



part of ecosystem and it is impossible to eliminate them entirely. Management strategies should focus on long-term sustainable forest management, improved pest control and predicting appropriate intervention points and should focus on economically important tree crops. There should also be improved monitoring the impacts of pest control measures which currently are not undertaken in a scientific manner. The current pest management approach focuses on spraying visibly infected areas, but this is often undertaken when pest population is at a peak, and it would naturally die the following year.



Forest pest management and control strategies should focus on long-term resilience building through sustainable forest management, carefully planned pest control using biological agents, and monitoring. Pest spraying should focus on areas of economic importance, near households and in extremely severe cases.

Climate Change - The long-term impacts on forests due to climate change are not yet fully comprehended, but include permafrost melting (which reduces soil moisture) and increased incidence of forest fire. Climate change may also be an underlying cause of increased forest vulnerability from pathogens and pests, increasing frequency and severity of droughts creating an environment more conducive to pests. Pests and pathogens may increase in the future because of climate change, as has occurred in other boreal forests areas in the world, such as the large-scale forest loss due to bark beetles in Canada's boreal forests.



Forest management strategies should focus on long-term sustainable forest management, building diversity of tree species and age structure, increasing ecosystem health through sustainable thinning and harvesting, ensuring genetically diverse seed stock is maintained, and ensuring communities living in buffer zones have resilient livelihoods that are resilient in face of climate change.

Drought & Permafrost – Climate trends predict variability and uncertainty in precipitation levels in Mongolia, this may benefit some areas of forest, but likely to negatively

impact central forests in Mongolia which may result in shorter growing periods. Permafrost is also an important seasonal source of soil water regimes, though research has show that permafrost is receding in Mongolia⁹, maintaining forest cover is imperative as the permafrost layer recedes following forest degradation and exposure of the soil to direct sunlight.



Forests are vital for protection of the permafrost layer in upland watersheds. Research has shown permafrost layer melts following forest loss after fire. Maintaining and enhancing forest cover through protection and sustainable forest management can help maintain the permafrost layer and thus helps maintain watershed resources and regular flows of water.

MEETING INTERNATIONAL & NATIONAL CLIMATE CHANGE COMMITMENTS

INTERNATIONAL COMMITMENTS

Mongolia has been active in meeting international commitments for addressing climate change.

United Nations Framework Convention on Climate Change - Mongolia has made international commitments to climate change as a signatory of the UN Framework Convention on Climate Change (UNFCCC) in 1992 and the Paris Agreement in 2016.

Mongolia was one of the first countries to sign and ratify the Paris Agreement in 2016.

Reducing Emissions from Deforestation and Forest Degradation - Parties to the UNFCCC agreed to consider mechanisms to address climate change through reducing emissions from deforestation and forest degradation through; a mechanism known as Reducing Emissions from Deforestation and Forest Degradation (REDD+).

REDD+ IN MONGOLIA

In June 2011, Mongolia became a partner country of the United Nations Collaborative Programme on REDD+. Since then Mongolia has taken significant steps towards implementation. Mongolia approved its National REDD+ Readiness Road Map in 2014¹⁰, and the UN-REDD National Programme started officially in 2016.



The main goal of the programme is to support the Mongolian government in REDD+ readiness.

REDD+ readiness relates to the efforts a country undertakes to develop the capacities and operational systems needed to implement REDD+ in the context of the UNFCCC. Support to REDD+ readiness is provided to countries through bilateral and multilateral initiatives, including the UN-REDD Programme. This includes both financial and technical support to help countries develop the four elements identified through UNFCCC negotiations, as follows:

- ▶ a national REDD+ strategy or action plan to improve forest and land use management
- ▶ a national forest reference emission level or forest reference level (FRL) which shows the amount of greenhouse gases released from deforestation and forest degradation
- ▶ a national forest monitoring system, and
- ▶ a system for providing information on safeguards.



A national REDD+ strategy will be developed for Mongolia. It will devise long-term forest strategies to maintain and enhance Mongolia's ecosystem services, to contribute toward tackling climate change action through making forests more resilient, to reduce forest degradation and thus greenhouse gas emissions, and to contribute towards Mongolia's Green Development Policy¹¹ and Sustainable Development Vision¹² and SDG goals.

More information can be found from the following factsheets:

- ▶ Factsheet 1 REDD+ and Climate Change Strategies
- ▶ Factsheet 2 REDD+ and Sustainable Development Goals
- ▶ Factsheet 3 REDD+ and Climate Change Adaptation

The UN-REDD Programme is the United Nations Collaborative Initiative on Reducing Emissions from Deforestation and forest Degradation (REDD+) in developing countries. The Programme was launched in 2008 and builds on the convening role and technical expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). The UN-REDD Programme supports nationally led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including indigenous peoples and other forest-dependent communities, in national and international REDD+ implementation.

Since Mongolia became a partner country of the Programme in June 2011, the country has taken steps to start implementing REDD+ readiness activities. This includes the preparation of its National REDD+ Readiness Roadmap, which was officially adopted by the Ministry of Environment and Green Development and Tourism (MEGDT) in June 2014. The national programme was signed on September 18, 2015, and launched officially on January 26, 2016.

MAIN GOAL

The overall goal of the UN-REDD Mongolia National Programme is to support the Government of Mongolia in designing and implementing its National REDD+ Strategy and in meeting the requirements under the UNFCCC Warsaw Framework to receive results-based payments.

Outcome 1: National REDD+ Management arrangements established and improved stakeholder awareness and effective stakeholder engagement

Outcome 2: National REDD+ Strategy prepared

Outcome 3: Forest reference levels developed

Outcome 4: National forest monitoring system and safeguards information system developed

FOR MORE INFORMATION:

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БАЙГАЛЬ ОРЧИН,
АЯЛАЛ ЖУУЛЧЛАЛЫН ЯАМ



FACTSHEET 1: FORESTS AND CLIMATE CHANGE IN MONGOLIA – SOLUTIONS AND OPPORTUNITIES FOR IMPROVING FOREST MANAGEMENT

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KEY POINTS:

- ▶ Global warming and climate change are caused by human activities such as burning fossil fuels, certain types of agriculture and livestock production, and deforestation, which all release CO₂ and other greenhouse gases into the atmosphere.
- ▶ Mongolia is extremely vulnerable to climate change with a recorded increase in average temperatures of 2.4 degrees¹, three times higher than the global average. In Mongolia, the risk of climate change and / or extreme climatic events such as drought and dzuds have dramatic impacts on the country's economy and natural systems. The drying up of lakes, rivers and springs, and melting of permafrost and glaciers has increased in last decade, accompanied by increased evaporation and melting of permafrost results in declining water availability in forest soils¹.
- ▶ Forests provide a wealth of benefits for Mongolia's socio-economic development, including include services such as water regulation, biodiversity conservation, soil protection, grazing pasture, and products such as pine nuts and timber.
- ▶ Forests are also critical to the global climate system due to their ability to absorb and store carbon, and because continued deforestation or forest degradation leads to further greenhouse gas emissions. Forest ecosystems are affected by the impacts of climate change, particularly drought, which increases fire risk, limits forest growth and may weaken the health of forests through competition for limited water supplies making them susceptible to pest attack.
- ▶ Initial studies by UN-REDD3 and Government counterparts show that deforestation, resulting in permanent land use change, is low in Mongolia, with approximately 6,130 ha per year³. Whereas, forest degradation, from combined effects of fire and pests, accounts for 137,000 ha annually since 19863. To a certain extent, pests and forest fire, are a natural part of the ecosystem, and can not be eliminated entirely. However, their impacts are increased by poor long-term forest management strategies which increase the forests susceptibility to pest attack, and vulnerability to fire.
- ▶ Long-term strategies that embrace both protection and utilisation, through sustainable thinning and harvesting can result in increased forest health and resilience to pests and drought.

Sustainable forest management provides economic incentives for local communities, enterprises and the government, whilst also ensuring ecosystem services, such as biodiversity, water, grazing are maintained and enhanced.

- ▶ In consultation, with government, scientific and community partners a National REDD+ Strategy will be developed. This will aim to develop policies and measures to reduce forest degradation, increase economic opportunities, maintain ecosystem services and increase the resilience of forest ecosystems to climate change. The strategy is expected to galvanize support both within Mongolia and for external donors to invest in forest protection and utilisation.

WHAT CAUSES GLOBAL WARMING?

Current levels of CO₂ in the atmosphere are 380 ppm, atmospheric carbon has never previously been above 300ppm during the last 650,000 years⁴. This results in a temperature increase is mainly caused through the use of fossil fuels in developed countries, and in recent years in emerging economies such as China, India and Indonesia. Deforestation and forest degradation releases further greenhouse gases into the atmosphere.

- ▶ Forests are critical to the global climate system due to their ability to absorb and store carbon, and because continued deforestation or forest degradation leads to further greenhouse gas emissions.
- ▶ Current estimates state that land use change, predominantly loss of forests, accounts for around 15% of global greenhouse gas emissions⁴.

IMPACTS OF CLIMATE CHANGE

Natural climate change has occurred many times during the earth's history, but now it is occurring at unprecedented rates, faster than ever before. The earth is now inhabited by over 7 billion humans and, as such, puts enormous pressure on society. The United Nations Framework Convention on Climate Change (UNFCCC) meeting in Paris in 2015, otherwise known as 'COP 21', set a target of ensuring global averages do not increase more than 1.5 degrees; a 2 degree rise is regarded by many experts as catastrophic for global ecosystems and humans⁵.

Mongolia is extremely vulnerable to climate change with a recently recorded increase in average temperatures of 2.4 degrees, significantly three times higher than the global average¹, a few key points with regards climate change are as follows:

- ▶ Annual mean temperatures have risen, 3 times the global increase in mean temperature.
- ▶ Longer periods of dry and hot periods in the summer, and shortened cold in the summer.
- ▶ Annual precipitation changes are variable, decreasing in central regions and increasing in western and eastern regions, however, timing and availability is key to vegetation growth.
- ▶ The drying up of lakes, rivers and melting of glaciers and permafrost has intensified in last decades. These changes, along with increased temperatures and evaporation, reduce the amount of available soil water resources and affect forest growth in the summer periods.
- ▶ Pasture yields are affected by climate and weather patterns this may place more impact on forest edges for winter grazing in periods of drought.

- ▶ Most impacts are because of climate variability and extreme events like drought, dzuds and storms. These will dramatically impact the countries' economy and natural systems. Agriculture, livestock, grasslands and water and amongst the most vulnerable.

FORESTS AND CLIMATE CHANGE IN MONGOLIA

FORESTS IN MONGOLIA

Mongolia's forests cover nearly 18 million ha of land accounting for approximately 11.8% of the country's surface area⁶. Mongolian forests are made up of two main types, namely boreal and saxaul forests.

- ▶ The boreal forest covers 13.1 million hectares⁶ is comprised of deciduous and coniferous forest growing in the northern forest areas, boreal forest and montane areas, these areas are dominated by conifers including Siberian larch, Scots and Siberian pine, and broadleaf species, particularly birch, with aspen and poplar also occurring.
- ▶ The southern saxaul forests, or woodlands, are in the southern desert and desert steppe regions and cover 4.6 million hectares⁶ they consist of scattered trees and are rarely over 4m in height, and biomass is typically very low, and would be classified as woodland under international definition. Saxaul forests are important for stabilizing arid zone land and reducing desertification.

ECONOMIC VALUE

Looking at the direct contribution of the forest sector to Mongolia's GDP in 2016² it was less than 0.5%, approximately MNT 66 billion (USD 35 million at 2016 currency exchange rates). Looking at this figure it would be easy to believe that forests have little value towards the national economy. However, the reality is very different. A study carried out by the UN-REDD found that boreal forest ecosystem services are worth around MNT 430 billion a year (Figure 1.0) to the national economy².

- ▶ **Timber and fuelwood** at current levels may were estimated to have an annual value of almost MNT 200 billion, and generated MNT 66 billion in operating profits to producers. Just over half of this value comes from unlicensed removals, particularly firewood. The National Forest Inventory⁶ which sampled forest stocks across the country, identified that there are many areas where, under strict regulations, the current stocks would benefit from harvesting or thinning to improve growth and resilience.
- ▶ **Non-timber forest product** collection has a value of almost MNT 16.5 billion a year, benefitting around half of the rural population in soums with boreal forest. More than 90% of this value comes from unlicensed removals, and three quarters is accounted for by home-consumed products which never enter the market but of vital importance for communities.
- ▶ **Grassland** areas in forests are an important source of seasonal pasture for livestock, to a value of more than MNT 34.5 billion in terms of contribution to herders' gross margins. Management of forest edges needs to be improved to ensure that grazing benefits farmers, but also so it is regulated to ensure forests regeneration is enabled otherwise forests will eventually disappear in grazing areas.

- ▶ **Hunting** under permit in boreal forest areas generates products with an annual market value of approximaely MNT 91 million if sold locally and MNT 2.7 billion if hunted for sport.
- ▶ **Forest-based leisure tourism** directly generates more than MNT 22.7 billion in visitor spending and sales, supports up to 6,000 jobs and wage earnings of MNT 18.31 billion, and makes a direct contribution to GDP of MNT 55.26 billion. Its multiplier effects across the economy are substantial: the total contribution to GDP may be in excess of MNT 144 billion.
- ▶ **Forest watershed protection** services in the Upper Tuul basin alone are worth MNT 27.2 billion a year to urban water users. This service is underestimated, a report on Ecosystem Benefits⁷ showed that the fogging effect of forested watersheds was highly significant in rain capture, and riverside forests and surrounding oasis in the saxal forests are also believed to contribute to watershed service protection.

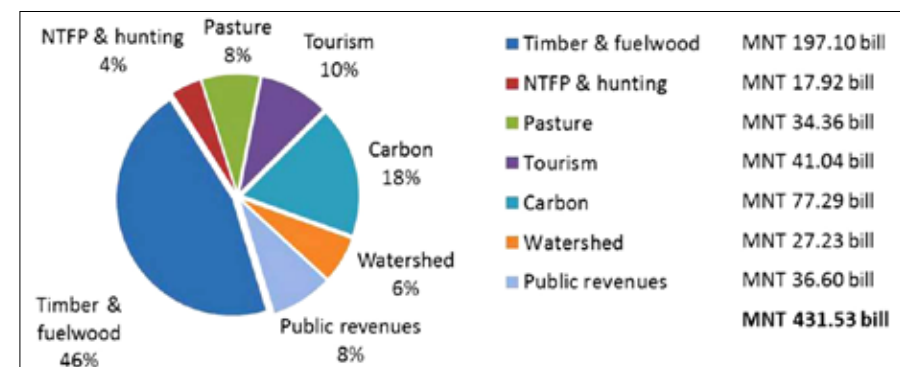


Figure 1.0. Estimates of Revenues from Forests Services in Mongolia¹⁰

THREATS TO FORESTS IN MONGOLIA

Mongolia's forests are threatened by a multitude of factors ranging from direct human pressure particularly human caused forest fires, and the indirect impacts of poor forest management, climate change, pests and poor governance⁸. Initial studies by UN-REDD and Government counterparts¹ show that deforestation resulting in permanent land use change is low in Mongolia, with approximately 6,130 ha per year, whereas, forest degradation from forest fire and pest damage combined accounts for approximately 137,000 ha annually since 19863.

Fire - Forest fires are common in Mongolia. It is estimated that 90% of fires in Mongolia are caused by humans. Once burnt, the resulting opening of crown cover benefits grasses and therefore attracts grazing animals, while fire-weakened trees are more vulnerable to pest and fungal infestations.



Forest fire management strategies should focus on long-term sustainable forest management, fire prevention and awareness raising, increased penalties for causing fires and capacity building for fire protection teams

Pests – Insect pests may damage forests, particularly weakened trees which have less resistance to attack. This may be a result of overly dense forests, with trees competing for light, nutrients and water or those that have been affected by fire damage. However, pests are natural

¹ MARCCC (2014). Mongolia's Second Assessment on Climate Change – 2014. Ministry of Environment, Green Development and Tourism. Mongolia.

² UN-REDD (2015). Financing Flows in the Mongolia Forests Sector. Ministry of Environment, Mongolia.

³ UN-REDD (In Prep). Draft Data - Forest Cover Change Assessment using Collect Earth. Ministry of Environment, Mongolia

⁴ IPCC (2014). Climate Change Assessment. International Panel on Climate Change.

⁵ UNFCCC (2015). Paris Agreement on Climate Change. UNFCCC

⁶ Ministry of Environment (2015). National Forest Assessment - 2015. FRDC, Mongolia.

⁷ UN-REDD (2016). Multiple Benefits Assessment and Mapping. UNREDD, Mongolia.

⁸ UNDP (2015). Mapping Permafrost Change in Mongolia. UNDP, Mongolia.

⁹ UN-REDD (2016). A preliminary assessment of the causes and drivers of deforestation and forest degradation in Mongolia. MET, Mongolia

¹⁰ MEGDT (2015). REDD Readiness Roadmap. Ministry of Environment, Green Development and Tourism. Mongolia.

¹¹ MEGDT (2014). Green Development Policy. Ministry of Environment, Green Development and Tourism. Mongolia.

¹² MEDGT (2014). Sustainable Development Vision. Ministry of Environment, Green Development and Tourism. Mongolia.