

Interreg

Alpine Space

ALPTREES

European Regional Development Fund



ALPTREES Policy Brief

**Sustainable use and management of non native tree species
in the Alpine Space**

KEY MESSAGES

1

Non native tree species can facilitate the adaption capacity of forest to climate change and provide important ecosystem services in forests as well as urban areas

2

The potential threats of non native tree species, such as negative impacts on native ecosystems, need careful site-specific risk assessment (SSRA), and clear communication regarding their use and management

3

The information on risks, opportunities, climate adaptation, and benefits of non native tree species needs continuous update and improvement through long-term studies, trials, monitoring, and forecasting with special models

4

Regional development strategies for managing non native tree species responsibly need to build upon a transnational strategy with coherent principles

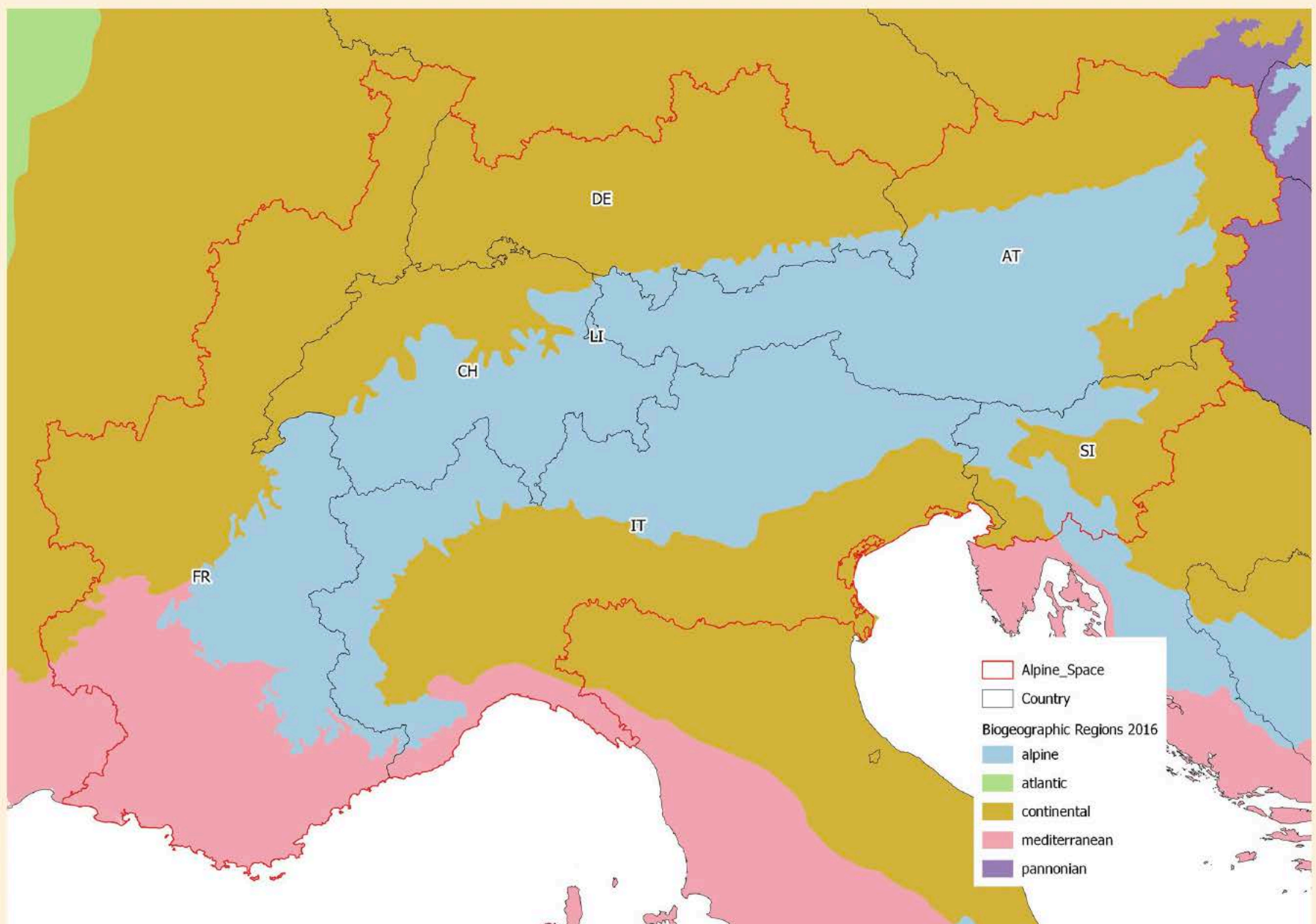
BACKGROUND

The Alpine Space is comprised of three biogeographical regions covering 390,000 km² across several European countries, and which are home to many fragile ecosystems threatened by climate change and human activities. Adaptation efforts are required to respond to negative effects on the environment, economy, and society. Non native tree species (NNT) can support climate change adaptation and mitigation in forests and urban areas, but may also pose a risk to biodiversity and the provision of ecosystem services. Many efforts have already been undertaken to manage these risks and benefits.

A unified strategy for the responsible use of NNTs, while considering the challenges of climate change, is not yet in place at neither the national nor European level.

NNT management knowledge is often region- or country-specific and is not applicable in a transnational context. Furthermore, the current state of NNT management knowledge is not generally based on coherent principles. Given the challenges with respect to both risks and benefits of NNT, future Alpine Space ecosystem management needs a transnational approach.

The overall objective of the ALPTREES project is to protect and enhance biodiversity while maintaining high levels of resilience and ecosystem services in cities and forests, with a particular emphasis on the possible role of NNT. To achieve this goal, key concepts were developed and several activities were carried out in this cooperation project.



The three bio-geographical regions of the Alpine Space and the boundaries of the Interreg Alpine Space period (2014 - 2020)

Transnational Strategy on Non Native Tree Species

A transnational strategy to improve knowledge-based decision making and communication about risk, sustainable use, and management of NNT has been developed, with five recommendations

- 1.** Achieving sustainability: Promote discussions and information sharing between public authorities, regional agencies, NGOs, foresters, timber industry, and forest owners.
- 2.** Reduce the risk of escape and other threats: Clearly communicate the results of the Site-specific risk assessment with policymakers, practitioners, and public users.
- 3.** Improve resilience of forest and urban trees to climate change: Consider multiple criteria when selecting appropriate urban and forest NNT; but select only species that are adapted to the climate, non-invasive, and harmless to human health.
- 4.** Improve cooperation, capacity building, and expertise sharing: Invest in transnational research on population genetics research activities to identify suitable tree species and assess the adaptive potential of native and NNT.
- 5.** Increased communication, citizens' awareness and involvement: Always refer to species- and site-specific information to avoid generalizations and to distinguish between invasive and non-invasive tree species and tree species with unknown risks.

Non-native tree species in urban areas and forests in the Alpine Space:

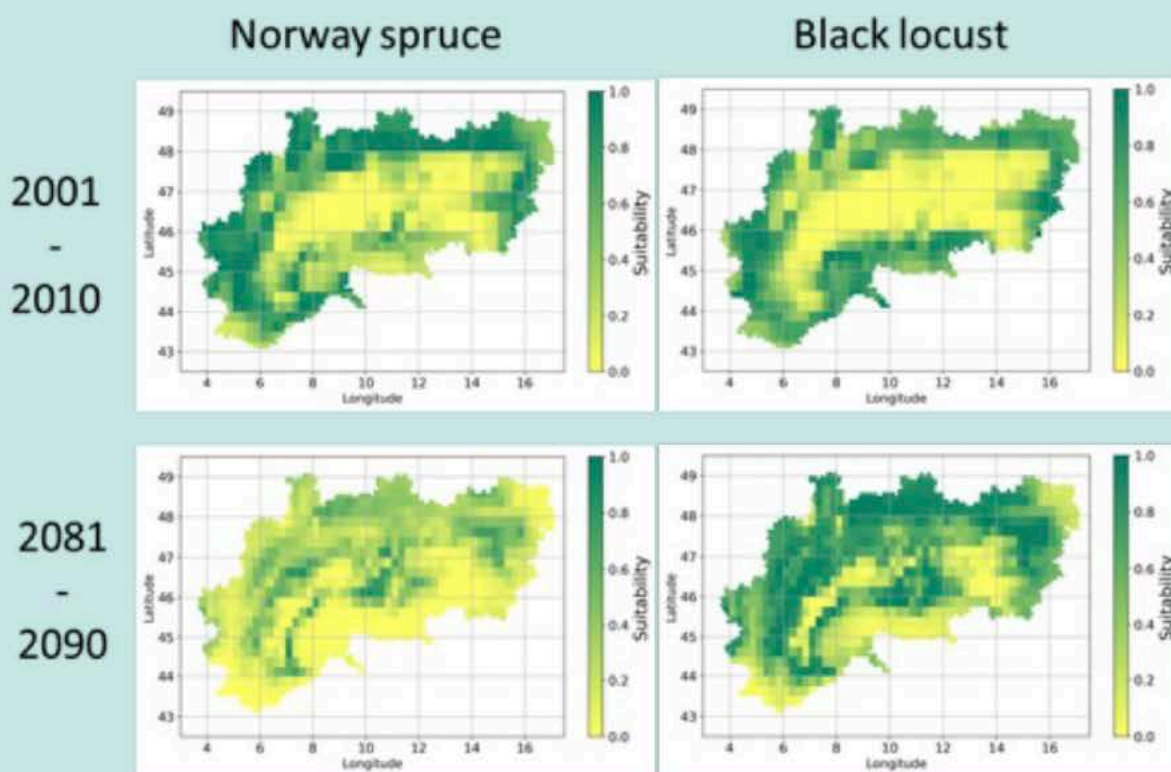
- Some 650 tree species grow in the Alpine Space
- Of all tree species, about 80% are non-native (~520 species)
- The majority of non-native tree species (~350 species) occur in urban areas
- 90% have their natural distribution outside of Europe; most of them originate from Asia and North America

Ecosystem services provided by Alpine Space forests:

- The average hectare of a managed forest is home to 223 m³ of woody biomass
- Approximately 2.3 billion tons of carbon are stored in living woody biomass and forest soils (about 140 t.C./ha)
- Rockfall protection forests account for about 15 % of the forest area
- 20 % have recreational potential
- 34% are protected

Climate change risk maps

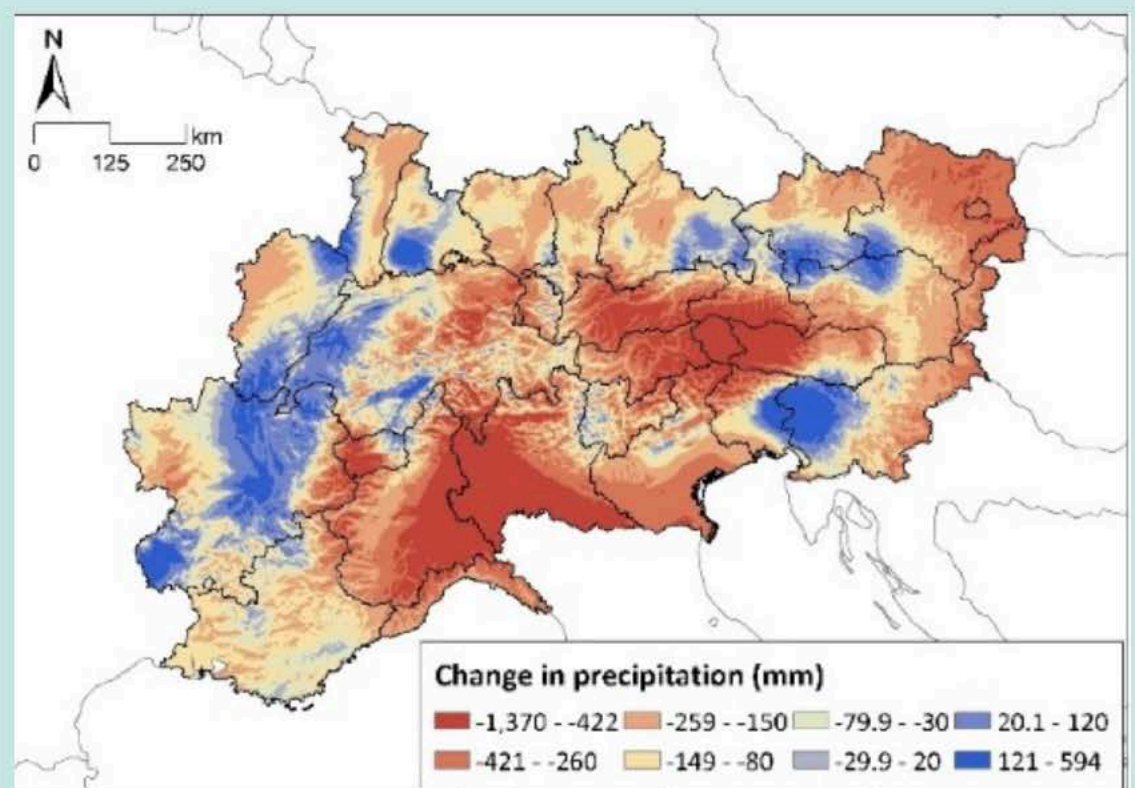
Future climate scenarios for the Alpine Space show that this region is vulnerable regarding longer drought periods at higher temperatures over the coming decades. Areas where decreasing precipitation and increasing temperature forecasts coincide, are called »climate change hot spots«. In order to improve their management and better understand their suitability under future climate change, specific risk maps were developed for different NNT and native tree species. Since available data about growth and location of NNT in the Alpine Space is limited, an ALPTREES section at the crowd sourcing platform iNaturalist has been established. It enables citizens to help collect missing information through a mobile app. Merging the results of information on climate hot spots with information collected through citizen science, national forest inventory data, and forest modelling facilitates the creation of suitability maps for forest tree species. With their help, the climate change risk for each tree species can be assessed. Results indicate that there are locations in the Alps where Norway Spruce will be much more difficult to grow in the future while NNT like Black Locust might prosper in many more places of the Alpine space than they do now



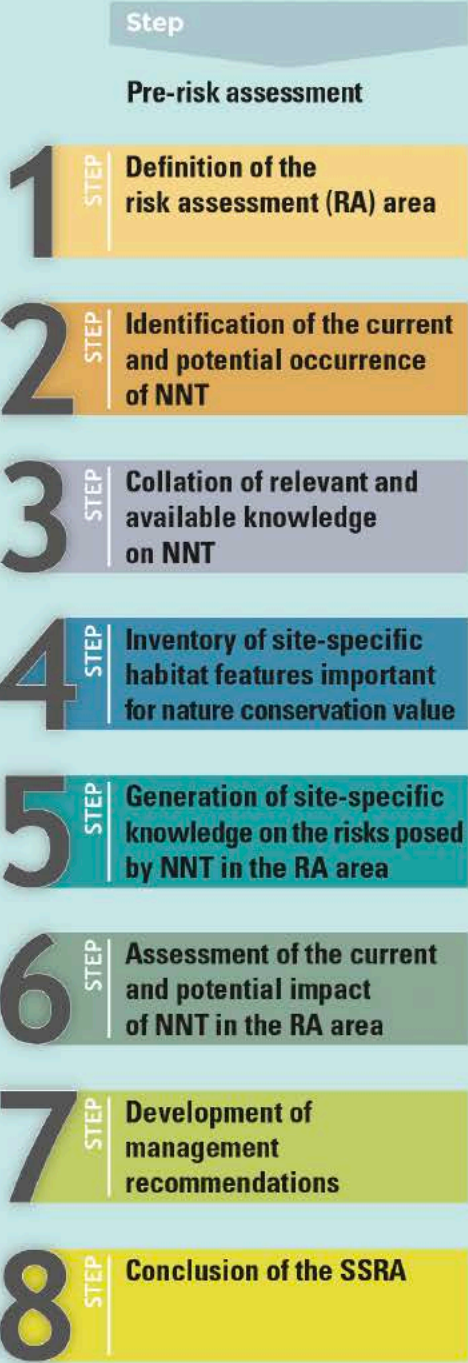
Suitability maps indicating the climate change risk for tree species under the climate change scenarios RCP 8.5. Dark/green colour indicates high suitability while light/yellow shows low suitability.

Source: IIASA, Krasovskiy, 2021

Project mean annual precipitation change in the Alpine Space (base year 2010; projections 2050), Source: IIASA 2020



Site specific risk assessment (SSRA)



A new methodological framework for “Site-Specific Risk Assessment” (SSRA) was developed under the ALPTREES project with interdisciplinary groups of experts, public authorities, and stakeholders of the Alpine Space. The SSRA is founded on a stratified assessment of risks posed by NNT that distinguishes between different ecosystem types, locations or sites. The SSRA allows for consideration of the regional context as well as the effectiveness of available management strategies to mitigate negative impacts in the area of concern. It serves as a decision support tool for selecting sites, NNT, and silvicultural practices to take advantage of ecosystem services provided by potentially beneficial NNT while limiting associated risks.

The SSRA is divided into eight steps, and for each step, specific target information must be collected and analysed. The SSRA step-by-step guide offers research institutions, forest managers, conservation managers, and local and national authorities a user-friendly framework for managing NNT sustainably. The overall goal of the SSRA is to help decide where, how, and which NNT can be used to limit potentially associated risks and maximise their benefits in a given area of concern.

Bindewald et al. 2021 *Ecology and Evolution*, 11, 18089-18110

Key terms and definitions

Native tree species are tree species of natural, post-glacial forest development in the Alpine Space.	Non-native trees (NNT), also known as “non-indigenous”, “alien”, “introduced”, “allochthones” or “exotic” trees are tree species, breeds or hybrids in the Alpine Space region whose presence there is as the result of intentional or unintentional introduction by humans.		
	Archaeophytes include NNT intentionally or unintentionally introduced to the Alpine Space that became naturalized there prior to the year 1492.	Neophytes include NNT intentionally or unintentionally introduced to the Alpine Space that became naturalized there after 1492 (when Christopher Columbus arrived in the Americas and the global trade in non-native species began).	
		Non-invasive trees are NNT that have not yet exhibited any indication of negative effects, or whose effects are unknown.	(Potentially) invasive trees are NNT whose introduction, establishment and/or spread pose potential or actual risks to native biodiversity, ecosystem functions, or socio-economic aspects including human health.

The ALPTREES project

Climate change and human activities represent major threats to the ecosystems in the Alpine Space.

Therefore, adaptation efforts are required to respond to the negative effects on the Alpine environment, economy and society. Non-native tree species can support the adaptation of European forests and urban areas to climate change, but simultaneously entail risks for biodiversity and ecosystem functions. Many efforts have already been undertaken to manage these risks, but neither European or national/regional recommendations and strategies for non-native tree species management in the Alpine Space that consider the challenges of climate change yet.

Experiences in the management of non-native tree species in urban areas, peri-urban, rural territories and forests are often country-/city-specific and thus rarely shared. Given the challenges in non-native tree species management with respect to both benefits and risks, a transnational approach is needed to qualify the role of non-native tree species in future Alpine Space ecosystems.

The objective is to provide a transnational strategy for a Decision Support System on responsible use and management of non-native tree species in the Alpine Space. The project fits within the context of national and regional site-derived policy aiming to protect and enhance biodiversity to ensure ecological connectivity and cultural resources while maintaining a high level of resilience and ecosystem services across the Alpine space. Implementations include:

- developing a comprehensive database on non-native tree species;
- predicting the current and potential distribution of non-native tree species in Alpine Space under climate change scenarios;
- determining their invasive potential;
- analysing the different Ecosystem services provided by non-native tree species to assess the tradeoffs between risks and benefits.
- ALPTREES will formulate management recommendations for non-native tree species under different climate and economic scenarios

Contact

Dr. Katharina Lapin

Head of Department of Forest Biodiversity and Nature Conservation

Austrian Research Centre for Forests

Seckendorff-Gudent-Weg 8, 1131 Vienna

Tel: +43-1-87838-1350

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Email: Katharina.lapin@bfw.gv.at

<https://www.alpine-space.org/projects/alptrees/en/home>

