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CONTEXT

European forests and news about their condition are gaining increasing attention. Extreme climatic events and more frequent large-scale disturbances challenge sustainable forest management (SFM) in policy and practice (Fig. 1). One consequence is a strong call for more resilient forests, that is, forests that are able to cope better with disturbances and adapted to a rapidly changing climate. But what does this mean and how does this affect our understanding of SFM across Europe?

Figure 1: Interlinkages between disturbance risks are important as often storm damage is followed by bark beetle outbreaks or wildfires can trigger land erosion. The Bistrishko Branishte reserve in Bulgaria was affected by a sequence of disturbances, starting with a windstorm in 2001, subsequent bark beetle damage between 2002 and 2007, followed by wildfire in 2012. Photos: Alexander Dounchev

Forest health (especially the impacts of disturbances) and ecosystem protection have always been core elements of SFM, enabling us to maintain and enhance the provision of different ecosystem services such as forest products, biodiversity, carbon sequestration and protective functions.

The current wave of forest disturbances requires more than ever proactive risk management and resilient forest systems. The FOREST EUROPE process plans the implementation of a forest risk facility (FoRISK), i.e., a pan-European cooperation platform on risk management and prevention, with the aim of supporting SFM and help making pan-European forests fit for the future.
WAYS AHEAD: HOW CAN FOREST RESILIENCE BE ENHANCED?

While acknowledging the diversity of European forests and management approaches at the landscape level, some examples on how to develop resilient forest systems are shown here. Such approaches hold the potential to create synergies and co-benefits with other aims of forest policy and management, such as maintaining or enhancing both forest productivity and biodiversity.

Recent research as part of the Horizon2020 project RESONATE proposed an operational resilience assessment framework (ORF) with eight steps to evaluate the effectiveness of resilience enhancing management measures in different forest management circumstances (Fig. 2).

These examples underline that SFM needs to evolve further under climate change and increased disturbance risks. Forest resilience management as a concept can be used to support decision-making to this end.
Figure 2: The eight steps of the operational forest resilience assessment framework (ORF) illustrated by the example of a Norway spruce forest in Central Europe. The social-ecological forest resilience assessment is applied to analyse resilience to windstorms and bark-beetle outbreaks in a small forest enterprise by comparing the performance of a Norway spruce monoculture and a mixed broadleaf forest. The selection of indicators depends on the context and distinguishes between manageable resilience predictors and non-manageable co-drivers of resilience. Note that browsing pressure from ungulates is considered as a critical resilience co-driver affecting tree species composition. (Adapted from a graph by Lloret, Hurtado & Jaime; www.resonateforest.org)

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