lowest branches in some populations were about 6 m tall.





According to NP Tara employees, there is one omorika population visible from the rock, but it is impossible to assess from that side.

We assumed that it is possible to reach from the river, so we arranged the terrain by boat in order to get closer to the site.



This was the closest point to reach the population which is located at about 800-900 ma.s.l. However, our guides warned us that climbing without proper equipment and experience is dangerous. For that reason, the assessment of this population will take place in the future, when all necessary conditions (safety, professional mountain guides, equipment, and weather conditions) will be met.

Recording of this population was also not possible using conventional equipment. It would be possible with a drone that we did not have.

Another example of how inaccessible the terrain is from the canyon.

