A World of Opportunity

Over the last several centuries, vast forest areas have been cleared as agriculture has spread and human populations have grown. About 30 percent of global forest cover has been completely cleared and a further 20 percent has been degraded. Breaking the spiral of loss and degradation and restoring these lands would bring many benefits.

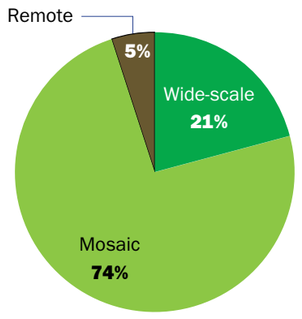
Restored lands support livelihoods and biodiversity by supplying clean water, reducing erosion, providing wildlife habitat, biofuel, and other forest products. Forests and trees mitigate climate change by sequestering carbon. Trees in agricultural landscapes can enhance soil fertility, conserve soil moisture, and boost food production.

More than two billion hectares worldwide offer opportunities for restoration — an area larger than South America. Most of these lands are in tropical and temperate areas.

- One and a half billion hectares would be best-suited for mosaic restoration, in which forests and trees are combined with other land uses, including agroforestry, smallholder agriculture, and settlements.
- Up to about half a billion hectares would be suitable for wide-scale restoration of closed forests.
- In addition to these two billion hectares, there are 200 million hectares of unpopulated lands, mainly in the far northern boreal forests, that have been degraded by fire. These areas would likely be difficult to restore due to their remoteness.

Croplands and densely populated rural areas on former forest lands amount to a further one billion hectares. They do not offer extensive restoration opportunities in terms of area, but some of these lands would benefit from having trees planted in strategic places to protect and enhance agricultural productivity and other ecosystem functions.

Mosaic restoration is the most widespread opportunity.



Restoration opportunities can be found everywhere, but are mainly in tropical and temperate areas. Most of these opportunities are for mosaic restoration.

This global assessment should be refined at the national level.

Restoration is possible – Most countries have suffered forest loss and degradation and have opportunities for restoration. Vast deforested areas in Europe and North America have regrown forests. South Korea and Costa Rica have embarked on successful forest restoration strategies. Restoration efforts in China, Niger, Tanzania, and other countries are slowing desertification and restoring woodlands with associated dramatic improvements in livelihoods and ecological health. Yet restoration opportunities are often overlooked.

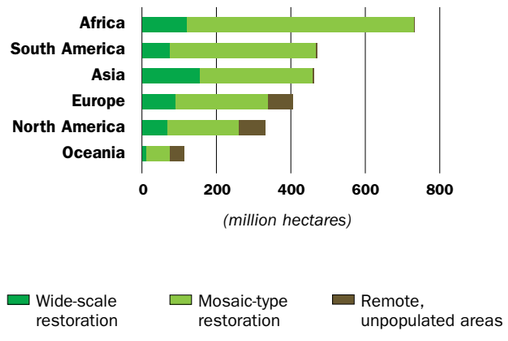
Restoration of Forests and Landscapes

Forest and landscape restoration is about more than just trees. It goes beyond afforestation, reforestation and ecological restoration to improve both human livelihoods and ecological integrity. Key characteristics include the following:

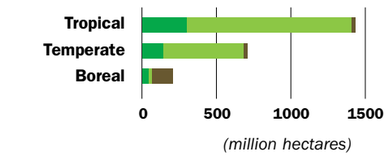
- Local stakeholders are actively engaged in decision making, collaboration, and implementation.
- Whole landscapes are restored, not just individual sites, so that trade-offs among conflicting interests can be made and minimized within a wider context.
- Landscapes are restored and managed to provide for an agreed, balanced combination of ecosystem services and goods, not only for increased forest cover.
- A wide range of restoration strategies are considered, from managed natural regeneration to tree planting.
- Continuous monitoring, learning and adaptation are central.

A restored landscape can accommodate a mosaic of land uses such as agriculture, protected reserves, ecological corridors, regenerating forests, well-managed plantations, agroforestry systems, and riparian plantings to protect waterways. Restoration must complement and enhance food production and not cause natural forests to be converted into plantations.

Africa has the greatest land area with forest and landscape restoration opportunities.



Most restoration opportunities are located in tropical and temperate areas.



How to interpret the results

The results must be interpreted with caution. The map is based on significant simplifications due to limited data. Only pre-existing information was used. Good information was available on land cover, land use, population density and other factors. Yet many important factors could not be considered for lack of data, such as resource tenure and land-use dynamics.

The map shows wider landscapes where restoration opportunities are more likely to be found, not the location of potential individual restoration sites. Many features of the landscape are not visible at this map's spatial resolution, and local context could not be considered. No ground validation was conducted.

The map does not prescribe any particular type of restoration intervention. It only shows lands with characteristics that indicate restoration opportunities.

The results are globally consistent, but pertain only to lands capable of supporting forests or woodlands. They should not be compared with UN Food and Agriculture Organization global assessments as assumptions, methods, data sources, and definitions are different.

The assessment is intended to inform the policy making process at the global level. It should be complemented by further investigation at regional and national scales, where more detailed information is needed and available.

Conclusions

Many countries have suffered forest loss or degradation in the past. Opportunities for restoration are huge in terms of area and exist on all continents.

Many more countries can mitigate climate change through restoration than by avoiding additional deforestation and degradation.

Restoration and avoided deforestation are complementary and mutually supportive measures. Restoration opportunities tend to be located far away from the areas where ongoing deforestation is widespread and concentrated.

One of the most attractive features of forest and landscape restoration is its many benefits. The Convention on Biological Diversity has agreed on a target to restore 15 percent of degraded ecosystems by 2020. The UN Framework Convention on Climate Change has adopted a decision that sets a goal for all countries to slow, halt and reverse forest cover and carbon loss. Properly designed initiatives could bring benefits for biodiversity and climate while also improving people's lives.

Authors: Susan Minnemeyer, Lars Laestadius and Nigel Sizer (World Resources Institute), Carole Saint-Laurent (IUCN), and Peter Potapov (South Dakota State University). **Supported by the German Ministry for the Environment, Nature Conservation and Nuclear Safety, building on work supported by Profor and the Forestry Commission of Great Britain. Review comments from the UNEP World Conservation Monitoring Centre are gratefully acknowledged. More information may be found at www.ideastransformlandscapes.org and www.wri.org/restoring-forests.**

The Global Partnership on Forest Landscape Restoration is a worldwide network that unites governments, major UN and non-governmental organizations, companies and individuals with a common cause. **We believe that ideas transform landscapes.** The partnership provides the information and tools to strengthen restoration efforts around the world and builds support for forest landscape restoration with decision-makers and opinion-formers, both at local and international levels.

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Some important terms

Forest – Ecosystems dominated by trees. Three types of forests were considered in this study: closed forests (canopy cover greater than 45 percent), open forests (canopy cover between 25 and 45 percent), and woodlands (canopy cover between 10 and 25 percent). Lands with less tree cover were considered to be either naturally nonforested or converted former forests or woodlands.

Landscape – A broad, typically heterogeneous land area. As defined in this study, a forest landscape is any landscape, regardless of its current vegetation or use, which is naturally capable of supporting forests or woodlands.

Degradation – A process that reduces the volume and canopy cover of trees across a landscape. Degradation leads to reduced biomass, reduced biodiversity, and a reduction in the ecosystem services provided by forests.

Forest and landscape restoration – An active process that brings people together to identify, negotiate and implement practices that restore an agreed balance of the ecological, social and economic benefits of forests and trees within a broader pattern of land-uses. Many international processes reference restoration, including the Convention on Biological Diversity (Strategic Plan Target 15), the UN Framework Convention on Climate Change (the REDD+ goal and the Cancun COP 16 decision on reversing forest and carbon loss and enhancing forest carbon stocks), the UN Forum on Forests, and the International Tropical Timber Organization.

Mapping restoration opportunities

A new and improved map – This restoration opportunity map is a revised and improved version of a previous map (published in 2009 and revised in 2010). The boreal forest landscapes of the north are now included; differences in forest canopy cover are reflected in greater detail; the assessment of potential forest cover has been improved, and the analysis has been updated with more recent and higher resolution data. The new map indicates a restoration opportunity twice as large as the old one. This is mainly because a more precise mapping of potential forest extent has increased the estimate of degraded lands with opportunities for restoration, not because something has changed in the real world.

Methods – We first mapped where forests and woodlands could grow according to climatic conditions — their potential extent without human influence (top map, right). Dry areas such as the Sahel were not included, although trees play an important role there, because of their very low potential forest density.

Second, we mapped the current extent of forests and woodlands (bottom map, right). Forest maps were derived from global 250m resolution satellite imagery.

Third, we identified restoration opportunities by comparing the maps of potential and current forest extent in light of information about current land-use. Intact forest landscapes and managed natural forests and woodlands were considered to have no need or potential for restoration.

Parties to the **Convention on Biological Diversity**, in 2010 in Nagoya, Japan, adopted the Strategic Plan for Biodiversity 2011–2020, with the purpose of inspiring broad-based action in support of biodiversity over the next decade. The strategic plan includes the following target for restoration of ecosystems:

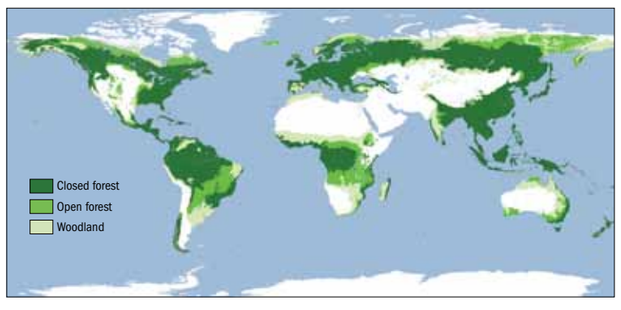
Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Fourth, we considered constraints on restoration by mapping human pressure as a combination of population density and land use. Restoration opportunities in remote, unpopulated areas were also identified.

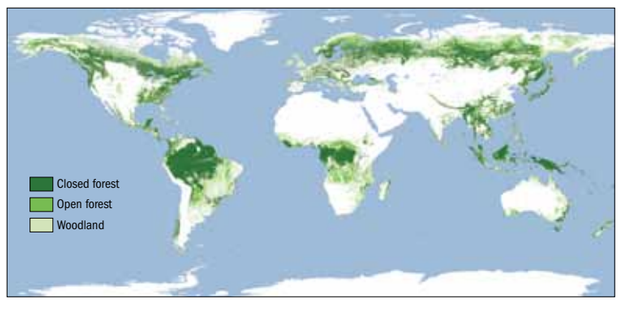
Deforested and degraded forest lands were divided into four categories, resulting in a map of restoration opportunity areas and other former forest lands (with resolution of one square kilometer):

- **Wide-scale restoration** – Less than 10 people per square kilometer and potential to support closed forest.
- **Mosaic restoration** – Moderate human pressure (between 10 and 100 people per square kilometer).
- **Remote restoration** – Very low human pressure (density of less than one person per square kilometer within a 500km radius).
- **Croplands** – Intensive human pressure (over 100 people per square kilometer).

Potential extent of forest and woodlands according to climate



Current extent of forest and woodlands



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A World of Opportunity

More than two billion hectares of the world's deforested and degraded landscapes are likely to offer potential for restoration — a vast opportunity to reduce poverty, improve food security, reduce climate change and conserve biodiversity.

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A World of Opportunity for Forest and Landscape Restoration

BONN CHALLENGE
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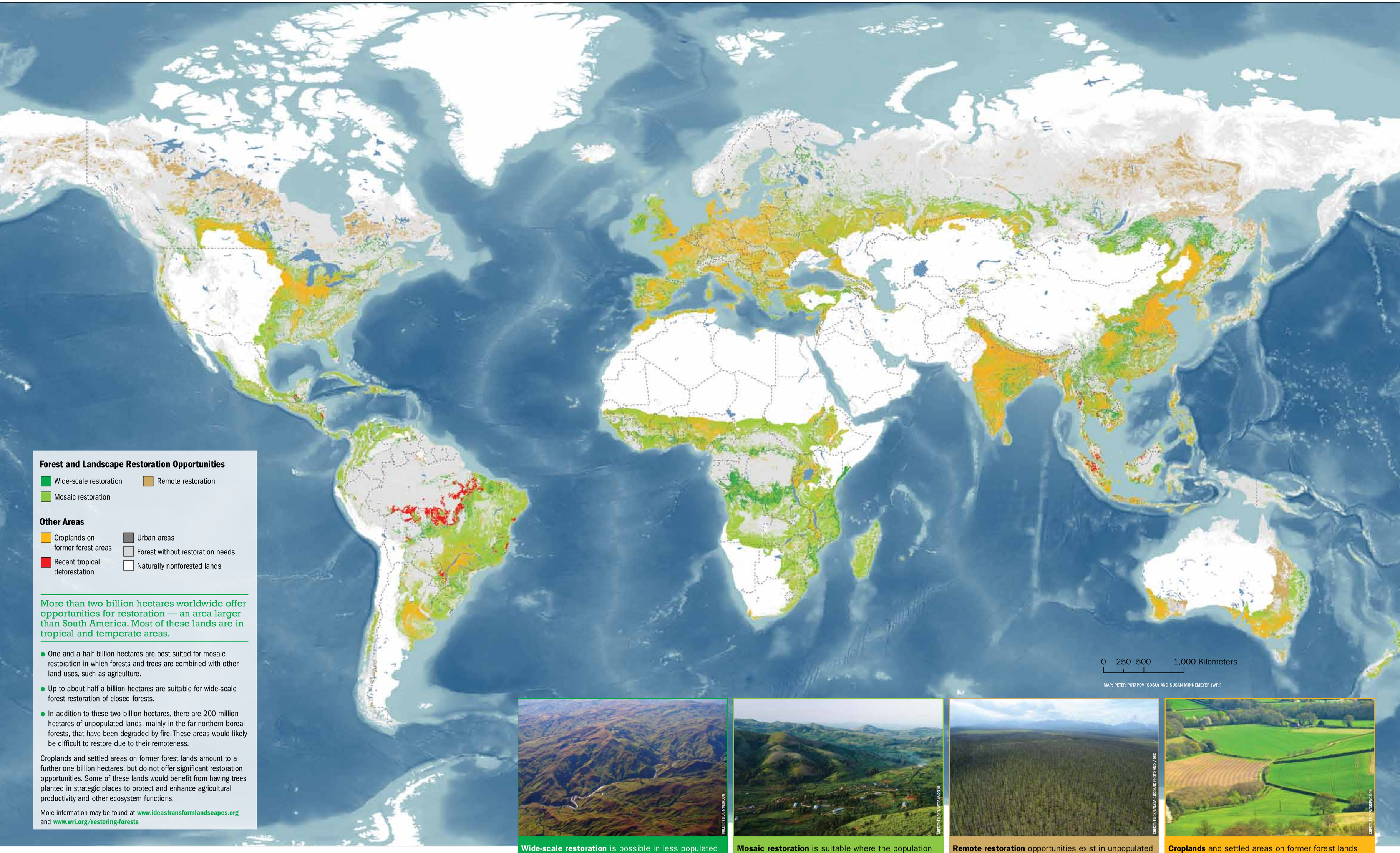

MAP: PETER POTAPOV (SDSU) AND SUSAN MINNEMEYER (WRI)

Forest and Landscape Restoration Opportunities

- Wide-scale restoration
- Mosaic restoration
- Remote restoration

Other Areas

- Croplands on former forest areas
- Recent tropical deforestation
- Urban areas
- Forest without restoration needs
- Naturally nonforested lands

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- Up to about half a billion hectares are suitable for wide-scale forest restoration of closed forests.
- In addition to these two billion hectares, there are 200 million hectares of unpopulated lands, mainly in the far northern boreal forests, that have been degraded by fire. These areas would likely be difficult to restore due to their remoteness.

Croplands and settled areas on former forest lands amount to a further one billion hectares, but do not offer significant restoration opportunities. Some of these lands would benefit from having trees planted in strategic places to protect and enhance agricultural productivity and other ecosystem functions.

More information may be found at **www.ideastransformlandscapes.org** and **www.wri.org/restoring-forests**

CREDIT: FLICKR/ MORGEN

Wide-scale restoration is possible in less populated areas with less intensive land-use where closed forests can grow back on a large scale once barriers such as fire or grazing are controlled.

CREDIT: FLICKR/ REESAMO10

Mosaic restoration is suitable where the population density is higher, including on lands where closed forests cannot grow. The result is a mix of forest, trees, and other land uses including agroforestry and small-holder agriculture.

CREDIT: FLICKR/ NASA GODDARD PHOTO AND VIDEO

Remote restoration opportunities exist in unpopulated areas, but are so far from human habitation that restoration may not be feasible. In these areas, forests have been lost or degraded by natural and human-influenced forces such as fire, drought, extreme climatic events, or pests and disease.

CREDIT: FLICKR/ JOSHPHOTOS

Croplands and settled areas on former forest lands may benefit from tree planting on steep slopes, along waterways, and in other targeted places to prevent soil erosion, protect waterways, absorb storm water, increase soil fertility, and enhance soil moisture capacity.

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