

## „Managing forests in the 21<sup>st</sup> century”, Potsdam, Germany, 3<sup>rd</sup> – 5<sup>th</sup> March 2020



Group photo of conference participants (Foto: PIK / AKdS)

The conference “Managing forest in the 21<sup>st</sup> century” was held in Potsdam Institute for Climate Impact Research between 3<sup>rd</sup> – 5<sup>th</sup> March 2020. It was the final conference of 3 European research projects (FORMASAM, REFORCE AND FOREXCLIM) and gathered more than 140 scientific experts (from which 30 have attended online), managers and young researchers who discussed and raised awareness again about the importance of forest and forest management in the context of climate change. There were 3 intense days with plenary sessions, parallel sessions and poster sessions covering a wide area of topics as (i) impacts of climate extremes and disturbances, (ii) management challenges and options for resilient forest and (iii) forest management contribution to climate change mitigation.

**In the first day of the conference**, the plenary session was opened by Nadine Ruhr (Karlsruhe Institute of Technology, Germany) who spoke about tree and forest functioning in a changing world and about the urgent improvement of

European forests resilience through adaptive managements. She also highlighted the importance of a rigorous ecological and physiological understanding of tree and forest responses to climate change in recommending management strategies to owners and managers.

Harald Bugmann (ETH Zurich, Switzerland) spoke about the need for a paradigm shift in forest management due to current challenges arising from enhanced disturbances regimes (including recent droughts). “Command and control” forest management no longer represents a solution and forest managers need to change their role from “governor” to “contributor” on forest dynamics. Accepting this shift will arise multiple implications on provisioning ecosystem services and relationships between forests, forest management and society.

Another important presentation was of Galina Churkina (Potsdam Institute for Climate Impact Research, Germany) and it was about the growth and urbanization of global population and how construction through cement,

steel and other building materials will be a source of GHG emissions. This threat can be mitigated by transforming buildings in carbon sink sources, using engineered timber which provides long-term carbon storage.

The first day of the conference ended with a plenary session about the impacts of climate extremes & disturbances. Maxime Cailleret (IRSTEA, France) talked about the impact on primary growth (shoot elongation, number of ramifications, leaf size), production of reproductive organs and short and long term effects on tree mortality risk in Aleppo pine trees experimental site from Font-Blanche, France.

George Kunstler (IRSTEA, France) presentation tackled species range limits and the need to shift the focus from geographic to climatic edges. The main results of their study showed that at cold and wet edges of European tree species, growth and time passage were constrained, whereas at their hot and dry edges, survival and lifespan were constrained. Therefore, the picture is more complicated than previously thought, with demographic responses that differ between hot and cold edges. For example, the hot edge is experiencing higher mortality and a shorter time to quasi-extinction.

Rupert Seidl (Technical University of Munich, Germany) presentation was about increased bark beetle disturbances from Central European forest with focus on forest recovering from recent bark beetle outbreaks and if the outbreaks will amplify or will dampen the risk of future disturbances. Combining remote sensing and landscape-scale modelling allowed them to prove that an active forest management increases recovery speed with a reduction of the variation induced by disturbances in forest structure. Also, the simulation results showed that the increase in compositional and structural diversity in areas with natural regeneration after disturbances was able to dampen future bark beetle outbreak. The conclusion is that Central European forests have a considerable ecological resilience to outbreaks and the diversity induced by disturbances should be harnessed by forest management.

Janet Maringer (WSL, Switzerland) pro-

ved that beech forests burn even if the general assumption of European scientists and forest managers is that they do not burn due to poor flammability. Based on over 40 years of post-fire dynamics they concluded that: (i) fire injured beeches experience a delayed mortality, (ii) regeneration window opens immediately and is successful in first 15 years if it is supported by mast events and (iii) protective capacity is critical in moderate and severe burnt areas within 5 and 30 years post event. The ideas to take home were: leave dying trees and dead wood in the forest to enhance regeneration, apply silvicultural treatments after a mast year and take precaution on burnt beech stands on steep slopes.

**The second day of the conference** was dedicated to management challenges and options for resilient forests. The first lecture, given by Klaus Puettmann (Oregon State University, USA), was about adaptation to climate change and all the efforts needed to prepare for a future which is continuously changing at a faster rate. He underlined that understanding natural adaptation mechanism can be a solution for development of forest management strategies. The concluding idea was that a multi-scale adaptation strategy is needed, which acknowledges the continuous change at increasing rates.

Carola Paul (University of Göttingen, Germany) presented the situation of forest enterprises which are trapped between desperation and resignation. The high uncertainty the forest owners are facing, natural disturbances, changing demands for different wood products are key aspects in forest management. Besides this, climate change adds further uncertainties and unprecedented forest damages. In this context, the single best solution highlighted is incorporating uncertainties in ecological-economic modelling. Diversifying tree species seemed to be the most robust management strategy against a wide set of uncertain futures while other recommendations remain sensitive to economic drivers (planting costs and wood prices). This implies that despite the urgent need for ecological adaptation strategies, resilient forests need to account for classic econo-

mic decision variables to path a way between desperation and resignation for forest managers.

The second day ended with a plenary session on the same topic. Hans Verkerk (European Forest Institute) talked about poor documentation of current management practices in Europe and the creation of an atlas to fill this gap. In their research they identified 11 major forest management decisions from which clear-cutting has been the dominant harvest system in Europe in the past, but now the trend is moving to harvesting systems which promote continuous forest cover. The developed atlas helps better understand how forests are managed which is indispensable for targeting climate change mitigation and adaptation efforts in the European forest-based sector.

Laura Nikinmaa (European Forest Institute) showed her research about resilience and the use in forest sciences. From the literature analysed (255 studies) resulted different concepts of resilience: engineering resilience (54%), ecological resilience (34%) and socio-ecological resilience (21%). To ease selection of most appropriate resilience concept for management it is recommended to follow the guidelines provided by authors: identification of managed system, stressors and disturbances which can affect it, temporal scale of interests and consideration of the trade-off between accuracy and cost-efficiency in indicator selection.

Marcus Lindner (European Forest Institute) spoke about the enhancement of forest sector resilience through a pro-active disaster risk management. Recent event provided evidence that business as usual management it is not the best strategy to deal with extreme climate events and disturbances and new strategies are needed to change focus from reaction to prevention and preparedness. To accomplish this, a web-based knowledge platform was created to access tools and measures for different stages of disaster risk at different levels of management. This facility will promote cross border collaboration in disturbance risk management, with scientific best practice guidance, exchange of experts, training workshops and engagement in public relations and media outreach.

**The plenary sessions of the third day** of conference dealt with increasing contribution of forest management to climate change mitigation. In this regard, Julia Pongratz (Ludwig Maximilian University of Munich, Germany) talked about forests and strong further changes because reforestation, afforestation and forest management have been assigned prime roles in the effort to limit global warming to 2 degrees. The high importance of forests effects on local, regional and global climate in past and future scenarios sometimes had diverged or contradicted results. For example, the potential of reforestation and afforestation to store CO<sub>2</sub> was overestimated in some studies due to neglecting of socioeconomic constrains but still have large potential. Solving some literature discrepancies regarding the effects of some forest management strategies can lead to an increased contribution of forest and forest management to mitigate and adapt to anthropogenic climate change.

Georgy Safonov, (National Research University Higher School of Economics (HSE), Russian Federation) presented the important role of Russian forestry in the national carbon budget and potential decarbonisation of national economy in the context in which Russia does not have an official low carbon strategy. The recent economic modelling revealed the enormous potential for decarbonisation through different kinds of biofuels (wood pellets and briquettes, energetic biochar, liquid and gaseous biofuels) and residential and commercial buildings sector (wooden houses, windows, construction materials). The decarbonisation of Russian economy will need stronger engagement of forest sector in the context of forest losses due to wildfires, expansion of diseases and extreme weather events.

Mart-Jan Schelhaas (Wageningen University & Research, the Netherlands) presented a sensitive topic about cessation of harvesting to increase contribution of forest to climate change mitigation with pros and cons. Pro: (i) short term gains in Dutch forest and (ii) easy to implement and understand. Cons: (i) effects on industry employment, (ii) leakage effect, (iii)

risk of disturbances and (iv) no opportunity for adaptation. The question is if with all pros and cons, will a middle road solution be possible?

Annikki Mäkelä (University of Helsinki, Finland) talked about the importance of climate change mitigation and that forest stand information needs to be obtained faster and with the same accuracy as forest inventories for appropriate mitigation measures. Using remote sensing data, forest state can be interpreted in terms of species composition, site type, height, mean diameter and volume. Further, the information is used as the initial state for the model, which predicts the subsequent growth driven by climate data.

In the second part of the final day, two different excursions were organized. The first trip offered the opportunity to discuss regional management challenges with a local forester in a nearby forest district. The aspects discussed were forest conversion from Scots pine forests to mixed forests, management compliance with nature conservation and treatment of *Prunus serotina*. The second excursion was in Albert Einstein Science Park on Potsdam Telegraphenberg, one of the traditional science locations followed by a visit in the Laboratory for Dendrochronology of the GFZ German Research Centre for Geosciences.

The forest management strategies have an important contribution to climate change mitigation and the synchronization of local, regional and global measures is essential in order to avoid the possibility that global measures mask regional or local measures. If so, choosing a management strategy to adapt forests to climate changes and make them more resilient remains a challenging but possible task.

Attending the conference was a good opportunity to exchange new research ideas with scientists who are working on the same topics. This participation gave me the chance to self-assess my research based on achieved knowledge, to improve my PhD thesis and to

find out what are the future trends in forest modelling.

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**Cosmin Coșofreț**

#### Abstract. Managing forests in the 21<sup>st</sup> century, Potsdam, Germany, 3<sup>rd</sup> – 5<sup>th</sup> March 2020

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