

Drought-related forest damage and management strategies for sustainable forest conversion in Germany

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Introduction

In Germany, the drought years of 2018-2020 caused extreme forest damage. In 2019 twice as many trees died as in the previous year, and after the drought years, about 5% of the total forest area was cleared or dead (Fig. 1). Drought is a combination of natural, renewable water variability, climate change, human influences and altered microclimatic conditions. Extreme drought with high summer temperatures has a significant impact on the health of the trees and consequently on the stability of the forest ecosystem. Forest damage is measured by the defoliation, fructification and dieback rate. A distinction is made between conifers and deciduous trees. To counteract this forest damage in the future, management strategies for sustainable forest conversion are required.

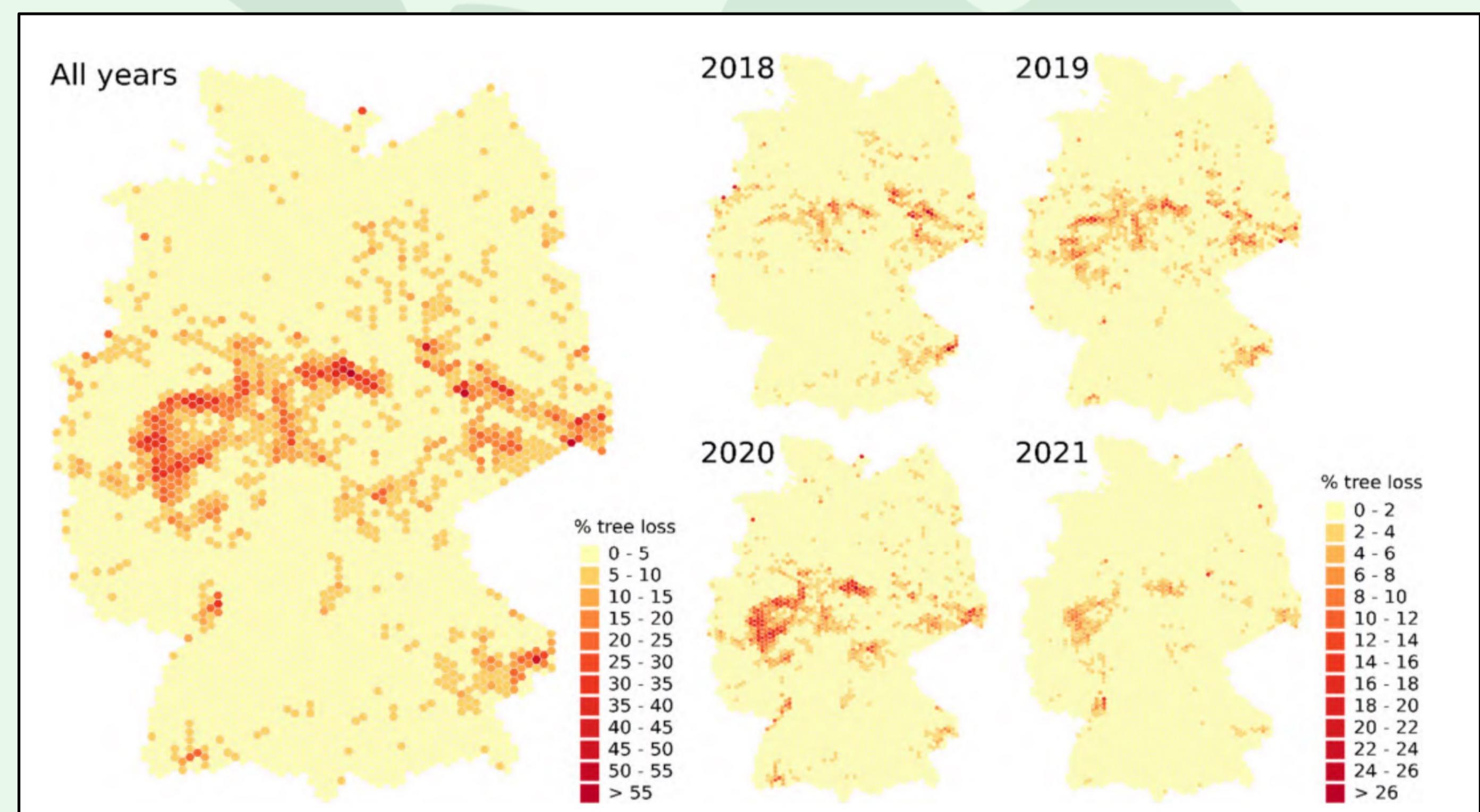


Fig 1: Relative forest area loss from 2018 to 2021 (Thonfeld et al. 2022).

Results

Although current aid packages for forest owners are linked to requirements for sustainable forest development, economic aspects continue to play a central role in forest management. This results in frequent clearing and short rotation periods, as well as monoculture, especially of susceptible conifer species. Uncertainty regarding the course of climate change and its effects leads to cautious management and adherence to the status quo. Furthermore, there is a noticeable lack of exchange between managers and the scientific community, as well as hardly any large-scale and long-term plans. This is exacerbated by the influence of individual decisions by forest management and the resulting multitude of strategies.



Discussion

Natural adaptation and regeneration after disturbances will not be able to keep up with the rate of climate change, which is why early and sustainable action is needed to create forests that are as resistant and resilient as possible. Long-term and large-scale objectives in terms of adaptive forest management should be defined centrally and continuously updated in line with climate change developments and the resulting challenges. These must then be adapted to local needs and implemented as quickly as possible (Fig. 2). Particular emphasis should be placed on high diversity high diversity of the forest species composition, which can only be achieved through reduced fragmentation and forestry. A much-discussed option is the incorporation of non-native species that are better adapted to the challenges of climate change, although this strategy entails unforeseeable risks to the ecosystem. Further research is also needed to investigate the interactions within the ecosystem under changing climate conditions.

Suggestion for an integrative concept of adaptive forest management

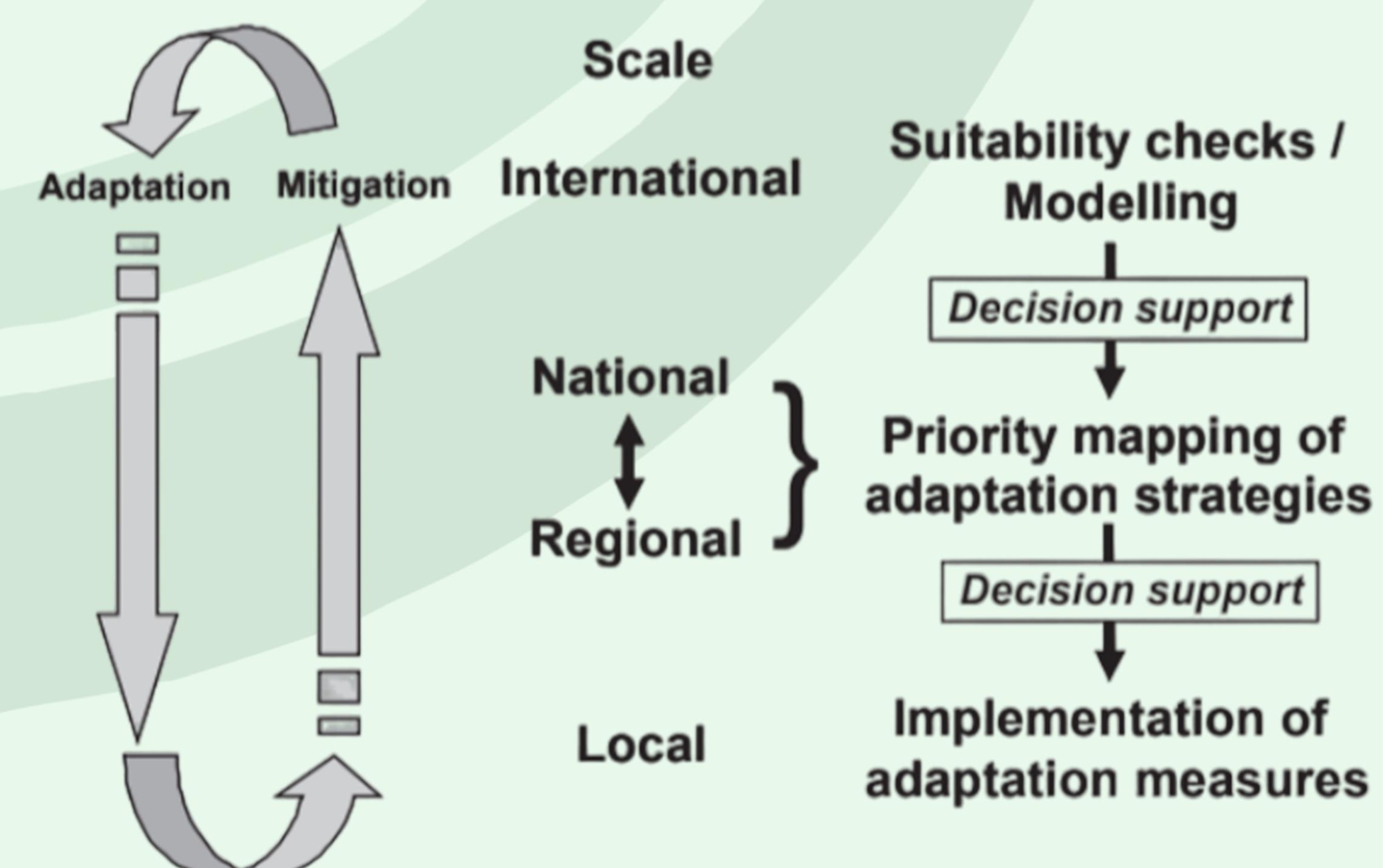


Fig 2: Concept for multi-stage adaptive forest management (Bolte et al. 2009).



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Literature

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