

## Forestry Responses to Conflict & Disasters

### Basic knowledge



**This module examines the role of forestry in mitigating natural and human-conflict disasters, and forest-related responses that might assist communities and ecosystems to recover in the wake of disasters in the short and longer terms.**

### Forestry and disasters

Disasters caused by extreme weather events (e.g. droughts, storms, floods, hurricanes and cyclones), other natural phenomena (e.g. fire, outbreaks of animal and plant pests, earthquakes, landslides, tsunamis and volcanic eruptions) and human conflicts (e.g. civil unrest and armed conflicts that displace people) may result in forest degradation and deforestation. Inevitably, such disasters disrupt the supply of forest products and environmental services, threatening the subsistence and livelihoods of local communities and forest industries. They can trigger unprecedented pressure on forests, with survivors and displaced people forced to forage in residual forests for food, timber, woodfuel, fibre, fodder and other products, or to occupy the forests and clear them for agriculture.

Forests that have been destroyed or seriously damaged by disasters may suffer secondary impacts, such as pest outbreaks, wildfire and erosion. These can delay forest recovery and cause the further deterioration of the livelihoods and food security of forest-dependent people. The loss or damage of forest and tree resources can lead to the degradation of soil and water resources, with the potential for negative effects on downstream agricultural and fishery production and consequently on the livelihoods of communities.

On the other hand, forests can be lifesaving resources during and after disasters, providing food, timber for rebuilding, woodfuel, medicines, and a means by which affected people can obtain their livelihoods.

Well-managed forests and trees can reduce the impacts of disasters. In steep lands, for example, well-managed forests can reduce soil erosion caused by flooding and, in some cases, avert landslides (see module on [Mountain Forests](#)). Mangroves and other coastal forests can reduce the damage caused by storm surges and tsunamis, and well-managed lands and forests can decrease the risk of wildfire.

When the damage to forests as a result of a disaster is severe, the negative impacts can be long-lasting because of the lengthy timeframes generally involved in forest recovery. Forest-dependent communities may need assistance in preparing for disasters and in recovering from them when they occur, taking into account long-term factors.

The challenge for forest managers is to implement sustainable forest management so that, in the face of disaster, forests are best-placed to mitigate impacts, contribute to relief aid and rebuilding, and prevent future disasters, thus contributing to community resilience.

### ***Impacts of disasters on forests and people***

The potential impacts of disasters on forests and forest-dependent communities include:

- disrupted supplies of timber, woodfuel, fibre and non-wood forest products, with consequent negative impacts on the availability of forest products for reconstruction, heating, cooking, fodder, medicines, etc., and the potential to earn livelihoods from such products;
- disrupted or destroyed forest-based livelihoods;
- damaged production facilities (e.g. nurseries, sawmills and processing plants);
- blocked transport routes and facilities, reducing the ability of forest-based enterprises to get their products to market;
- increased erosion and soil loss, thereby reducing productivity in the agriculture and forest sectors and decreasing water quality;
- increased vulnerability to flooding and landslides in fragile watersheds;
- the depletion of forest carbon sinks, thus releasing greenhouse gases into the atmosphere; and
- increased vulnerability to further disasters and conflicts due to the loss of forest functions.

**Forestry responses to natural and human-conflict disasters contributes to SDGs:**



**13** CLIMATE ACTION



**15** LIFE ON LAND



## In more depth

### Disaster risk management cycle

Disaster risk management approaches can be categorized according to whether they involve:

- an immediate, short-term disaster relief response to assess damage and minimize the loss of lives and livelihoods (usually 6–12 months after a disaster);
- medium-term to long-term rehabilitation after disaster with the aim of restoring livelihoods and establishing a foundation for sustainable development; and
- measures to minimize the risk of future disasters in vulnerable communities and landscapes and to mitigate the impacts of those that do occur.

Each of these is discussed in detail below with respect to forests and forestry.

#### ***Short-term relief, or disaster response***

Immediate disaster relief follows an assessment of the injuries and loss of human life sustained in the disaster, as well as the loss of, or damage caused to, homes, livelihoods, infrastructure and landscapes. The aim of the immediate disaster response is to minimize the further loss of life and livelihoods. Depending on the context, forestry may be part of the immediate disaster response, most likely in collaboration with other sectors, such as agriculture, fisheries, water, energy and health.

#### ***Needs assessment and participatory planning***

The first forest-related action in the immediate relief effort is to mobilize specialists to assess the extent of forest damage caused by the disaster; this can be done using satellite imagery, aerial photos, LIDAR and other readily available survey technologies and tools. The immediate focus is on the impacts the disaster has had on the provision of forest functions and the needs of families and communities who depend on flows of forest goods and environmental services. A multidisciplinary team of intersectoral specialists may be mobilized to assist in integrating disaster responses so as to restore or replace (temporarily or in the longer term) the means by which affected people earn their livelihoods.

Following the damage and needs assessments, a participatory planning process should be established involving affected communities, governments at all levels, non-governmental organizations, and other stakeholder groups to prepare a strategy and action plan for integrating forestry interventions with those of other key sectors. Engaging key stakeholder groups in disaster response planning encourages understanding, consensus and commitment to interventions. Conflicts are common in disaster situations because of competition for scarce resources, disruptions to usual governance processes, and the stresses to which disaster victims are subjected. Participatory processes and conflict-resolution mechanisms, therefore, are essential for successful planning, especially in relation to access to and tenure of land, trees and other forest resources.

Conflicts among affected communities and other actors during immediate relief responses are particularly apparent in the aftermath of prolonged war, civil unrest and other forms of violence; where communities face severe hunger and poverty; where there has been a significant loss of livelihoods, homes and infrastructure; or where natural resources have been severely depleted or degraded.

#### ***Salvage and clearing***

Hurricanes, typhoons, cyclones, storms, floods, fires and other disasters can leave behind large quantities of dead trees, either standing or fallen. It may be possible to salvage wood from these damaged forests as part of clean-up processes, and the wood can be used in the reconstruction effort and as fuel for heating and cooking. Roads, bridges and access tracks damaged in the disaster must be re-opened to allow the delivery of relief assistance and to enable the extraction and transport of salvaged timber. In certain circumstances, the relief response might involve the provision of chainsaws, safety gear, handling equipment, mobile sawmills and vehicles and the training of communities in wood harvesting, extraction, handling and transport to facilitate salvaging and maximize the local benefits it provides.

Wood of sufficient quality for building repairs, the reconstruction of houses and infrastructure, and boat repair, is likely to be in heavy demand as part of the relief response, and specific guidance on the sustainable use of wood products in the post-disaster situation may be needed. Tree salvaging can provide employment and income (e.g. cash-for-work and food-for-work modalities), thereby assisting devastated families and communities in the aftermath of the disaster. Salvaging can be dangerous, however, so adequate training and supervision, and appropriate safeguards, are required. Rapid salvaging can help reduce the risk of fire, pest outbreaks and other secondary impacts.

### *Planning and practices for the use of forest products in reconstruction*

Technical support may be needed in the wake of a disaster to assist governments and communities in using timber and bamboo in the reconstruction of houses, civic buildings and other infrastructure. Local communities can be mobilized and trained in construction (and, where needed, boat-building) techniques. It is important that the principles of sustainable forest management are adhered to so as to avoid overharvesting and forest degradation; it may be necessary, however, to increase harvests in the short term (with a view to reducing it in the medium to long term) and to temporarily relax restrictions on harvesting in conservation areas or of certain species, especially in the salvaging of damaged timber.

### *Supporting refugees and internally displaced people*

Refugees and internally displaced persons (IDPs) fleeing war, civil unrest or social conflict can place extra pressure on natural resources and social services, and they may be forced to overexploit forests for food, woodfuel and fodder, simply to stay alive. Short-term disaster relief in such circumstances should aim to improve food security and nutrition, provide basic health care, and offer people means for generating income.

A common response in humanitarian settings in forested areas is to promoting the Safe Access to Fuelwood and Energy (SAFE) strategy, in tandem with the introduction of fuel-efficient cook stoves to reduce woodfuel consumption. Typical SAFE interventions include the local production of fuel-efficient stoves, the establishment of tree nurseries for reforestation, agroforestry and fuel supply, the use of alternative fuels, and the promotion of related livelihood activities. Another approach is to plant fast-growing shrubs and tree species for bioenergy (cooking and heating) and fodder close to refugee and IDP camps, thereby reducing the risk of attack on (particularly) women and children as they gather products for household consumption.

Refugees and IDPs may be granted access to forests, perhaps including protected areas, so they can supplement their diets with forest foods such as fruits, berries, roots, mushrooms, insects and wild meat, and to harvest medicinal plants. Supervision is likely to be required to ensure that exploitation does not exceed sustainable levels.

### *Diet diversification*

People affected by disaster are vulnerable to hunger, malnutrition and poverty. Forests and trees outside forests are potential resources in such circumstances for supplementing and diversifying diets, in both the short and longer terms. Agroforestry, intercropping and the growing of fruit, nut and other food-yielding trees (such as *Moringa*) are potential elements of strategies to diversify diets in the wake of disaster. Forestry efforts to diversify diets are best integrated with those of other sectors to achieve optimal diversification and to anchor interventions in the livelihoods of affected people.

### *Outbreaks of forest pests*

A major outbreak of forest pests may constitute a natural disaster in itself, or it may occur as a consequence (i.e. secondary effect) of an earlier disaster. Either way, a pest outbreak can undermine forest health and vitality and reduce the sustainable supply of forest products and environmental services and threaten the livelihoods of forest-dependent people.

Measures to contain pest outbreaks in forests should be part of responses to disaster and subsequent recovery efforts. In extreme cases, such measures may include aerial chemical spraying, but a preferable strategy is to increase capacity in biological control and integrated pest management. Silvicultural interventions to reduce competition among trees for light, nutrients and water can also help mitigate pest outbreaks.

### *Early employment for conservation and reforestation*

Good-quality forest-related disaster response projects can set the foundations for medium-term to long-term forest restoration and development by mobilizing planning processes, establishing nurseries for tree-seedling production, and preparing land for planting. Such projects are most common in responses to war, civil unrest and social conflict, where social recovery is a long-term process, governance has been weakened, the environment is vulnerable to overexploitation, and tenure and access rights to natural resources are lacking or contested.

### *Foundation for longer-term rehabilitation*

Establishing the foundation for medium-term to long-term forest rehabilitation and restoration has not always been a part of immediate disaster responses. Nevertheless, a strong case can be made for it to be so, especially in localities where the vulnerability to subsequent

disasters is high, such as in coastal buffer zones and at sites prone to landslides, erosion and flooding. Efforts should be made to determine future high-risk areas, prepare strategies for increasing resilience in the face of disaster, and engage communities in restoration processes. Such efforts will require adequate resources and training.

### ***Medium-term to long-term rehabilitation***

Ideally, forestry responses to disaster will include preparation and planning for, and preliminary work towards, forest and tree rehabilitation and restoration as a way of supporting livelihoods, maintaining landscape productivity, and reducing the risk posed by future disasters (see above). The principle in constructing such foundations is to “build back better”, taking into account the risk of future disasters and the preventive functions of forestry as a basis for sustainable development.

Forest restoration, rehabilitation and management should address the seven criteria of sustainable forest management, as follows: 1) forest resources; 2) biodiversity; 3) forest health and vitality; 4) productive functions (i.e. wood and non-wood forest products); 5) protective functions (such as watershed protection); 6) socioeconomic functions; and 7) the legal, policy and institutional framework. Disaster projects do not always have the mandate, time or resources to commit to medium-term to long-term responses, but, when they do, the interventions can play a critical role in the transition from short-term relief to longer-term rehabilitation and development. They can also provide vulnerable households, disadvantaged groups and local communities with options for sustaining and diversifying their livelihoods while also maintaining the resource.

Forestry responses are only one component of the diverse integrated disaster response package needed to fully meet medium-term to long-term requirements for livelihoods and landscape restoration. The forestry response must be part of wider rehabilitation planning mechanisms involving authorities, community leaders, non-governmental organizations, the private sector and other stakeholders involved in sectors such as cash cropping, horticulture, livestock, fisheries, aquaculture, forestry and rural development. Attention to gender is essential, considering, for example, the roles of women and girls in meeting primary needs for food, water and fuel for cooking and heating, and food preparation.

### ***Reforestation and agroforestry***

Reforestation in the wake of disaster provides employment, helps diversify livelihoods and production systems, and reduces the vulnerability of people and landscapes to soil erosion, landslides and flooding. It may be carried out to enrich natural forests or to establish or re-establish forest plantations, woodlots, agroforestry systems, shelterbelts or home gardens, preferably using native species.

Participatory processes involving all stakeholder groups in a given community should be used to determine, among other things, the priority needs of communities, priority areas for reforestation and agroforestry, the most appropriate species, and the timing of activities. Nursery management, seedling production, land preparation, planting, tending, maintenance and protection are all labour-intensive tasks that can provide work for local people. Reforestation and agroforestry practices and procedures, and finance, should be put in place over the medium term to ensure that restoration areas are maintained and protected beyond the disaster phase.

### ***Restoration of coastal forests, including mangroves***

Mangrove and estuarine ecosystems play important roles in marine food chains by providing crucial habitat and breeding grounds for fisheries and coastal fauna; filtering and assimilating pollutants; and stabilizing sediments produced by upstream erosion. They can also be important for local communities as sources of woodfuel and construction wood. Mangroves are susceptible to hurricanes, cyclones, floods, tidal swells and excessive siltation, and they are vulnerable to overexploitation for timber and woodfuel; shrimp and crab aquaculture; and agricultural and residential encroachment. Like other coastal forests, mangroves require particular attention for their role in disaster prevention and impact mitigation.

Evidence from post-tsunami surveys, field research and model simulation strongly supports the assertion that coastal forests can significantly mitigate the impacts of tsunamis and storm waves. Intact mangroves and beach forests, and even tree plantations of closely spaced trees with low, widely branching canopies or significant ground vegetation, have a demonstrated ability to reduce tsunami energy and force, as well as flow depth and velocity, and to limit the inundation area.

Coastal forests can be restored or rehabilitated after disaster through planting or assisted natural regeneration. Sites and species should be selected carefully to ensure high survival rates and subsequent high growth rates. In the past, however, there has been a tendency to plant mangroves (especially *Rhizophora* species) after disasters without adequate assessment of site suitability.

### ***Watershed protection***

Watersheds are vulnerable to erosion and landslides caused by flooding, earthquakes and infrastructure development, especially when forests have been degraded or lost due to fire, overgrazing, overharvesting, encroachment or other pressures. Integrated watershed management aims to achieve a balanced mosaic of land uses in landscapes, comprising, for example, livestock and crop management systems and natural and planted forests. Land-use policies, strategies, plans and practices should be negotiated among stakeholders – such as governments, land users and communities – using participatory approaches to encourage mutual understanding, respect, trust and commitment. Integrated land-use management is the best way to ensure sustainability at the landscape scale and the long-term provision of essential goods and environmental services.

Integrated watershed management is particularly important for protecting downstream urban and peri-urban infrastructure. Among other things, it is a measure for disaster risk reduction in “risk-sensitive” development.

#### *Wildfire*

Wildfires can cause large losses of lives, homes, livelihoods, infrastructure, ecosystems and carbon stocks and may require disaster responses. The rehabilitation of damaged or destroyed vegetation and infrastructure can be a starting point for establishing a more integrated approach to fire management, with five key elements (also known as the five Rs): review (monitoring and analysis); risk reduction (prevention); readiness (preparedness); response (suppression); and rehabilitation or recovery.

Natural disasters and human conflicts can damage forests and trees and generate large quantities of burnable debris, thereby increasing the risk of fire. Integrated fire management can reduce the risk of fire in the wake of disaster by evaluating damage; clearing blocked roads, tracks and firebreaks; removing fallen trees and debris; monitoring the situation using a combination of satellite and ground observations; increasing preparedness; instituting early-warning and early-response systems; increasing collaboration with partner organizations; and restoring damaged forests and assets.

#### ***Prevention, mitigation and development***

Following natural disasters and human conflicts, an important challenge for medium-term to long-term responses in forestry is to strengthen the resilience of landscapes as a way of reducing the vulnerability of communities to future risks that may threaten their lives and livelihoods. This requires the identification of ecosystems and communities that are vulnerable to natural and human-caused disasters as well as sustained investment in integrated and participatory approaches to the rehabilitation of forest ecosystems, watershed management, pest management, fire management and natural resource management. Investment is also required in monitoring, early-warning systems, rapid mobilization, preparedness and prevention.

Forest and landscape restoration in the wake of disaster can help set the foundation for sustainable development. “Building back better” should be the underlying aim of this approach.

## Further Learning

FAO. 2015. [Forests, trees and disasters](#). *Unasylva*, 66(243/244): 2015/1–2

UN. [Sendai framework for disaster risk reduction 2015 - 2030](#)

### Web links

<http://www.unisdr.org/> *United Nations Office for Disaster Risk Reduction*. Last accessed 28.10.2015.

<http://www.fao.org/resilience/resources/natural-hazards/en/> *FAO Natural Hazards*. Last accessed 28.10.2015.



## Credits

This module was developed with the kind collaboration of the following people and/or institutions:

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