BIODIVERSITY IS ESSENTIAL FOR INVESTMENTS IN FORESTS AND CARBON

Synthesis report finds forest resilience depends on biodiversity at multiple scales

Results of a scientific synthesis[1] of the stability-resilience relationship in forest ecosystems published by the Convention on Biological Diversity (CBD) are relevant for forest decision-makers, investors, and other stakeholders:

- Resilience is the capacity of a forest to withstand (absorb) external pressures and return, over time, to its pre-disturbance state. When viewed over an appropriate time span, a resilient forest ecosystem is able to maintain its 'identity' in terms of taxonomic composition, structure, ecological functions, and process rates.

- The available scientific evidence strongly supports the conclusion that the capacity of forests to resist change, or recover following disturbance, is dependent on biodiversity at multiple scales.

- Maintaining and restoring biodiversity in forests promotes their resilience to human-induced pressures and therefore provides a measure of insurance against expected climate change impacts. Biodiversity should be considered at all scales (stand, landscape, ecosystem, bioregional) and in terms of all elements (genes, species, communities). Increasing the biodiversity in planted and semi-natural forests will have a positive effect on their resilience capacity and often on their productivity (including carbon storage).

> Maintaining and restoring biodiversity in forests promotes their resilience to human-induced pressures and is therefore an important 'insurance policy' against loss of forest value and functionality.

- The resilience of a forest ecosystem to changing environmental conditions is determined by its biological and ecological resources, in particular (i) the diversity of species, including micro-organisms, (ii) the genetic variability within species (i.e., the diversity of genetic traits within populations of species), and (iii) the regional pool of species and ecosystems. Resilience is also influenced by the size of forest ecosystems (generally, the larger and less fragmented, the better), and by the condition and character of the surrounding landscape.

[1]Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 43, 67 pages.

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• Primary forests are generally more resilient (and stable, resistant, and adaptive) than modified natural forests or plantations. Therefore, policies and measures that promote their protection yield both biodiversity conservation and climate change mitigation benefits, in addition to a full array of ecosystem services. Nevertheless, it must be recognized that certain degraded forests, especially those with invasive alien species, may be stable and resilient, and these forests can become serious management challenges if attempts are made to re-establish the natural ecosystem to recover original goods and services.

• The carbon pool is generally largest in old primary forests, especially in the wet tropics, which are stable forest systems with high resilience.

• Some forest ecosystems with naturally low species diversity have a high degree of resilience, such as boreal pine forests. These forests, however, are highly adapted to severe disturbances, and their dominant tree species have a broad genetic variability that enables tolerance to a wide range of environmental conditions.

• The permanence of efforts under UNFCCC negotiations, such as reducing emissions from deforestation and forest degradation (REDD), and of other forest-based climate change mitigation and adaptation policies and measures, is linked to the resilience of forests, and thus to forest biodiversity. REDD activities therefore should take biodiversity conservation into consideration, as this will help maintain forest ecosystem resilience and the long-term stability of the carbon pool.

The permanence of REDD-plus, and of other forest-based climate change mitigation and adaptation policies and measures, is linked to the resilience of forests, and thus to forest biodiversity.

• The regional impacts of climate change, especially interacting with other land use pressures, might be sufficient to overcome the resilience of even some large areas of primary forests, pushing them into a permanently changed state. If forest ecosystems are pushed past an ecological 'tipping point', they could be transformed into a different forest type, and, in extreme cases, a new non-forest ecosystem state (e.g. from forest to savannah). In most cases, the new ecosystem state would be poorer in terms of both biological diversity and delivering ecosystem goods and services, including the storage of carbon.

Plantations and modified natural forests

Plantations and modified natural forests will face greater disturbances and risks for large-scale losses due to climate change than primary forests, because of their generally reduced biodiversity.

The risks can partly be mitigated by adhering to a number of forest management recommendations:

- Maintain genetic diversity in forests by avoiding practices that select only certain trees for harvesting based on site, growth rate, or form.

- Maintain stand and landscape structural complexity, using natural forests and processes as models.

- Maintain connectivity across forest landscapes by reducing fragmentation, recovering lost habitats (forest types), expanding protected area networks, and establishing ecological corridors.

- Maintain functional diversity and eliminate the conversion of diverse natural forests to monotypic or reduced-species plantations.

- Reduce non-natural competition by controlling invasive species and reduce reliance on non-native tree crop species for plantation, afforestation, or reforestation projects.

- Manage plantation and semi-natural forests in an ecologically sustainable way that recognizes and plans for predicted future climates. For example, reduce the odds of long-term failure by apportioning some areas of assisted regeneration for trees from regional provenances and from climates that approximate future climate conditions, based on climate modelling.

- Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genes, species, communities) by, for example, protecting tree populations which are isolated, disjunct, or at margins of their distributions, source habitats, and refuge networks. These populations are most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change.

- Ensure that there are national and regional networks of scientifically-designed, comprehensive, adequate, and representative protected areas. Build these networks into national and regional planning for large-scale landscape connectivity.

CBD

Source: Thompson, I., Mackey, B., McNulty, S., Mosseler, A. (2009). Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 43, 67 pages.

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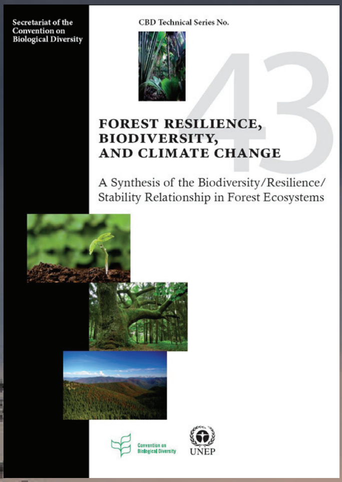

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