REFORM - Regional Workshop
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The second regional workshop within the ERA-Net Sumforest Project REFORM was held on January 17 and 18, 2019 in Maissau, Austria. The workshop was organized by the Institute of Forest Growth of the University of Natural Resources and Life Sciences Vienna (BOKU). The complete steering committee was present represented by the project leader Miren del Río as well as by the work package leaders Hervé Jactel, Hans Pretzsch, Anna Barbati, Magnus Löf, and Felipe Bravo. In addition, Vincent Boulanger (Office National des Forêts, France), Norbert Putzgruber and Monika Kanzian (Austrian Federal Forests, ÖBF), Stefan Tretter (Bavarian State Institute of Forestry, Germany), and Heinz Utschig (Bavarian Federal State Forests, Germany) were invited as partners from forest practice.

The workshop started with a meeting of the steering committee. Afterwards, the CEO and owner of the private forest company Traun'sche Forsverwaltung Ernst Abensperg und Traun and his local managing officer Walter Berger gave a comprehensive introduction on the history and the characteristics of their forest company.

On the second conference day, January 18, presentations were held by members of the project team as well as by invited partners from forest practice. Miren del Río started with an introductory talk on the organizational structure and described the main goals of the REFORM project. In her talk entitled "Overview on mixture forests in Europe" Anna Barbati provided a fundamental definition of mixture forests. She showed that the percentage share of mixture forests varies strongly among different forest ecotypes, with mesophytic and thermophilous deciduous forest types possessing the highest share of mixture forest with on average 50%, and with broadleaved evergreens and coniferous forests having the smallest share of only 20% mixture types. The presentation of Hervé Jactel was entitled "How mixed forests can reduce damage and risks: from theory to practice". Hevé Jactel gave a definition of the major drivers of forest damages through forest insects and pathogens. He showed that temperature triggers pest outbreaks and that drought increases risk of fires as well as the susceptibility to pest infection, and he also highlighted the prominent role of wind damages. Hervé gave a motivation of the concept of "associational resistance" stating that assemblages of different tree (plant) species would result in lower damages by natural disturbances at the stand level. Arne Nothdurft continued with first results of the tree ring analysis for the Austrian triplets. Major outcomes were that species mixture lowers the variability (climate sensitivity) of growth reactions and increases the resistance of single trees in most relevant forest types,

except for the oak-pine mixture scenario which behaved contrarily. Mixture lowers the single tree productivity rates on the examined Lower Austrian sites, except for beech-larch.

Nobert Putzgruber gave the first presentation from practice side with focus on the Federal Austrian Forests. He showed that the occurrence of the most relevant tree species is strongly correlated with the elevation above sea level. In particular, common beech is mainly present in colline sites, whereas stone pine plays a dominant role on sites above 1500 m elevation. The relevance of spruce has decreased on lower elevation sites. Nowadays, mixed forests have a higher share than pure forests. Nobert Putzgruber also presented an approach for the management and establishment of mixed stands based on natural regenerations. The crucial phase starts in young stands having a mean height of between 2 and 3 meters. Tending is applied to achieve a spatial segregation of the different species.

Vincent Boulanger gave a talk entitled “Implementing species mixture in forest stands management: state of the art and challenges”. He recommended that management activities in mixed stands should focus on a single target tree species per mixed stand. The target species should be the most appropriate species candidate for wood production. In most cases, the species with the highest proportion is selected as target species. The target species is then favored through the applied thinning activities. Other accompanied tree species can be also promoted if they fulfil special services (e.g. diversification or education through shading understory) during the stand development. Mixed stands often show a higher resistance against biotic disturbances, but mixture does not generally enhance the resistance against drought nor does it generally increase the productivity. Vincent Boulanger suggests that extra costs should be avoided to promote mixed stands.

The talk of Stefan Tretter was focused on the mixed species forestry in private and municipal forests in Bavaria. Mixed forests already possess a high relevance and have a total share of 85%. This is in accordance with the traditional policy of a nature-orientated forestry in Bavaria. Pure stands of spruce or scots pine are rather restricted to predefined regions with special climatic or edaphic conditions. Mixed species forestry is often associated with a challenging silvicultural management, and a higher management effort has to be invested into the establishment and maintenance of the regeneration, in particular. In addition, timber harvesting and wood sale becomes more complicated under a mixture scenario. Because silvicultural knowledge is often lacking, especially in small private forests, a special advisory service is given by trainers from the Bavarian Federal Forest Service. Bavaria pays extra subsidies for the planting and regeneration of mixed species stands, especially in cases related to protection forests or if the purpose is to mitigate effects of climate extremes.

Heinz Utschig’s talk was entitled “Management of Mixed Species Forests in Bavaria - Principles and Experiences”. He provided practical experiences form the 20,000 ha Forest District Wasserburg belonging to the Bavarian State Forest Service. Over the last 12 years, the salvage felling had a share between 5% and 70% (average 36%) of the annual allowable cuttings. The percentage share of spruce is nowadays 51% and will be reduced to 43% during the next 50

years in the future. This goal will be mainly achieved by the conversion of pure spruce stands into mixed stands. It is likely that increased damages will accelerate the conversion process. In practice, regeneration with appropriate tree species is established by artificial plantings under the canopy of mature stands. Even in younger spruce stands, a selective thinning is consequently applied and requires an early definition of elite trees. Other admixed tree species are generally promoted. In both stand types, either dominated by spruce or by beech, a restricted number of 100 elite trees per ha is carefully selected. Thinning activities are usually applied with a high frequency of one or two interventions per decade. This guarantees that the periodical increment remains on a relatively high level and also results in a high structural diversity. The transition phase from harvesting to regeneration starts relatively early at a stand age of 60 years in spruce stands and 90 years in beech stands. The growing stock as well as the stand density is kept relatively low between 60 and 70% of the maximum potential stand density. However, this results in a relatively high periodical increment of between 80 and 90% of the increment potentially achieved under maximum density.

In the afternoon, a field trip was organized to the nearby oak-pine triplet established by BOKU University in the Traun'sche Forstverwaltung. In the trial stand, pine is strongly suffering from diseases. The tree ring width measurements from sample cores are currently analyzed within a broader context within the REFORM project along the entire ecological gradient as well as in comparison with other mixtures and site conditions in Austria.