

# THE POLLINATION SERVICES OF FORESTS: THE BENEFITS OF FOREST AND LANDSCAPE INTERVENTIONS

## 1 | POLLINATORS AT A GLANCE



WILD BEES



MOTHS



BIRDS



BATS



HOVERFLIES



BEETLES

Animals pollinate the majority of flowering plants

Fertilizing about 90% of wild flowering plants globally

Improving forest regeneration and the production of many forest plants

Enhancing ecosystem services and resilience

Intensive land management and changes in land-use and climate

Reduce natural habitats and connectivity among them

Destroy nesting and forage sites for pollinators

Reduce pollinator breeding success and populations

Declines in pollinator populations have negative effects worldwide

On crop production, food security and nutrition (decline in crop yield and quality)

On plant diversity with consequent threats to animals

On genetic diversity of plants and their potential to adapt to climate change

## 2 | PRINCIPLES OF FOREST AND LANDSCAPE MANAGEMENT FOR POLLINATION SERVICES

### WHY DO FORESTS MATTER?

Both large contiguous and small remnant forests harbour wild pollinators and enhance pollination on nearby agricultural land.

### PROMOTE

#### AT THE LANDSCAPE LEVEL

Key habitats for pollinators (forests, native vegetation ...)

Connectivity among habitats (trees, agroforestry, biological corridors ...)

Pollinator-friendly agricultural practices (minimizing pesticides, tillage ...)

Floral and nesting resources for pollinators

#### AT THE FOREST LEVEL

Old trees with cavities and dead wood (for cavity-nesting pollinators)

Mature forests and primary forest remnants (with related habitats)

Sustainable use and conservation of forests and their products

Habitats close to restoration sites to enable their effective pollination



### INCREASE

HABITAT HETEROGENEITY WITH CONTROLLED DISTURBANCES



Plan vegetation interventions (selective logging, coppicing, dead wood retention)



Prescribe burning (control timing and leave unburned areas)



Regulate grazing and mowing (restrict interventions to a few patches, minimize external inputs)



Create temporary micro-habitats (semi-natural flowering habitats, exposed ground for ground-nesting pollinators)

## 3 | EXAMPLES

### USA

In oak and tulip tree forests with a rhododendron understorey, logging (with retention of trees) creates habitat heterogeneity and ecotones at a local scale, which increases bee diversity.



### GERMANY

Selective thinning increases bilberry flowering, leading to a greater abundance of pollinators, an increase in bilberry fruit set and, as a bonus, improved conservation of a threatened bird (*Tetrao urogallus*) that feeds on these berries.



### INDIA

Of the 139 non-wood forest product (NWFP) species considered important for livelihoods (with medicinal and nutritional properties), nearly half benefit directly from animal pollination.



### BRAZIL

In São Paulo, rural homesteads with trees provide forage for nectarivorous birds and connectivity among their populations. These biological stepping stones facilitate pollination and forest regeneration.



### TANZANIA

Productivity and revenue of pollinator-dependent crops benefit substantially from forest proximity. This benefit declines with distance from forest, and reduced forest cover leads to lower crop revenue.



### INDONESIA

Using mixed-tree agroforestry instead of monocrop rice paddies maintains 93% of the crop pollinators in West Java's natural forest.

