LAND DEGRADATION NEUTRALITY TARGET SETTING PROGRAMME

NATIONAL REPORT ON VOLUNTARY TARGET SETTING TO ACHIEVE LAND DEGRADATION NEUTRALITY IN MONGOLIA

National Committee on Combatting Desertification of Mongolia (NCCD)

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The views and content expressed in this document are solely those of the authors of this document and do not necessarily represent the views of the LDN TSP or any of its partners.
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Executive summary

Mongolia is one of the countries in Asia suffering from climate change and facing the negative impacts of land degradation, drought, and desertification; thus the Government of Mongolia ratified the United Nations Convention to Combat Desertification (UNCCD) in 1994 and elaborated a National Action Plan to combat desertification in 1996. Since then, Mongolia has made many efforts to reverse land degradation, drought, and desertification. In 2016, the Parliament of Mongolia adopted the concept of sustainable development, where the issues of nature conservation, water resources, disaster preparedness, and sustainable land management (SLM) and natural resource management were among the top priorities. In June 2017, the Government of Mongolia (GoM) expressed its interest in formulating national land degradation neutrality (LDN) targets and measures to achieve LDN. The LDN target setting process started in November 2017 under the leadership of the National Committee of Mongolia to Combat Desertification. To ensure the involvement of all relevant institutions and stakeholders, an expert team including a representative from all Ministries, the National Statistical Office, research institutes and development agencies, formed the LDN working group which discussed and validated the baseline and voluntary LDN targets for Mongolia.

The implementation of LDN can contribute to achieving medium and long-term international commitments, goals and targets of the GoM by leveraging of LDN targets through other national strategies as below:

- **Mitigation and adaptation to climate change:**
  - The introduction of the LDN concept and landscape approach will strengthen land use planning and management capacity, thus supporting the achievement of adaptation targets;
  - Interventions for LDN using SLM practices will increase carbon sequestration, improve agriculture and forestry sector adaptation.

- **Biodiversity conservation:**
  - Introduction of the response hierarchy (avoid-reduce-reverse) at the decision-making level for local and regional planning has the potential to prevent habitat loss and thus contribute to national priorities on biodiversity conservation, especially designing and locating special protected areas;
  - LDN targets can be incorporated into land management interventions to reduce the impact of current land use practice (e.g., pasture use, mining) on biodiversity.

- **Ensure economic growth:**
  - LDN aims to sustain and restore productive lands, thus improving economic production of land and enhancing rural livelihoods.
  - The adoption and scaling up of SLM practices will ensure sustainable income generation.

Considering the “one out, all out” approach defined by the UNCCD SPI (ibid.), all degradation maps estimated for the three LDN indicators were overlaid to determine the LDN baseline for Mongolia.
According to the results, based on LDN indicators the total proportion of degraded land in Mongolia is 13.29 %, which is equal to 205,973.4 sq.km of land.

Notably, calculation of the area of degraded land using the three biophysical indicators is a recently developed methodological approach; land degradation is assessed nationally using the criteria of aridity, wind, water erosion and vegetation cover change. Based on these criteria the proportion of degraded land is 76.8% of the total territory, of which severely degraded lands occupy 22.9%. The use of the LDN indicators provides a robust scientific basis for assessment; however, national data on the LDN indicators land productivity dynamics and soil organic Carbon are under currently progress, and the figures on land degradation will be further revised.

The following are targets to achieve land degradation neutrality in Mongolia by 2030.

- Target 1: Reduce deforestation and forest degradation to maintain the forest area and reach 9% of the total area by 2030 compared to 7.85% \(^1\) in 2015.
- Target 2: Promote sustainable grassland management and stop further grassland degradation.
- Target 3: Increase agricultural yields by 2.5 t/ha per annum by 2030 compared to 1.6 t/ha per annum \(^2\) in 2015.
- Target 4: Ensure no net loss of wetlands by 2030 compared to 2015 (3963.3 sq. km) \(^3\).

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\(^1\) Sustainable Development Vision of Mongolia, Government of Mongolia, 2016  
\(^2\) Green Development Concept, Government of Mongolia, 2014  
\(^3\) Baseline assessment using LDN indicators
Introduction

In September 2015, the United Nations General Assembly adopted the United Nations Agenda for Sustainable Development by 2030 (the 2030 Sustainable Development Goals, or SDGs), which identified 17 SDGs and 169 targets. SDG goal 15 urges countries to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss. Target 15.3 aims to “combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land-degradation-neutral (LDN) world” by 2030.

The United Nations Convention on Combating Desertification (UNCCD) is the only international agreement addressing the problem of land degradation, drought, and desertification, as well as a platform to ensure synergy among the Rio Conventions. In 2015, the twelfth session of the Conference of Parties (COP) of the UNCCD endorsed SDG target 15.3 and the concept of land degradation neutrality as a reliable vehicle for driving the implementation of the Convention. It invited all UNCCD country parties to formulate voluntary targets to achieve LDN at the national level, and requested the UNCCD bodies to provide technical guidance to formulate national LDN targets and facilitate monitoring, evaluation, and communication of progress using a well-agreed set of indicators. In response to the decisions taken by the UNCCD COP 12, the Global Mechanism of the UNCCD established the LDN Target Setting Programme (TSP), which aims to support countries to define national LDN targets and associated measures.

Mongolia is one of the countries in Asia suffering from climate change and facing the negative impacts of land degradation, drought, and desertification; thus the Government of Mongolia ratified the UNCCD in 1994 and elaborated a National Action Plan to combat desertification in 1996. Since then, Mongolia has made many efforts to reverse land degradation, drought, and desertification. In 2016, the Parliament of Mongolia adopted the concept of sustainable development, where the issues of nature conservation, water resource, disaster preparedness, and SLM and natural resources management were among the top priorities. In June 2017, the Government of Mongolia expressed its interest in formulating national LDN targets and measures to achieve LDN. The LDN target setting process started in November 2017 under the leadership of the National Committee of Mongolia to Combat Desertification. To ensure the involvement of all relevant institutions and stakeholders an expert team including a representative from all Ministries, the National Statistical Office, research institutes and development agencies was established. The target setting process was implemented in accordance with the LDN target setting building blocks developed with the scientific guidance of the UNCCD’s Science-Policy Interface, based on the early lessons learned from the LDN Target Setting Pilot Project with 14 pioneer countries, representing all regions.
1. Leveraging Land Degradation Neutrality

LDN target setting is not a stand-alone process: it provides opportunities for leveraging and coordination across various line ministries and sectors involved in land management. As a country-led process, successful LDN target setting and implementation depend on the highest level of political commitment and involvement of a wide variety of sectors and stakeholders.

By understanding why LDN matters, defining what to leverage, and identifying whom to engage, countries will be able to showcase and effectively communicate the multiple benefits that LDN offers to address national development priorities such as food security, poverty reduction, and climate action.

1.1. National priorities and their linkage to LDN

The Parliament of Mongolia adopted the Sustainable Development Vision of Mongolia in 2016. The actions mentioned in the vision will be implemented in three periods: the short-term (2016-2020); medium-term (2021-2025); and long-term (2026-2030).

The SDG long-term targets related to environmental protection and conservation are as follows:

- maintain a forest area to reach 9% of the total area;
- expand special protected areas to reach 30% of the total area;
- bring under the protection about 60% of all headwaters;
- introduce no-till soil processing in arable land;
- improve water availability for arable land to increase the irrigated area to up to 120 thousand hectares;
- regulate and manage animal numbers in alignment with pasture carrying capacity;
- Support green development and enhance the living standards of herders and agriculture workers.

To reach these targets the Government of Mongolia is working towards strengthening sectoral policy, legislation, and programmes, and enforcing the recently adopted Law on Soil Conservation and Desertification Prevention. Land degradation is addressed in agriculture, urban development, forestry, and environment sector development policies and programmes.

The agriculture sector policies mainly focus on the adoption of SLM practices and traditions in both arable farming and livestock breeding. The priorities for arable farming are increased area of agricultural land under irrigation, improved soil fertility and reduced impacts of drought and extreme weather events. As the primary land use type for Mongolia is extensive pasture, this covers a large area of productive lands. To sustain land productivity as well as livestock breeding sector development, the Mongolian Government initiated a national programme entitled “Livestock of Mongolia.” The
programme aimed to enhance the productivity of the sector by increasing the benefits from livestock breeding, improving the ecological sustainability of rangelands and enhancing veterinary service.

The forestry sector aims to increase forest cover by up to 9% of the total territory. Besides this target, the new policy aims to improve community-based forest management, enhance technologies for forest restoration and reforestation, improve financial flows and reduce risks in the forest ecosystem. Since 2011 Mongolia has been engaged in a UN REDD+ programme to reduce emissions from deforestation and degradation.

The Green Development Strategy of Mongolia, adopted in 2015, aims to develop Mongolia into an advanced nation having built conditions for environmental sustainability to be inherited by future generations and with the opportunity to gain benefits from it in the long-run through participatory and inclusive economic growth based on the green development concept. The core measure for the implementation of this strategy is linked to land use planning and management at all levels.

From those above, it can be concluded that land degradation is mostly addressed in these policies and programmes to fulfill national commitments to achieve the SDGs by 2030.

The implementation of LDN can contribute to achieving medium and long-term targets as follows.

- **Climate change mitigation and adaptation:**
  - The introduction of the LDN concept and landscape approach will strengthen land use planning and management capacity, thus supporting achievement of adaptation targets;
  - Interventions for LDN through SLM practices will increase carbon sequestration, improve agriculture and forestry sector adaptation.

- **Biodiversity conservation:**
  - Introduction of the response hierarchy (avoid-reduce-reverse) at the decision-making level for local and regional planning has the potential to prevent habitat loss and thus contribute to national priorities on biodiversity conservation, especially the design and location of special protected areas;
  - LDN targets can be incorporated into land management interventions to reduce the impact of current land use practice (e.g., pasture use, mining) on biodiversity.

- **Ensure economic growth:**
  - LDN aims to sustain and restore productive lands, thus improving economic production of land and enhancing rural livelihoods.
  - The adoption and scaling up of SLM practices will ensure sustainable income generation.
1.2. **Leverage opportunities**

Based on an assessment of opportunities and linkages, the National LDN Leverage plan was developed and is shown in Table 1.

**Table 1: Framework for LDN TSP leverage plan**

<table>
<thead>
<tr>
<th>Leverage Opportunities</th>
<th>Actions and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Why does LDN matter?</strong></td>
<td></td>
</tr>
<tr>
<td>1. Creating multiple Benefits</td>
<td>Incorporate LDN targets into national policies and programmes. The UNCCD focal point agency is responsible for SDGs indicator 15.3.1 and the benefit of LDN to other sectors and related working groups.</td>
</tr>
<tr>
<td>2. Fostering Policy Coherence</td>
<td>Mainstream LDN targets in economic and land use planning, and cross-reference in relevant action plans. The National Development Agency and focal points for the Rio Conventions are responsible for coherent action planning, finance, and implementation.</td>
</tr>
</tbody>
</table>
| 3. Advancing Climate Action | - Cooperate with relevant stakeholders on climate change to monitor soil organic carbon.  
- Assess co-benefits and trade-offs of SLM practices.  
- Establish extension services to facilitate the adoption and scaling up of SLM practices. |
| 4. Tapping financing opportunities | - Mainstream LDN to new GEF strategy (GEF7);  
- Develop project concepts on land-based climate activities to access Green Climate Fund and Adaptation Financing;  
- Identify potential to mobilize domestic public financial resources;  
- Research on the establishment of Trust fund or other resource mobilization structures to support local initiatives moving forward. |
| **What to leverage?** |                              |
| 5. National Climate Change Action Plan 2015 – 2050 | - Effective planning and management to reduce climate risks, especially drought impacts on the agriculture sector (croplands, livestock);  
- Maintain forest area to reach 9% of total area;  
- Increase water availability for agriculture production by focusing on currently rain-fed croplands;  
- Increase the area with soil and water conservation interventions;  
- Protection of headwaters. |
- Restore degraded soils and improve the fertility of agricultural lands;  
- Reduce negative drivers and threats to biodiversity mainly induced by the intrusion of large herd flock;  
- Reduce the loss of habitat areas due to soil erosion and land productivity decline. |
7. INDC

- Setting baselines and monitoring land degradation will contribute to a more careful planning of interventions towards land-based climate action;
- Restore and conserve natural resources, early warning and reduce risks of droughts and other environment-induced risks.

### Who to engage in creating leverage?

<table>
<thead>
<tr>
<th>11. UNCCD Focal Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Ensure the linkage between LDN and other Rio Conventions;</td>
</tr>
<tr>
<td>- Establish strong cooperation with National and Local Government to support them in meeting commitments;</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>12. Academia</th>
</tr>
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<tbody>
<tr>
<td>- Extend scientific networks relevant to LDN;</td>
</tr>
<tr>
<td>- Support for National and Local Government with appropriate choice of SLM technologies and approaches;</td>
</tr>
<tr>
<td>- Support with scientifically-proven methods on land and natural resource management and planning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13. UN Agencies (UNDP, FAO, UN-REDD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Support the establishment of an effective policy, regulatory, and institutional framework for LDN;</td>
</tr>
<tr>
<td>- Capacity needs assessment and strengthening of technical capacity to achieve LDN;</td>
</tr>
<tr>
<td>- Identifying potential mechanisms and financing options, including private sector financing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14. International organizations (ADB, WB, GIZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Technical assistance for policy, planning, and management of land resources;</td>
</tr>
<tr>
<td>- Support the development of information, education and communication strategy for LDN;</td>
</tr>
<tr>
<td>- Support mainstreaming of PPP activities in LDN at large and SLM practices specifically.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15. NGOs/CSOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Support the implementation of information, education and communication strategy for LDN;</td>
</tr>
<tr>
<td>- Develop learning programs for local environmental officers, practitioners, and other relevant stakeholders;</td>
</tr>
<tr>
<td>- The financial framework for exploring PPP options;</td>
</tr>
<tr>
<td>- Monitoring and auditing the implementation of LDN at national and sub-national levels.</td>
</tr>
</tbody>
</table>
1.3. **LDN Working group**

Mongolia has been a party to the UNCCD since 1996 and the Ministry of Nature, Environment and Tourism is the designated National Focal Point of the Convention. To date, there is no institutional arrangement to foster UNCCD implementation in Mongolia. It is therefore vital to formalize and extend the LDN working group into the National Working group to ensure an enabling environment to foster UNCCD implementation to achieve LDN in Mongolia. Figure 1 shows the opportunities for cross-sectoral priority areas among agencies to strengthen National LDN target setting and implementation.

![Figure 1: LDN TSP Working group](image)

- National Development Agency
- Ministry of Environment and Tourism (MNET)
- Department of Environment and Natural Resources, MNET
- Department of Land management and Integrated Water Policy Regulation, MNET
- Ministry of Agriculture and Light Industry
- Private sector and NGO/CSO
- National Statistical Office
- Academia
- National Remote Sensing Center/IHME
- NGO/CSO
- Ministry of Education, Culture and Science
- Academia
- Mongolian University of Education
- NGO/CSO
2. Status of Land Degradation, Trends and Drivers

An assessment of the current status, trends, and drivers of land degradation is needed to set sound LDN targets, make decisions on potential interventions, forecast changes in land-based natural capital and track progress. The UNCCD Science and Policy Interface (SPI) proposed using a set of three indicators that reflect land-based natural capital and its associated ecosystem services. These include:

- Land cover (metric: land cover change);
- Land productivity (metric: net primary productivity);
- Carbon stocks above and below ground (metric: soil organic carbon (SOC) stock).

These indicators correspond to the UNCCD progress indicators and have been adopted as sub-indicators for indicator 15.3.1 “Proportion of land that is degraded over the total land area,” to measure progress toward SDG target 15.3. These three indicators are the minimum set that could be enhanced and complemented by national or subnational indicators for a more accurate picture of land degradation.

A tiered approach is recommended for the computation of the indicators, as it generally provides advice on estimation methods at three levels of detail, from tier 1 (the default method) to tier 3 (the most detailed method). In the context of the LDN TSP, the following approach is used:

- Tier 1: Global/regional Earth observation, geospatial information, and modeling;
- Tier 2: National statistics based on data acquired for administrative or natural reference units (e.g., watersheds) and national earth observation;
- Tier 3: Field surveys, assessments and ground measurements.

Such an approach allows national authorities to use methods consistent with their capacities, resources, and data availability, and facilitates comparability at the global level. In this research, the global data is used, because of the absence of national data. Shortly, Mongolia will be able to perform relevant data collection and analysis independently, mainly to improve the spatial resolution of two of the LDN indicators: land cover and below- and above-ground Carbon stocks.

2.1. Land degradation status in Mongolia

Almost 90 percent of the total territory of Mongolia is located in arid, semi-arid, dry and sub-humid climatic regions, which are areas prone to desertification. Geographically, the country is located in transition between the Siberian taiga forests and Central Asian deserts, which explains the sensitivity of the country to both climate change and changes related to social development strategies, land, and natural resource use (Batjargal Z., 2000). The warming process occurring in Mongolia, the drastic increase in livestock, unsustainable mining industry development and other direct and indirect phenomena are the critical factors resulting in desertification and the exacerbation of land degradation. These factors explain the need to put land degradation and desertification issues at the higher policy-making level and require multiple actions involving the political, social and science and technology
sectors. The proper planning of response measures depends on high-quality assessments at the national, regional and local levels.

For Mongolia, desertification and land degradation processes have been evaluated at the national level four times, involving different methodological approaches. The latest research was implemented in 2015 with the use of remote sensing and significant statistical data. Researchers defined the trend and changes as major indicators of the selected environmental and socio-economic datasets (N. Mandakh, 2017). The numeric thresholds considered for each indicator is shown in Table 2.

**Table 2: Indicator system and thresholds to assess land degradation and desertification**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Level of land degradation and desertification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-Not degraded</td>
</tr>
<tr>
<td>Trend in aridity, $Z_{mk}$</td>
<td>$&lt;0$</td>
</tr>
<tr>
<td>Change in aridity, %</td>
<td>$&lt;10$</td>
</tr>
<tr>
<td>Trend in water erosion, $Z_{mk}$</td>
<td>$&lt;0$</td>
</tr>
<tr>
<td>Change in water erosion, %</td>
<td>$&lt;10$</td>
</tr>
<tr>
<td>Trend in wind erosion, $Z_{mk}$</td>
<td>$&lt;0$</td>
</tr>
<tr>
<td>Change in wind erosion, %</td>
<td>$&lt;10$</td>
</tr>
<tr>
<td>Trend in vegetation cover (NDVI), $Z_{mk}$</td>
<td>$&lt;0$</td>
</tr>
<tr>
<td>Change in vegetation cover (NDVI), %</td>
<td>$&lt;10$</td>
</tr>
<tr>
<td>Trend in livestock number, $Z_{mk}$</td>
<td>$&lt;0$</td>
</tr>
<tr>
<td>Change in livestock number, %</td>
<td>$&lt;10$</td>
</tr>
</tbody>
</table>

Applying the “One-out, All-out” rule in line with the Good Practice Guidance (GPG) for SDG indicator 15.3.1, for Mongolia the “proportion of land that is degraded over total land area” (i.e. SDG indicator 15.3.1) during the period 2005-2015 is equal to 13.29%.

This estimate differs from previous national estimates derived using the criteria of aridity, wind, water erosion and vegetation cover change where, 76.8% of the total territory is degraded, of which severely degraded lands occupy 22.9%. Assuming that desertification is land degradation in arid, semi-arid, dry and sub-humid areas, the total desert areas account for 64.7% (Figure 2). The discrepancy between the assessments of land degradation is due to the use of different timeframes and methodological approaches which are not comparable.
Notably, the results of the land degradation and desertification assessment of 2015 was validated with pasture monitoring data obtained from field studies by the National Agency for Meteorology and Environmental Monitoring, which showed that 63.4% of the research’s results coincided with their monitoring assessments.

Keeping in mind decision 22/COP.11 which encourages countries to identify complementary indicators that address their national and sub-national specificities and to strengthen the interpretation of the three bio-physical indicators and the assessment of degraded land, the LDN working group in Mongolia has decided to use the land degradation assessment figure of 13.29% of the total territory is degraded land for setting the LDN baseline and formulating voluntary LDN targets (See section 2.2.). The working group, however, agreed to consider revising its estimates of the proportion of degraded land based on the LDN method and using national data on Land Productivity Dynamics and Soil Organic Carbon, which are currently under progress.

### 2.2. Status of sub-indicators in Mongolia

#### Status of sub-indicator land cover and land cover change in Mongolia

Land cover is a fundamental land surface parameter that assists with the interpretation and stratification of the other two indicators (LDN TS Technical guide, 2016). Changes in land cover are also important indicators in their own right as they provide the first indication of a reduction or increase in vegetation, habitat fragmentation, and land conversion.

Most often derived from Earth observation, the indicator requires geospatial mapping of land cover classes using comparable methodologies at regular time intervals. A common ontology (i.e., the formal naming and definition of the types, properties, and interrelationships) should be used to enable global
comparisons. The use of the Food and Agriculture Organization’s (FAO) Land Cover Meta Language (LCML) is recommended (FAO, 2016).

Default tier 1 data source is provided by the European Space Agency’s Climate Change Initiative Land Cover dataset (CCI-LC)\(^4\). The dataset has global coverage and a spatial resolution of 300m. Four epochs are available, centered around 2000, 2005, 2010, and 2015. The dataset uses a hierarchical classification system based on the FAO LCML: the 37 CCI-LC classes aggregated into the level 2 classes.

As a reference, the Level 1 classes are based on IPCC land categories (IPCC, 2006). Level 2 data are based on land cover classes provisionally used by the System of Environmental-Economic Accounting (SEEA), which uses the FAO LCML (United Nations, 2014). Countries should use this hierarchical classification as a reference and at the level consistent with the amount of information available to describe each land cover class.

Table 3: Land cover/land-use classification system

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>National LC/LU classes(^5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree-covered area</td>
<td>Forest tree cover</td>
<td>Evergreen forest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mixed forest</td>
</tr>
<tr>
<td>Grassland</td>
<td>Pasture and natural grassland</td>
<td>High mountain steppe</td>
</tr>
<tr>
<td></td>
<td>Shrub land, bushland, heathland</td>
<td>Steppe</td>
</tr>
<tr>
<td></td>
<td>Sparseley vegetated areas</td>
<td>Shrub land</td>
</tr>
<tr>
<td></td>
<td>Natural vegetation associations and mosaics</td>
<td>Dry steppe</td>
</tr>
<tr>
<td>Cropland</td>
<td>Medium to large fields of rain-fed herbaceous cropland</td>
<td>Cropland fallow</td>
</tr>
<tr>
<td></td>
<td>Medium to large fields of irrigated herbaceous cropland</td>
<td>Permanent croplands</td>
</tr>
<tr>
<td></td>
<td>Permanent crops, agricultural plantations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural associations and mosaics</td>
<td></td>
</tr>
<tr>
<td>Wetlands</td>
<td>Open wetlands</td>
<td>Riparian meadow</td>
</tr>
<tr>
<td>Settlements</td>
<td>Urban and associated developed areas</td>
<td>Urban</td>
</tr>
<tr>
<td>Other land</td>
<td>Barren land</td>
<td>Glacier</td>
</tr>
<tr>
<td></td>
<td>Permanent snow and glaciers</td>
<td>High mountain taiga</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Desert Steppe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barren land</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Semi-desert</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Desert</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Abandoned cropland</td>
</tr>
<tr>
<td>Water bodies (inland water bodies, coastal water bodies, sea)</td>
<td></td>
<td>Lakes and Rivers</td>
</tr>
</tbody>
</table>

\(^4\) http://www.esa-landcover-cci.org/

\(^5\) http://eic.mn/DLDbase/dld_gis.php
According to the technical guidelines, if a country's national land-use classification system does not match classes in level 1 or 2, the land-use classifications should be combined or disaggregated to represent the classes presented level 1 classes in Table 3.

As Mongolia has its own system of land cover classification, this assessment relied on national land cover/land use data from the Environmental Information Center. The nationally available land cover/land use data has been developed for each five year period since 2000 and has 19 LU/LC classes (see table 3). The national land cover/land use map is validated in the field, thus it is more reliable to determine the land degradation neutrality baseline. The original land cover and land use map using 19 classes and combined with 7 classes is presented in Figure 4, and the difference between Tier 1 data is explained in Table 4.
Figure 4: Land cover/land use map of Mongolia using a national classification system and combined with a 7-class system

Table 4: Land cover/land use status by different classification for 2000

<table>
<thead>
<tr>
<th>LCLUClass</th>
<th>CCI-LC, km²</th>
<th>National classification, km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree-covered area</td>
<td>405351</td>
<td>191716</td>
</tr>
<tr>
<td>Grassland</td>
<td>305108</td>
<td>928338</td>
</tr>
<tr>
<td>Cropland</td>
<td>463250</td>
<td>14704.3</td>
</tr>
<tr>
<td>Wetlands</td>
<td>17192.6</td>
<td>19201.3</td>
</tr>
</tbody>
</table>
A change in land cover is one of the indicators used to track potential land degradation, which needs to be reported to the UNCCD and to track progress towards SDG 15.3.1. While some land cover transitions indicate, in most cases, processes of land degradation, the interpretation of those transitions is for the most part context-specific. For that reason, this indicator requires the input of the user to identify which changes in land cover are considered as degradation, improvement or no change regarding degradation.

According to the land cover change by classes, 764.28 sq. km of forest, 650.58 sq. km of croplands and 97,153.78 sq. km of other lands have changed between 2000 and 2015 (Table 5).

**Table 5:** Land cover change by classes according to the National data produced by Environmental Information Center

<table>
<thead>
<tr>
<th>Class</th>
<th>Baseline area in 2000 (sq. km)</th>
<th>Target area in 2015 (sq. km)</th>
<th>Change in the area between 2000-2015 (sq. km)</th>
<th>Change in the area between 2000-2015 (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree-covered areas</td>
<td>133,774.47</td>
<td>133,010.19</td>
<td>-764.28</td>
<td>-0.57%</td>
</tr>
<tr>
<td>Grasslands</td>
<td>733,178.05</td>
<td>818,848.48</td>
<td>85,670.42</td>
<td>11.68%</td>
</tr>
<tr>
<td>Croplands</td>
<td>10,506.04</td>
<td>9,855.46</td>
<td>-650.58</td>
<td>-6.19%</td>
</tr>
<tr>
<td>Wetlands</td>
<td>13,324.05</td>
<td>24,176.70</td>
<td>10,852.64</td>
<td>81.45%</td>
</tr>
<tr>
<td>Artificial areas</td>
<td>162.23</td>
<td>471.54</td>
<td>309.32</td>
<td>190.67%</td>
</tr>
<tr>
<td>Other lands</td>
<td>660,812.54</td>
<td>563,658.77</td>
<td>-97,153.78</td>
<td>-14.70%</td>
</tr>
<tr>
<td>Water bodies</td>
<td>12,903.25</td>
<td>14,639.50</td>
<td>1,736.26</td>
<td>13.46%</td>
</tr>
</tbody>
</table>

By default, and following the CSIRO best practices guidance document (CSIRO, 2017), the dominant land cover change processes classified as degradation are:

1) Deforestation (forest to cropland or settlements);
2) Urban expansion (grassland, cropland wetlands or other land to settlements);
3) Vegetation loss (forest to grassland, other land or grassland, cropland to other land);
4) Inundation (forest, grassland, cropland to wetlands);
5) Wetland drainage (wetlands to cropland or grassland);
6) Withdrawal of agriculture (croplands to grassland);

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6 http://eic.mn/DLDbase/dld_gis.php
7) Woody encroachment (wetlands to forest).

The major land cover change processes that are not considered degradation are:

1) Stable (land cover class remains the same over a time period);
2) Afforestation (grassland, cropland to forest; settlements to forest);
3) Agricultural expansion (grassland to cropland; settlements or other land to cropland);
4) Vegetation establishment (settlements or other land to settlements);
5) Wetland establishment (settlements or other land to wetlands);
6) Withdrawal of settlements (settlements to other land),

According to the land use change matrix, 27,758.97 sq. km of tree-covered area, 33,651.83 sq. km of grassland, 3,163.84 sq. km of croplands, 4,183.64 sq. km of wetlands and 40.63 sq. km of other land are degraded. The majority of degradation is associated with deforestation and vegetation loss, and a relatively high degradation rate is found in wetlands. Urbanization caused degradation in 330.24 sq. km.

A map of land cover degradation using the Trend Earth toolbox is shown in Figure 5 and a detailed transition matrix is shown in Table 6.

![Land cover degradation](image)

**Figure 5:** Land cover degradation for the period 2000-2015 using the Trends Earth toolbox
Table 6: Land area by type of land cover change (sq. km) estimated using national land cover dataset

<table>
<thead>
<tr>
<th>Land cover type in the target year of 2015</th>
<th>Tree-covered areas</th>
<th>Grasslands</th>
<th>Croplands</th>
<th>Wetlands</th>
<th>Artificial areas</th>
<th>Other lands</th>
<th>Water bodies</th>
<th>Total:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree-covered areas</td>
<td>105,989.44</td>
<td>24,796.86</td>
<td>389.18</td>
<td>2,542.91</td>
<td>1.80</td>
<td>28.22</td>
<td>26.06</td>
<td>133,774.47</td>
</tr>
<tr>
<td>Grasslands</td>
<td>26,759.27</td>
<td>670,583.33</td>
<td>1,260.51</td>
<td>12,086.64</td>
<td>287.31</td>
<td>21,277.88</td>
<td>923.11</td>
<td>733,178.05</td>
</tr>
<tr>
<td>Croplands</td>
<td>35.07</td>
<td>1,340.00</td>
<td>7,304.09</td>
<td>30.57</td>
<td>0.13</td>
<td>1,793.15</td>
<td>3.04</td>
<td>10,506.04</td>
</tr>
<tr>
<td>Wetlands</td>
<td>219.89</td>
<td>3,835.71</td>
<td>102.35</td>
<td>9,059.42</td>
<td>0.37</td>
<td>25.32</td>
<td>80.99</td>
<td>13,324.05</td>
</tr>
<tr>
<td>Artificial areas</td>
<td>0.00</td>
<td>9.26</td>
<td>0.00</td>
<td>1.71</td>
<td>141.30</td>
<td>9.95</td>
<td>0.00</td>
<td>162.23</td>
</tr>
<tr>
<td>Other lands</td>
<td>4.19</td>
<td>118,087.10</td>
<td>799.32</td>
<td>425.23</td>
<td>40.63</td>
<td>540,374.16</td>
<td>1,081.91</td>
<td>660,812.54</td>
</tr>
<tr>
<td>Water bodies</td>
<td>2.33</td>
<td>196.23</td>
<td>0.00</td>
<td>30.21</td>
<td>0.00</td>
<td>150.08</td>
<td>12,524.40</td>
<td>12,903.25</td>
</tr>
<tr>
<td>Total:</td>
<td>133,010.19</td>
<td>818,848.48</td>
<td>9,855.46</td>
<td>24,176.70</td>
<td>471.54</td>
<td>563,658.77</td>
<td>14,639.50</td>
<td>1,564,660.64</td>
</tr>
</tbody>
</table>

The degraded areas by land cover change accounts for 4.31% of the total territory, or 66,781.8 sq. km. The majority of degradation occurred in grasslands and forest areas.

**Status of sub-indicator land productivity and its change in Mongolia**

Land productivity refers to the productive biological capacity of the land, the source of all the food, fiber, and fuel that sustains humans (i.e., provisioning ecosystem services). Maintaining and enhancing the productivity of agro-ecosystems in a sustainable manner reduces the pressure for expansion and thus minimizes the loss and degradation of natural ecosystems. It is similar to the total above-ground net primary productivity (NPP) defined as the energy fixed by plants minus their respiration (Millennium Ecosystem Assessment, 2005).

The default Tier 1 dataset is provided by the JRC. The JRC’s Land Productivity Dynamics (LPD) was derived from a 15-year time series (1999-2013) of global NDVI observations composited in 10-day intervals at a spatial resolution of 1km. This dataset provides five qualitative classes of land productivity trends over the time period mentioned above. The five classes are rather a qualitative combined measure of the intensity and persistence of negative or positive trends and changes of the photo-synthetically active vegetation cover over the observed period.
According to the JRC LPD dataset, 4.7% of the total land the productivity is declining, for 7.3% the early signs of decline have been observed and 22% of land under stress. The increase of productivity during 1999-2015 was observed on 21.9% of the total territory, and 44.1% is considered stable.

Following the CSIRO approach, Mongolia defined its own degradation threshold (CSIRO, 2017). The initial trend was indicated by the slope of a linear regression fitted across annual NDVI over the 2000-2015 period as assessed using the Mann-Kendall Z score where degradation occurs when $z \leq -0.1$ (Mandakh, 2017).
According to the nationally-developed land productivity dynamics, 25.1%, or a total land area of 393,181.0 sq. km are considered degraded, of which 22.7% of land experienced continuous degradation during the period 2000-2015.

From the national stakeholder's workshop, it was recommended to use the Trends Earth approach to assess land productivity. The Trends Earth tool analyzes productivity using measures as the trajectory, performance, and state of primary productivity using either 8km GIMMS3g.v1 AVHRR or 250m MODIS data sets. The specifics of these measures are as follows:

- *The trajectory* is related to the rate of change in productivity over time. The initial trend indicated by the slope of a linear regression fitted across annual productivity measurements over the entire period as assessed using the Mann-Kendall Z score where degradation occurs when $z \leq -1.96$ (CSIRO, 2017). Degradation in each reporting period should be assessed by appending the recent annual NPP values (measured in the toolbox as the annual integral of NDVI) to the baseline data and calculating the trend and significance over the entire data series and the most recent eight years of data (CSIRO, 2017).

- *Performance* is a comparison of how productivity in an area compares to productivity in similar areas at the same point in time. The initial productivity performance assessed about the 90th percentile of annual productivity values calculated over the baseline period amongst pixels in the same land unit. The toolbox defines land units as regions with the same combination of Global Agroecological Zones and land cover (300m from ESA CCI). Pixels with an NPP performance in the lowest 50% of the distribution for that particular unit may indicate degradation in this metric (CSIRO, 2017).

- *The state* is a comparison of how current productivity in an area compares to past productivity in that area. The baseline period classifies annual productivity measurements to determine initial degradation. Pixels in the lowest 50% of classes may indicate degradation (CSIRO, 2017). Productivity State assessments for each reporting period should compare the average of the annual productivity measurements over the reporting period (up to 4 years of new data) to the productivity classes calculated from the baseline period. NPP State classifications that have changed by two or more classes between the baseline and reporting period indicate significant productivity State change (CSIRO, 2017).

The Trends Earth land productivity result is summarized in Table 7, and its spatial distribution shown in Figure 8.
**Figure 8:** Land productivity degradation using the Trends Earth tool

**Table 7:** Trends for land productivity as defined by Trends Earth tool

<table>
<thead>
<tr>
<th>Land cover type</th>
<th>Declining</th>
<th>Moderate decline</th>
<th>Stressed</th>
<th>Stable</th>
<th>Increasing</th>
<th>No data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree-covered areas</td>
<td>4,169.37</td>
<td>78.87</td>
<td>3.99</td>
<td>69,757.79</td>
<td>31,950.99</td>
<td>28.42</td>
</tr>
<tr>
<td>Grasslands</td>
<td>7,624.66</td>
<td>65.33</td>
<td>13,410.12</td>
<td>461,608.02</td>
<td>186,412.54</td>
<td>1,462.67</td>
</tr>
<tr>
<td>Croplands</td>
<td>336.49</td>
<td>7.88</td>
<td>0.34</td>
<td>5,773.51</td>
<td>1,185.46</td>
<td>0.41</td>
</tr>
<tr>
<td>Wetlands</td>
<td>419.51</td>
<td>3.18</td>
<td>16.92</td>
<td>5,969.64</td>
<td>2,604.87</td>
<td>45.29</td>
</tr>
<tr>
<td>Artificial areas</td>
<td>19.74</td>
<td>0.04</td>
<td>18.68</td>
<td>68.93</td>
<td>33.83</td>
<td>0.08</td>
</tr>
<tr>
<td>Other land</td>
<td>3,207.60</td>
<td>42.85</td>
<td>103,996.49</td>
<td>364,459.54</td>
<td>68,379.39</td>
<td>288.29</td>
</tr>
</tbody>
</table>
Productivity decline occurred on 9.42 %, or 146,059.9 sq. km of land. The decline of LPD in grasslands is relatively high compared to other classes.

**Above- and below-ground Carbon stock**

Carbon stock is the quantity of carbon in a pool (i.e., a system which can accumulate or release carbon). Terrestrial carbon pools are biomass (above-ground biomass and below-ground biomass); dead organic matter (dead wood and litter); and soil (soil organic matter) (IPCC, 2003). SOC should be used as metrics to assess Carbon stocks, to be replaced by the total terrestrial system Carbon stock (above- and below-ground Carbon) once operational. SOC is an indicator of overall soil quality associated with nutrient cycling, water holding, and its aggregate stability and structure. SOC stocks are therefore of local importance, but also of global importance because of their role in the global Carbon cycle: the SOC pool can be both a source and sink of Carbon and is thus fundamental to the estimation of Carbon fluxes. SOC stocks are primarily influenced by anthropogenic activities such as land use change and management practices, which affect the productive potential of the soil.

Default tier 1 data source is the International Soil Reference and Information Centre’s SoilGrids with a spatial resolution of 250m (http://www.isric.org/explore/soilgrids). SOC stocks computed from SOC content, gravel content, soil depth, and bulk density data estimated for each depth layer and aggregated to SOC content for topsoil (0-30 cm depth) and subsoil (below 30 cm).

![Map of organic carbon stock for 2000 by Tier 1 default data](image)

**Figure 9:** Map of organic carbon stock for 2000 by Tier 1 default data

The soil organic Carbon degradation was estimated using change factor land use scenarios provided in the Guidance document for the 2018 UNCCD reporting.
The land area with degraded soil organic Carbon is 1.56% or 24,164.8 sq. km. Most of the decline in soil organic Carbon is due to grassland degradation and is about 33.5% on average compared with the baseline. Around 31.2% of Carbon declined as a result of urbanization and deforestation.

To date, Mongolia has been developing its soil organic Carbon map and particular database. An update on the national Carbon map and the development of its own factor land use scenarios is being considered for future reporting rounds.

### 2.3. Land degradation neutrality baseline assessment

The baseline is the initial numerical value of the three indicators used as proxies to reflect the land-based natural capital. Since the aim is to achieve LDN with no net loss, the minimum level of ambition of an LDN target should equal the baseline for a given year. The baseline expressed as the initial (t0) estimated value of each of the indicators used as proxies of land-based natural capital and the ecosystem services that flow from that land base.

The condition of the land is highly variable both spatially and temporally, due to climate variability and the variety of human activities on the land. The baseline, therefore, should be calculated for each selected indicator as an average of 10-15 years. For Mongolia, the fifteen years starting from 2000 to 2015 were selected to calculate the baseline. Furthermore, the baseline was quantified by averaging the indicator values from 2000 to 2015 before t0, rather than using the values of a single year as recommended by the UNCCD SPI (Orr, Cowie, et al., 2017).

As Mongolia has its own system of land cover classification, this assessment relied on national land cover/land use data from the Environmental Information Center; for the two indicators i.e. Land

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**Table 8. Soil organic Carbon change from 2000 to 2015 using default data**

<table>
<thead>
<tr>
<th></th>
<th>Baseline soil organic carbon (tonnes/ha)</th>
<th>Target soil organic carbon (tonnes/ha)</th>
<th>Baseline soil organic carbon (10^6 tonnes)</th>
<th>Target soil organic carbon (10^6 tonnes)</th>
<th>Change in soil organic carbon (10^6 tonnes)</th>
<th>Change in soil organic carbon (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree-covered areas</td>
<td>153.64</td>
<td>153.61</td>
<td>2,054.87</td>
<td>2,043.18</td>
<td>-11.68</td>
<td>-0.57%</td>
</tr>
<tr>
<td>Grasslands</td>
<td>114.68</td>
<td>113.89</td>
<td>8,397.1</td>
<td>9,323.78</td>
<td>926.26</td>
<td>11.03%</td>
</tr>
<tr>
<td>Croplands</td>
<td>99.69</td>
<td>94.33</td>
<td>104.7</td>
<td>92.96</td>
<td>-11.73</td>
<td>-11.21%</td>
</tr>
<tr>
<td>Wetlands</td>
<td>112.18</td>
<td>112.04</td>
<td>148.5</td>
<td>270.54</td>
<td>121.98</td>
<td>82.12%</td>
</tr>
<tr>
<td>Artificial areas</td>
<td>92.87</td>
<td>93.80</td>
<td>1.0</td>
<td>4.42</td>
<td>2.91</td>
<td>193.58%</td>
</tr>
<tr>
<td>Other lands</td>
<td>86.71</td>
<td>93.60</td>
<td>5,720.7</td>
<td>5,274.68</td>
<td>-446.04</td>
<td>-7.80%</td>
</tr>
</tbody>
</table>
Productivity Dynamics and Soil Organic Carbon, the default data as provided by UNCCD through the LDN TSP were used.

Considering the “one out all out” approach defined by the UNCCD SPI, all degradation maps estimated for the three indicators were overlaid to determine the land degradation neutrality baseline for Mongolia. According to the result, a total of 13.29%, or 205,973.4 sq. km of land is considered degraded.

The land degradation situation in Mongolia can be summarized as follows, based on the assessment using the three indicators:

- From 2000 to 2015, 27.7 thousand km² of forest area was converted to grassland, shrubs, sparsely grown vegetation and croplands.
- From the trend analysis over the annual NDVI from 2001 to 2015, land productivity showed a declining trend in 4.0% of forest, 4.7% of cropland, and 1.2% of grassland, and about 20% of shrub lands and other lands showed early signs of decline.
- By 2015, 24 thousand km² was deforested with a productivity decline of 6.4% since 2000.
- The productivity in 8.1% of total land is under stress.
- The amount of cropland with declining and stressed productivity is 344.71 km².
- The largest amount of SOC loss was due to the transfer of grassland to other land classes and accounted for 827.4 thousand tons from 2000 to 2015.
• By 2015, total SOC loss due to deforestation and forest degradation was 4413.89 t or 125.4 t/ha.
• About 34.72 t/ha SOC was lost due to wetland degradation since 2000.

The results of the assessment were introduced, discussed and finalized among all relevant stakeholders during a series of workshops and consultative meetings implemented as part of the LDN TSP framework in Mongolia. The LDN targets are defined based on the figure of 13.29% of total land is degraded.

2.4. Land degradation hotspots

The land degradation hotspots are delineated using the overlap function and classified into three categories as high priority areas; priority areas and areas needing long-term action. The high priority hotspots are those where all three indicators provide declining tendency, where detailed planning, implementation, and monitoring of the actions and measures to combat desertification and reduce land degradation are needed. The priority hotspot areas are those where two out of three indicators overlap. The areas where the long-term action needed or the least priority areas include those where only one indicator shows a declining trend.

High priority hotspot areas are as follows:

1. Eastern Gobi and a Central Mongolian plateau region. The total hotspot coverage is 25600 sq. km. Eastern Gobi is the main route between Mongolia and China, thus considered one of the major economic regions. Degradation here is mainly linked to overgrazing, unplanned mining, and road and transportation use. The unsustainable use of groundwater may be considered an indirect factor of current land degradation in the region.

2. Wetlands along the major river basins. The total hotspot coverage is 12950 sq. km. Orkhon, Selenge, Tuul river basins are experiencing great pressure due to urbanization, migration of livestock from other drought-prone regions. The causes of degradation in the aforementioned river basins are small-scale gold mining in headwater regions, overgrazing, expansion of fallows and rain-fed croplands, and rapid urbanization. Indirect causes of the current degradation are deforestation and forest degradation in the headwaters of rivers, lack of governance, and mismanagement of river basins.

3. Western Mongolia and the Great Lakes depression specifically. The total coverage of the hotspot is estimated at 9790 sq. km. Great Lakes depression is one of the sand source regions. Approximately 12,000 sq. km of land is natural sand. The current trends of climate change and overgrazing are considered the main driving forces of land degradation in the region. The region has a minor level of mining development; however, the impact of mining is considered to be higher in the future.

Priority hotspot areas are as follows:
1. Darhad depression. The total coverage of the hotspot is estimated at 4,011 sq. km. The region is one of the largest closed depressions where degradation is highly linked to soil erosion, drying of surface water bodies and significant increase of aridity in light of the current climate change. Direct factors of the current land degradation are linked to overgrazing and deforestation/forest degradation in the surrounding mountain ranges.

2. Galbiin Gobi. The total coverage of the area is 2,020 sq. km. The region belongs to the Eastern Gobi sector of the Gobi desert and semi-desert zone of the country. The region is currently one of the major areas of strategic mining industry development. According to the latest monitoring and indicator analysis, the region is experiencing a steady decline in land productivity. A direct factor of this decline may be linked to current mining activities, especially with the use and management of underground water aquifers.

3. Central and Southern Hangai Mountains. The total coverage of the hotspot is 1,050 sq. km. The region is a core region for livestock breeding. The major negative impacts are linked to the gradual increase in seasonal temperatures, increased aridity, and deforestation/forest degradation. The direct drivers of land degradation are forest harvesting, overgrazing, and mismanagement of water use and water diversion.

Areas needing long-term action to avoid the risk of land degradation:

1. Eastern Mongolian plain.
2. Trans Altai Gobi region.
3. Onon river basin.

2.5. Drivers of land degradation
Almost 90 percent of the total territory of Mongolia is located in arid, semi-arid, dry and sub-humid climatic regions, which are areas prone to desertification. Geographically the country is located in the transition between the Siberian taiga forests and Central Asian deserts, which explains the sensitivity of the country to both climate change and changes related to social development, land, and natural resources use. The warming process occurring in Mongolia, the drastic increase in livestock, unsustainable development of the mining industry and other direct and indirect impacts are the key factors driving desertification and exacerbating land degradation.

The following types of degradation dominate the country:

- Vegetation loss;
- Deforestation;
- Withdrawal of agriculture;
- Woody encroachment.

The direct drivers of land degradation are linked mainly to the biophysical processes, such as drought, soil erosion, and human-driven degradation caused by the unsustainable development of extractive industries, and overgrazing.
Drought and zud

Drought and zud are disasters that bring out the greatest losses to Mongolian society and economy. It is not easy to estimate the damage caused by drought and zud. Notably, damages from drought remain unknown. According to the study by Natsagdorj L., drought occurs 1-2 times per 10 years in most areas of the high mountain, forest-steppe and steppe regions, once per 2 years in the Gobi desert area and once per 3 years in areas between the desert and steppe areas (Natsagdorj L., Dulamsuren J., 2001). The long-term trend of a nationwide averaged index of the drought-summer condition is shown in Figure 11.

Since 1940, drought conditions have increased; consecutive drought years in particular have continued to increase since 2000. Among them, 2000, 2002 and 2015 had the greatest effects on Mongolian society and economy (Figure 1).

White zud (heavy snow and large coverage) occurs every two years in the Tes river basin, every three years in Khangai, Khentei, Khankhohii, Khahiraa and Turgen mountain region, and frequently in the northern part of Dundgobi aimag compared to the surrounding area. There is good agreement between livestock loss and the winter index, which is expressed by a combination of air temperature (cold) and precipitation (snowy) anomalies from November to February.

In Mongolia, winter snow is increasing; however, winter harsh conditions are weakening due to increasing winter temperatures since 1940. Figure 12 shows that interannual change of winter index and frequency of winter with harshness and zud conditions have been increasing since the 1990s.
Figure 12: Inter-annual change of winter index (averaged by Nov-Feb) over Mongolia (positive refers to mild winter condition, while negative refers to harsh condition). Note: horizontal axis takes values from 1941 to 2016 winters.

If there is a severe drought in the summer and harsh conditions next winter, the mass number of livestock loss occurs as usual. Therefore, zud is evaluated by a combination of summer and winter conditions (Natsagdorj, Dulamsuren, 2001).

Figure 13: Inter-annual change of zud index over Mongolia (positive refers to zud condition, while negative refers to mild winter). Note: horizontal axis takes value from 1941 to 2016 winters.

Figure 13 shows increasing zud intensity in Mongolia since the 1990s. Among them, zud in 1999-2000, 2001-2002 and 2009-2010 were the most severe, and consequently, damages and loss were relatively higher compared with other years.
Erosion

One of the main drivers of land degradation and desertification is water erosion. There is not much research conducted in Mongolia to assess the influence of water erosion and its rate. A limited number of surveys was done to evaluate this process at the regional level during the 1980s (Sanjmyatav, 1993; Sugar, Sanjmyatav, 1987). Due to the incapability of the current environmental data to show the state of water erosion and its change over time, an attempt to use the widely-recognized physical model in order to evaluate erosion process has been implemented.

Using a physical model called Revised Universal Soil Loss Equation (RUSLE), annual soil loss from the unit of land has been calculated in relation to climatic and land cover conditions for 2000 and 2010. The results indicated that approximately 300-400 tons of soil is lost per annum due to the active influence of flowing water. The comparison of results for the two selected years revealed that water erosion has on average increased and about 500-600 tons of soil has been lost. This information can lead to concluding that water erosion might influence land degradation and desertification.

In the spatial distribution of water erosion, its area and intensity are high in mountainous regions and along piedmonts. In Mongol Altai, Gobi Altai, Gobi type piedmonts and southern parts of Khangai and Khan Khukhii mountains in particular, the intensity of erosion is very high. The main causes of intensive water erosion in the regions mentioned above related to vegetation cover, surface slope, soil development, and rainfall erosivity, which may act independently or in combination. Moderate erosion was observed in the middle parts of the country occupying a vast area of grassland and major river basins, while slight erosion marks can be identified in the Great Lakes depression, Lake Valley and eastern parts of Gobi, mainly represented by low-lying mountains and depressions.

Over the last ten years, soil erosion due to water has increased in the northern parts of the country, which is probably due to intensive rainfall and decreased vegetation cover. The change analysis of land
affected by water erosion states that about 3 percent of total land affected by water erosion could be classified as extremely eroded. Overall, water erosion has not significantly changed during the past decade, and it can be concluded that for most of the territory water erosion has a slight impact.

**Wind erosion and change.** One of the signs that land has degraded is the occurrence of dust storms, which for many reasons is explained as a driver of degradation and desertification. The impact of wind on soil surface has various forms, but dust storms should be understood as the most severe form of erosion. Although the impact of wind on soil and vegetation cover is an integral part of desertification, research such as surveys has been abandoned in Mongolia. The only research that could be used is by L. Natsagdorj, who researched the erosive impact of wind and wind velocity and attempted to explain it in relation to current climate conditions.

Wind erosion for the entire territory of Mongolia was assessed for the first time using the wind erosion equation (WEQ). Soil erosion maps for the years 2000 and 2010, calculated using these factors, demonstrate that there is a high degree of wind erosion along the desert zone, Great Lakes Depression, and the Lakes Valley. Soil around the Baruun Khuurain Khotgor, Southern Altai Govi, Ulaan Nuur Lake, Mandal-Ovoo territories has the highest degree of wind erosion. These areas have limited vegetative cover and surface sloping, limited barriers, etc., played a role in the wind erosion process. Otherwise, all the indexes calculated for these areas have high values.

Mongolia’s steppe, desert steppe zones, especially steppes of Dornod and areas of Zamyn Uud and Sainshand belong to lands with a moderate degree of soil erodibility. Mountain regions fall under areas whose soils are not affected by wind erosion, or these factors have improved compared to previous years. Wind erosion changes can be observed in the southern part of Govi-Altai, Bayankhongor, Omnogovi Aimags, particularly, in the valleys and depressions of desert areas like Sharga, Nomin, Ingen hoovor, Galba and Borzon Deserts. When comparing the years 2000 and 2010, 165.7 in/ha soil was carried away in these areas. However, there is evidence of the wind erosion process decreasing on the west side of the Great Lakes Depression and the territory along the Khar Us Lake and the Buyant River basin. Soil loss in these areas for the given period shows a reduction.

![Figure 16: Wind velocity and its change (during 2000-2010)](image_url)
There is a general notion that wind erosion is mainly defined by wind velocity. Thus the dynamics of wind speed over the territory were analyzed. From the analysis it was concluded that wind velocity is gradually decreasing; however, the frequency of wind with speed above 5 m/s is slightly increasing. Besides, any erosion process is determined by land cover condition. According to Kurosaki and Shinoda (2011), the occurrence of spring dust storms depends on soil moisture content and vegetation conditions in the previous year. This may apply to those regions where wind erosion during the last decade has decreased.

Mining

Mining can also cause land degradation in general and deforestation specifically when mining companies remove the topsoil and open pits. Degradation due to extractive industry happens independently of the other drivers. To date, 3,580 mining licenses have been issued covering 13.9 million hectares of land, which is about 8.9% of the total territory. These include 0.9% of exploitation licenses and 8.0% of exploration licenses (www.mrpam.gov.mn). In 2016, in the forest provinces, the total area under exploration and mining licenses is estimated to be between 2-14% of forest area.

Mine site restoration is insufficient on much of the mining areas. By the end of 2013, 24,636 ha were disturbed for mining. On 41.65% and 27.5% of the areas, respectively, technical reclamation (which refers to closing the mining pit) and biological restoration (which refers to re-establishing vegetation cover) were carried out (MEGD, 2015). The absence of grown soil makes biological reclamation difficult and often establishment of vegetation cover is unsatisfactory.

Grazing

Mongolia has a long tradition of raising livestock. Pastoral nomadism is the prevailing form of land use. Currently around one-third of Mongolia’s population lives as nomads from livestock husbandry (Dagvadorj et al. 2009). Currently, there are about 52 million heads of livestock, with about 23.3 million sheep and 22.0 million goats in addition to several other kinds of livestock (NSO of Mongolia, 2015).

Total number of livestock in Mongolia is estimated on the basis of sheep forage units (NSO, 2013). Studies on changes in livestock number per unit grazing area show that the number of livestock per 100 ha of pasture was 40 sheep forage units in 1980-2000, then it increased up to 60-70 sheep forage units by 2000-2015 (Figure 17).

According to Tserendash (2006), the total carrying capacity of grassland pastures is 80-90 million sheep head unit or 50-60 sheep unit per unit ha of pasture. From 1980 to 1990, the number of livestock was consistent with the given capacity. However, livestock heads steadily exceeded pasture capacity, even after severe drought and zud conditions observed since 1991.
Regarding the spatial distribution of livestock, a sharp increase of livestock was observed in the Eastern and Central regions. The number of livestock per unit area of pasture increased by 50-70 sheep forage units per year in Darkhan, Orkhon, Tov, and Arkhangai provinces and around Ulaanbaatar city over the last 15 years. In other regions, such increase was also pronounced and is estimated at around 10-30 sheep forage units per year (Figure 18).

In spatial distribution, about 32 percent of total livestock of Mongolia graze in Khangai region, 29 percent in the western region, 15 percent grazed in the eastern region, 14 percent in Govi region and the 9 percent in the central part of Mongolia. Livestock density is quite sparse throughout the nation. High density places are Myangad, Dariv Soums of Khovd Aimag, Bayan-Uul, Jargalan and Delger Soums of Govi-Altai Aimag, Khureemaral, Buutsagaan Soums of Bayankhongor Aimag, Bogd, Bayangol Soums of Ovorkhangai Aimag, Erdenedalai soum of Dundgovi Aimag, Khatanbulag soum of Dornogovi Aimag.
Aimag, Bayandelger, Erdenetsagaan Soums of Sukhbaatar Aimag and Tsagaan-Ovoo soum of Dornod Aimag. The situation is a same in most of the regions in 2000. However, comparing the livestock number to the years 2000 and 2015, there is a change in the central and eastern parts of Mongolia. Growing livestock density, which can affect pastureland capacity and resources, remains in these places: Gurvanbulag, Rashaant Soums of Bulgan Aimag, Khatanbulag soum of Dornogovi Aimag, Bayandelger, Erdenetsagaan Soums of Sukhbaatar Aimag, Bayankhutag and Kherlen Soums of Khentii Aimag and Choibalsan Soum of Dornod Aimag.

**Indirect drivers**

Indirect drivers leading to land degradation are linked mainly to rural-urban migration; grazing land management and land tenure. Demographically, another factor influencing land degradation is population distribution. Urbanization is an inseparable part of the historical development of civilization. Mongolia started to talk about centralization of the population in the 1970s under the state policy targeted at developing industries rather than the development of cities. However, population centralization itself becomes the main cause of land deterioration as well as strengthening agricultural industries in those places, according to the laws of the market.

The settled population in Mongolia was 2,407.5 thousand in 2000, and increased to 2,780.8 thousand by the end of 2015, showing an increase of 373.3 thousand and a 13.4 percent growth. This is surely related to a growing birth rate; the number of births per 1000 people is 22.9, and increased by 2.5 percent compared to the 2000 estimate. Similar to this estimation, there are changes in population settlement and location. In the last two decades, due to the population movement from rural areas to cities, 41.4 per cent of the Mongolian population lives in Ulaanbaatar in 2015. Nationally, 63.3% of the total Mongolian population, 1,760.4 thousand people, is living in urban areas (NSO of Mongolia, 2000-2015). More than half of the population in Dornod, Dornogovi, Govisumber, Orkhon and Darkhan-Uul Aimags are living in urban or settled areas.

According to demographic changes, the population in urban areas, towns and Soum centers is growing and contributing to population centralization. This trend is clear to continue in the near future. These changes in population settlement may become the causes of land degradation and ecological changes in places near urban areas.

After the transition from a centrally-planned to a market economy in 1990, state collective livestock was privatized completely by 1993, but pasture land remained state-owned. Herders became entirely responsible for their own herd management decisions, as well as production, risks, and inputs (Fernandez-Gimenez, 2002). Thus the yield-focused production of the state collective system returned to family-based, subsistence-oriented herding with mixed types of animals (Mearns, 2004). The privatization of state collective livestock provided an incentive for many Mongolians to turn to herding, and the livestock sector experienced a sharp upturn. Many newcomers were workers of collectives in the Soum center, e.g., those who lost their jobs but were provided with some livestock as a share of the former collectives. In addition, many of those who became unemployed due to the closing of factories in
the city migrated to rural areas and became herders. As rural communities swelled in size, they also became more heterogeneous.

The gap between rich and poor herders started to increase in the years between 1993 and 1995, and since 1995 this gap has increased even more. One of the wealth indicators of herders is the number of livestock, which is related to their income. The statistical data from 2007 shows that the number of herder households owning only a few animals has increased; 46.7% of the herder households have less than 50 head of livestock and own only 11.5% of the total number of animals. A total of 35.1% of herders own more than 200 animals, or 71.6% of the total livestock in the country (World Bank, 2006). Weakened traditional regulatory institutions, the detrimental effects of newer herders who have less skill and knowledge about herding practices, coupled with free and uncontrolled access to resources due to weak and unclear formal regulations, have in practice given herders the freedom to move anywhere. This has increased “trespassing” and out of season grazing of reserved winter and spring pastures, has resulted in more competition and more frequent conflicts, and has converted the herding system from a controlled pasture system to an open access system leading to overgrazing, a classic example of the tragedy of the commons (Hardin, 1968). The open access system introduced with the adoption of a free-market economy combined with the increasing livestock numbers due to missing markets or marketing opportunities has resulted in significant deterioration of pasture land, and the system is no longer sustainable.

2.6. Institutional and legal environment

Mongolia became a party to the UN Convention to Combat Desertification on 26 December 1996 by signing the Convention in 1994 and ratifying it on 3 September 1996. The National Action Plan (NAP) is a key instrument to implement the Convention in a country, thus requiring the involvement of various stakeholders, including research and scientific institutions, non-governmental and civil society organizations, local communities besides the government organizations. In 1998, the Ministry of Nature and Environment (former name) appointed several institutions and leading scientists as a member of the National Committee to Combat Desertification (NCCD). The UNCCD Focal Point acts as chairperson of the NCCD and is responsible for the planning of actions, coordination of implementation and reporting to this group as well as to UNCCD secretariat.

Mongolia National Action Plan to Combat Desertification

Since becoming a party to the UNCCD, Mongolia developed, implemented and reported on three NAPs in 2000, 2003 and 2010. The 2010 NAP was developed under the requirement of the UNCCD to align national actions with UNCCD’s 10 year strategy.

The NAP was finalized in October 2009 and approved by the Government of Mongolia on 14 April 2010. The NAP has three strategic targets and five functional objectives. The Government decided to implement the NAP in two phases: 1) 2010-2015 and 2) 2015-2020. By this document the Government of Mongolia enabled regions to develop their own action plans or sub-regional policy documents.
Table 9: SWOT of the NAP to support LDN targets

<table>
<thead>
<tr>
<th>Strengths:</th>
<th>Weaknesses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Institutional and legal instruments on combating desertification &amp; land degradation established;</td>
<td>• The absence of country-wide dispersed units, strong institutional structure and worthy knowledge and experience of the Ministry of Nature, Environment and Tourism, the responsible institution for the NAP and further LDN implementation.</td>
</tr>
<tr>
<td>• The action plan largely oriented to achieving LDN target;</td>
<td>• Frequent changes in Government and institutional structures, and the lack of inheritance in policies;</td>
</tr>
<tr>
<td>• Current Action Plan highlighted the importance of SLM and called actors to support WOCAT initiatives with a compilation of technologies and approaches suitable for Mongolia;</td>
<td>• Dispersion of function and lack of transparency among different level of authority and institutions;</td>
</tr>
<tr>
<td>• Action Plan comprising communication/coordination mechanisms essential to implementing LDN targets effectively;</td>
<td>• Lack of sub-regional capacity to identify the problem, define actions and implement measures;</td>
</tr>
<tr>
<td>• The NAP highlighted actions towards overcoming recent shortcomings enabling the effective implementation of UNCCD and SDGs.</td>
<td>• Lack of necessary communication/coordination mechanisms among the institutions to effectively implement SDGs, Rio Conventions and to create synergies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities:</th>
<th>Threats:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increasing awareness and concern for ecosystem services and values of land-based resources, e.g., water, forest, soil, etc.</td>
<td>• Overuse of mineral resources, agricultural lands, forests, and pastures for mining activities and other purposes;</td>
</tr>
<tr>
<td>• NAP anticipates establishment of efficient cooperation on SLM approaches particularly with adjacent countries;</td>
<td>• Climate change, especially the increase in the negative impacts of drought;</td>
</tr>
<tr>
<td>• Strengthening non-governmental organizations and local communities;</td>
<td>• Increased conflicts of interest between Ministry and economic sectors.</td>
</tr>
<tr>
<td>• Harmonize actions under the One Road and One Belt initiative and other related international agreements and commitments;</td>
<td>• Risk of the inadequate formulation of investment programme within the scope of LDN implementation.</td>
</tr>
<tr>
<td>• Development of new techniques and tools to support policies and decision-making process.</td>
<td></td>
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</table>

The Legal Regulatory Framework

In May 2012, the Parliament of Mongolia ratified the Law on Soil Protection and Desertification Prevention to enforce the implementation of the NAP and improve degraded lands, especially pasturelands.

The Soil Protection and Desertification Prevention Law provides a good framework to apply the concept of LDN at the national level, becoming a legal framework to regulate soil protection; desertification prevention; data collection; identify causes, and identify sustainable use of soil and soil rehabilitation activities. The Law includes measures for desertification prevention from the intensification of agriculture, mining, road construction, urban land use, as well as climate change. The Law established
for the first time in the country accountability in the protection of soil and criteria and assessment methodologies. The only shortcoming could be the excessive focus on only one land use type, namely pastureland.

The Law is a relatively new legal instrument, and the effect of its enforcement has not yet been evaluated. The framework of this Law has to be complemented with adequate policy, strategic and operational systems. To overcome some identified contradictions the Government has to amend related laws as well as some paragraphs of the current Law.

**Table 10: SWOT of the Soil Protection and Desertification Prevention Law to support LDN targets**

<table>
<thead>
<tr>
<th>Strengths:</th>
<th>Weaknesses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Good cooperation among all the research organizations and unified methodology to monitor and assess land degradation and desertification;</td>
<td>• Inadequate level of staff and lack of support to provide on-the-job capacity building;</td>
</tr>
<tr>
<td>• Established data sharing and management platform.</td>
<td>• Lack of identifiable career structure, adequate working conditions, leadership, feedback and incentives for excellence.</td>
</tr>
<tr>
<td>• The community-based approach to nature and resource management.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Opportunities:</th>
<th>Threats:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Synergy among the economic sectors;</td>
<td>• Inadequate facility to train and keep good staff;</td>
</tr>
<tr>
<td>• Involvement in the international treaties and regional initiatives;</td>
<td>• Weak human capacity at all levels.</td>
</tr>
<tr>
<td>• Amendment of environmental legislations;</td>
<td></td>
</tr>
<tr>
<td>• Possibilities to access financial mechanisms.</td>
<td></td>
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</tbody>
</table>
3. National Land Degradation Neutrality Targets

3.1. Land degradation Neutrality targets
The national workshop on setting LDN targets was held on 25-26 May 2018 in Ulaanbaatar. The workshop invited participants from all Regional Environmental and Tourism Offices in 21 aimags, representatives from the Ministry of Environment and Tourism, Agency for Land Affairs, Geodesy and Cartography, and international agencies UNDP, FAO and ADB. The workshop presented the LDN concept, current status of the land degradation neutrality baseline and identified the national targets to achieve land degradation neutrality in Mongolia. The following are targets to achieve land degradation neutrality in Mongolia by 2030.

- Target 1: Reduce deforestation and forest degradation to maintain the forest area and reach 9% of the total area by 2030 compared to 7.85%\(^7\) in 2015.
- Target 2: Promote sustainable grassland management and stop further grassland degradation. Target 3: Increase agricultural yields by 2.5 t/ha per annum by 2030 compared to 1.6 t/ha per annum\(^8\) in 2015.
- Target 4: Ensure no net loss of wetlands by 2030 compared to 2015 (3963.3 sq. km)\(^9\).

3.2. Actions and measure to achieve Land Degradation Neutrality
The actions and measures to achieve LDN in Mongolia are divided into two parts. In Table 11 the technical measures and actions are provided and in Table 12 the policy actions to create an enabling environment for LDN are given.

### Table 11: Technical measures to support achieving LDN in Mongolia

<table>
<thead>
<tr>
<th>Target</th>
<th>Action</th>
<th>Negative trend that needs addressing</th>
<th>Target area, sq.km</th>
<th>Leading organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target 1: Reduce deforestation and forest degradation to maintain the forest area and reach 9% of the total area by 2030 compared to 7.85%(^{10}) in 2015.</td>
<td>- Reforestation of land affected by forest fire, pest insect and deforestation&lt;br&gt;- Conversion of forests into grassland&lt;br&gt;- Net area change from forest to cropland resulted in 2956.87 t of SOC loss</td>
<td>1200 sq.km per year</td>
<td>- Ministry of Environment and Tourism&lt;br&gt;- Forest research and development center&lt;br&gt;- Private sector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Forest fire monitoring and prevention system&lt;br&gt;- Declining forest productivity&lt;br&gt;- Net area change from forest to cropland resulted in 2956.87 t of SOC loss</td>
<td>Total forest area</td>
<td></td>
<td>- National Emergency Management Agency&lt;br&gt;- Ministry of Environment and Tourism&lt;br&gt;- Forest research and development center</td>
</tr>
</tbody>
</table>

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\(^7\) Sustainable Development Vision of Mongolia, Government of Mongolia, 2016
\(^8\) Green Development Concept, Government of Mongolia, 2014
\(^9\) Baseline assessment using LDN indicators
| Target 2: Promote sustainable grassland management and stop further grassland degradation. | Develop a system for silvo-pastoral animal husbandry in steppe and forest steppe regions | Declining productivity in cropland | Developing agroforestry including shelterbelt system development | Declining productivity in cropland | 5000 sq.km | Ministry of Food, Agriculture and Light Industry | Academia | Private sector |
| --- | --- | Declining productivity in grassland | Air seeding, sowing of perennial grasses in areas where gradual grassland decline | Declining productivity in grassland | 1500 sq.km per year | Ministry of Food, Agriculture and Light Industry | Academia | CSOs and NGOs |
| Forest cleaning and weeding | • Declining forest productivity | Total forested area | Promote urban greening | • Conversion of forests into artificial land | 1.8 sq.km | Ministry of Environment and Tourism | Forest research and development center | Academia | Private sector |
| • Declining forest productivity | • Net area change from forest to cropland resulted in 2956.87 t of SOC loss | • Declining productivity in cropland | • Declining productivity in grassland | • Net area change from grassland to other land resulted in 827444.49 t of SOC loss | Target 3: Increase agricultural yields by 2.5 t/ha per annum by 2030 | 1260.5 sq.km | Ministry of Food, Agriculture and Light Industry | Ministry of Environment and Tourism |

- **Forest cleaning and weeding**
  - Declining forest productivity
  - Total forested area

- **Promote urban greening**
  - Conversion of forests into artificial land
  - Net area change from forest to cropland resulted in 2956.87 t of SOC loss
  - 1.8 sq.km

- **Target 2: Promote sustainable grassland management and stop further grassland degradation.**
  - Recover the traditional seasonal rotational pasture system
  - Declining productivity in grassland
  - Net area change from grassland to other land resulted in 827444.49 t of SOC loss
  - 3000 sq.km per year

- **Air seeding, sowing of perennial grasses in areas where gradual grassland decline**
  - Declining productivity in grassland
  - Net area change from grassland to other land resulted in 827444.49 t of SOC loss
  - 1500 sq.km per year

- **Developing a system for silvo-pastoral animal husbandry in steppe and forest steppe regions**
  - Declining productivity in cropland
  - Declining productivity in grassland
  - Net area change from grassland to other land resulted in 827444.49 t of SOC loss
  - 5000 sq.km

- **Target 3: Increase agricultural yields by 2.5 t/ha per annum by 2030**
  - Developing agroforestry including shelterbelt system development
  - Declining productivity in cropland
  - Declining productivity in grassland
  - 1260.5 sq.km
compared to 1.6 t/ha per annum in 2015.

<table>
<thead>
<tr>
<th>Decrease in use of pesticides</th>
<th>Declining productivity in cropland</th>
<th>1260.5 sq.km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion prevention in agriculture</td>
<td>Declining productivity in cropland</td>
<td>250 sq.km per year</td>
</tr>
</tbody>
</table>

Target 4: Ensure no net loss of wetlands by 2030 compared to 2015 (3963.3 sq. km)\(^{12}\).

<table>
<thead>
<tr>
<th>Expanding the national network of special protected areas</th>
<th>Conversion of wetlands</th>
<th>2091.8 sq.km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote sustainable use of wetland ecosystems</td>
<td>All river basins, wetland systems, especially headwaters</td>
<td></td>
</tr>
<tr>
<td>Develop the suitable system on payment for ecosystem services in headwaters and wetlands</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 12: Policy actions to achieve LDN in Mongolia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target</strong></td>
</tr>
</tbody>
</table>
| Target 1: Reduce deforestation and forest degradation to maintain the forest area and | Amend, if necessary newly develop standards and norms for reforestation | Conversion of forests into grassland | Ministry of Environment and Tourism | Survival rate increases by 10% compared to current 75%.
| Establishing a gene bank for major wood species | Net area change from forest to cropland resulted in 2956.87 t of SOC loss | Forest research and development center | Improved quality of planting material |
| Amend current forest sector policy to oblige forest user | | | Decreased area affected by |

\(^{11}\) Green Development Concept, Government of Mongolia, 2014

\(^{12}\) Baseline assessment using LDN indicators
reach 9% of the total area by 2030 compared to 7.85% in 2015.

| Target 2: Promote sustainable grassland management and stop further grassland degradation. | Integrate greening programs into the urban development planning process | • Ministry of Environment and tourism  
• Ministry of Construction and urban development  
• Agency for Land affairs, Geodesy and Cartography | The area of public parks, road greening increases to 50% compared to current 30%. |
| --- | --- | --- | --- |
|  | Integrate grassland planning into the regional land use plans  
Develop legal instruments and/or establish mechanism for sustainable pastureland use. | • Declining productivity in grassland  
• Net area change from grassland to other land resulted in 827,444.49 t of SOC loss | Decentralized pastures used under the current livestock breeding system.  
The current overgrazing is reduced. |
|  | Support researches towards development of adaptive silvo-pastoral systems suitable for traditional ways of nomadic pasture use. | • Declining productivity of grassland  
• Net area change from grassland to other land resulted in 827,444.49 t of SOC loss | Best practices in silvo-pastoralism developed |
| Target 3: Increase agricultural yields by 2.5 t/ha per annum by 2030 compared to 1.6 t/ha per annum\(^{14}\) in 2015. | Amend soil protection and desertification prevention law to support the concept on erosion prevention in croplands. | • Ministry of Food, Agriculture and Light Industry  
• Ministry of Environment and Tourism | All kinds of erosion prevention activities are legally obliged. |
|  | Revise current norms and standards on use of pesticides in agricultural sector | • Declining productivity in cropland | Organic farming is developed |

\(^{13}\) Sustainable Development Vision of Mongolia, Government of Mongolia, 2016  
\(^{14}\) Green Development Concept, Government of Mongolia, 2014
| Target 4: Ensure no net loss of wetlands by 2030 compared to 2015 (3963.3 sq. km)\(^{15}\) | Research and development of PES | • Conversion of wetlands | • Ministry of Environment and Tourism  
• Protected area administrations  
• Academia | System of incentives for land owners and pastoralist established. |

\(^{15}\) Baseline assessment using LDN indicators
4. Achieving Land Degradation Neutrality in Mongolia

Leverage already achieved

Mongolia has ratified its Green Development Policy as the main policy document that complements the Sustainable Development Vision for 2030. This paper highlights items related to land degradation, especially with a general focus on the sustainable use of natural resources through increased production in the agricultural sector. Major practical targets and measures defined in the UNFCCC NDC, NBSAP, and UNCCD NAP are already integrated into the Sustainable Development Vision for 2030 of Mongolia and the Green Development policy of Mongolia. The major leverage in action is mainly linked to the agriculture and livestock breeding sectors. It is expected that LDN targets will act as the main leveraging mechanism for the on-the-ground implementation of the practical targets and measures.

The agricultural policy and its action plan highlighted urgency on changing the management of the current land use practice and thus agreeing to shift to green technologies. This position strengthened with NDC and its several assessments are related to technology needs assessments for adaptation and mitigation of climate change. The highest priority of the country is to decrease emissions from the agricultural and forestry sectors. This priority is directly linked to land degradation and desertification issues for which the technologies in and knowledge of SLM are readily available. Drought, land degradation, and desertification are impacting the livestock sector, which is the main land use type of the country, and are leading to poverty and unemployment in rural areas in Mongolia. These issues are reflected in several policies and programmes, including UNFCCC NDC, NBSAP and Sendai disaster prevention work plans for 2016-2030. The current LDN targets relate to leveraging all these national programmes, thus targeting the same issues through different actions. Such leverage will promote sustainable use of pastureland as a primary strategic objective for the next several years.

The major problem to achieving these commitments is proper planning of financial flows, which in turn needs an in-depth analysis of current availability of financial flows in the environmental and agricultural sectors to shift to green technology; accessible technologies and their means; and availability of human resources able to transfer technologies.

Under the Sendai framework, the National Emergency Management Agency has developed a medium-term action plan. Under this action plan, the Agency is going to develop a drought and climate-induced disaster preparedness action plan and build capacity for drought disaster prevention by 2025. To date, several early warning systems are operating in different agencies, e.g. the Meteorological agency, NEMA and at the Ministry of Agriculture. Urgent action will be the detailed analysis of their performance, selection of the most suitable ones and occurrence and trend analyses across Mongolia. It is expected that NEMA will have close cooperation with the Ministry of Environment and Tourism, which is the focal point for all three Rio Conventions and a major data and information hub for critical environmental indicators.
National Tree Planting Day was initiated by the President of Mongolia in 2010 in accordance with the Law on Environmental Protection of Mongolia. According to this decree every second Saturday of May and October is a national tree planting day, during which every citizen, economic and legal entity has to create a condition and plant trees in cities, towns and other possible areas, including reforestation sites and national protected areas. According to the report by the Ministry of Environment and Tourism (MET) of Mongolia, during previous years (2010-2015) overall 7.4 million seedlings were planted to commemorate National Tree Planting Day and the survival rate of the trees is around 60-70%, depending on location, management and treatments. Since 2012, the Government has provided incentives to citizens and legal entities that engage in reforestation activities. During the 2013-2014 fiscal year 84.4 million tugrugs (40,000 USD) was paid as an incentive.

**LDN transformative projects and opportunities identified**

The national voluntary targets can be achieved through implementing transformative projects and programmes with the active involvement of private sector.

- National reforestation program;
- Fire Watch monitoring;
- Greening the cities;
- Sustainable grassland;
- Adapting silvo-pastoralism to nomadic livestock breeding system;
- Conservation agriculture in drought-prone regions of Mongolia;
- Organic farming;
- Wetland farming and sustainable use of wetlands;
- Restoration of mining sites;
- Payment for ecosystem service.
Conclusions

Overall achievements

Land Degradation Neutrality (LDN) is part of the Sustainable Development Goals (SDG 15.3) and, at the same time, the central objective of the United Nations Convention to Combat Desertification (UNCCD). In order to translate this global vision into national plans, the 195 member countries of the UNCCD are asked to set voluntary LDN targets. The Global Mechanism (GM) of the UNCCD has established an LDN target setting program (TSP) that supports countries in defining LDN targets and implementation pathways. Mongolia expressed its interest to take part in the TSP in November 2017.

Over the last one year, the LDN TSP has contributed greatly to appraisal of current knowledge, concept, and planning of national targets and actions to achieve land degradation neutrality. The implementation of the LDN TSP provided a unique opportunity for officers, scientists and rural representative from a range of departments to meet on a regular basis and discuss programs and activities of mutual interest in the field of combating desertification and mitigating land degradation. The project has also contributed to significant developments and changes, including an increased profile of baseline assessments in defining priorities, targets and activities, and improved links with the Sustainable Development Vision defined by the Government of Mongolia in 2016.

Some achievements include:

- Conducting over ten events for environment-related professionals attracting over 100 participants. These included inception workshop for the LDN TSP in Mongolia, workshop on baseline assessments, as well as presentations presented at environmental policy and development related conferences and the Ministry of Environment and Tourism.
- The consultant has frequently received invitations to visit major land degradation hotspot regions.
- The programme convened an Education Round Table which brought together over 40 senior government, community and private sector officials to discuss the concept of land degradation neutrality and possible opportunities for Mongolia.

Lessons learned

The lessons learned from the LDN TSP in Mongolia are as follows:

1. Proper communication to create mutual understanding. The concept of land degradation neutrality was new to decision makers and sectors at all levels. Thus, during the programme implementation all kinds of brainstorming activities were done to increase awareness.
2. Data availability and better representation of the current situation. There are different methodological frameworks developed in Mongolia on the assessment of land degradation. The change in indicator systems, especially understanding of such terms like trend, relative change,
land cover, and others, was essential for representatives both within the working group as well as outside of this group. It was agreed that a good situation analysis can lead to better identification of targets as well as proper planning of actions and measures.

3. The targets should rely more on currently developed policies and coherent with steps towards achieving SDGs in a country.

4. Actions and measure should address multiple benefits, e.g. poverty alleviation, livelihood support, etc.
References


Annex

List of LDN working group members

<table>
<thead>
<tr>
<th>Name of organisation</th>
<th>Website</th>
<th>Name of representative</th>
<th>Sector</th>
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<tr>
<td>Ministry of Environment and Tourism</td>
<td><a href="http://www.mne.mn">www.mne.mn</a></td>
<td>G. Nyamdavaa</td>
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<td>National Statistical Office</td>
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<td>Institute of Geography and Geocology</td>
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<td>Khaulenbek</td>
<td>Science</td>
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<td>Mongolian University of Education</td>
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<td>Research and Information institute for Hydrology, meteorology and environment</td>
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<td>Soil research association</td>
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<td>Business</td>
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<td>Int. Partners</td>
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<td>SDC</td>
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<td>N. Erdenesaikhan</td>
<td>Int. Partners</td>
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</table>
Inception workshop on LDN TSP in Mongolia

The National Land Degradation Neutrality Target Setting inception workshop was organized in Ulaanbaatar Hotel on 18th-19th December 2017. The event brought together 29 participants, including the UNCCD National Focal Point, UNCCD regional advisor, the LDN TSP country consultant, regional representatives, as well as international partners.

The objectives of the workshop were to discuss the scope and implementation arrangements of the support provided by the program; review data and methodologies proposed for use in the LDN target setting process; and facilitate the elaboration of a leverage plan and legal and institutional SWOT analysis. Over the two days of the workshop, participants i) had the opportunity to familiarize themselves with the four building blocks of LDN target setting at country level; ii) discussed how to use the LDN target setting exercise as a vehicle to implement the UNCCD and achieve SDG target 15.3; and iii) discussed further methodological and operational developments related to the LDN target setting process.

The main issues discussed were:

1. Participants noted that the LDN target setting process should be consistent with international processes (e.g. Rio Conventions). Participants stressed that land is a base resource, thus LDN targets should provoke good policies and compliance in all spheres of land management, land use and land-based development priorities.
2. Participants acknowledged that activation of the former national committee to combat desertification and its working group is core to achieving LDN. It is important to distinguish LDN as an opportunity to create synergies among processes to speak the same language at all levels and to attract more funding opportunities. Participants have also recommended involving the planning agencies in national governments and international organizations to actively support the LDN target setting process.

3. Participants highlighted the importance of activation of the former working group under the MNET. They noted that LDN target setting should imply both multi-sectoral and territorial approaches. Much more effort should be made to increasing the involvement of the private sector and mobilize its resources.

4. It was mentioned that countries are encouraged to use national level data on the three LDN indicators (i.e. land cover, land productivity and soil organic carbon), when available. LDN target setting should be based on scientifically-sound methodologies.

5. Depending on the results of the global dataset analysis it is advised to develop country-specific indicators (e.g. livestock density, soil erosion rate…).

6. An overview of the methodological process to assess land degradation trends and identify drivers was presented to the participants. It was mentioned that the same number of indicators used for setting the baseline are to be used to assess trends. The trend analysis is a numeric analysis of indicators for 10-15 years.

7. It was emphasized that LDN target setting is a voluntary process. The baseline to be established as part of the LDN target setting process should be considered as the minimum goal. The UNCCD and GM LDN TSP team advise countries to aim higher than the minimum level.

8. The preliminary results of the SWOT analysis were presented to participants. The participants agreed that Mongolia has done a lot to establish a strong legal framework by elaborating laws and regulations. The weakness of the current national legal and institutional framework is the absence of responsibility sharing, low level of human resources and human resource management both at national and regional levels.

9. General information on what transformative projects are, how they can be implemented and by whom, were presented during the workshop. The representatives of private sectors expressed their interest in being part of the process, but noted that such information and knowledge were lacking.
The LDN baseline and target setting workshop held on 24-25 May, 2018 brought together 45 participants, including regional representatives, major specialists on remote sensing and soil sciences, as well as officials from the Ministry of Environment and Tourism of Mongolia.

The objectives of the workshop were to:

- introduce a methodology to define the land degradation neutrality baseline;
- present the status of individual indicators in Mongolia;
- define the hotspots based on the baseline;
- introduce the target setting process and discuss preliminary targets;
- introduce objectives, steps and procedures for transformative projects and the LDN Fund.

The first half of the workshop on the first day introduced participants to the four building blocks for LDN target setting at country level; results done during the TSP process in Mongolia, e.g., the leverage plan, stakeholder analysis, SWOT analysis, etc. The workshop covered all individual indicators at the national level, what is the difference between international datasets and national data; availability of data, especially regarding soil organic Carbon; ways to unify and create a data team responsible for collecting data from various sources. The majority of participants expressed concern in regards to sustainability of the current structure in relation to the political situation.

The second day was dedicated to discussing LDN national targets and continued with defining hotspots, which were discussed on the first day. The majority of participants agreed to define targets based on land cover change and also expressed interest in defining targets related to mitigating land degradation
in areas with no degradation but where the risk is gradually increasing. A lot of questions were raised during the workshop about the current institutional arrangement, especially directed to interlinked actions with other development agencies.

Participants appreciated the support of the Global Mechanism and the Secretariat of the UNCCD for the workshop, which familiarized participants with the LDN target setting process.

The content of the two day workshop covered the four building blocks for LDN target setting, current level of policy, legal and institutional actions in Mongolia, key results on defining the land degradation neutrality baseline, clarified the ‘one out all out’ approach, and defined targets for further consideration at the higher level.

The land degradation neutrality baseline

Three baseline options using the following indicators were introduced:

- **Option 1:**
  - Land productivity using national data
  - Land cover change using national land cover
  - Soil organic Carbon using UNCCD indicator set

- **Option 2:**
  - Land productivity using Trends Earth sub-indicator data
  - Land cover change using national land cover
  - Soil organic Carbon using UNCCD indicator set

- **Option 3:**
  - Land productivity using UNCCD sub-indicator data
  - Land cover change using UNCCD land cover
  - Soil organic Carbon using UNCCD indicator set

Participants agreed to use the outputs of option 2 as sources of data for the national land degradation baseline indicators.
Fig. 1: Land degradation baseline

Table 1: Land degradation baseline summary

<table>
<thead>
<tr>
<th></th>
<th>Area (sq km)</th>
<th>Percent of total land area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total land area</td>
<td>1,550,021.1</td>
<td>100.00%</td>
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<tr>
<td>Land area improved</td>
<td>196,464.3</td>
<td>12.67%</td>
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<tr>
<td>Land area stable</td>
<td>1,138,094.3</td>
<td>73.42%</td>
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<tr>
<td>Land area degraded</td>
<td>158,474.4</td>
<td>10.22%</td>
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<tr>
<td>Land area with no data</td>
<td>56,988.2</td>
<td>3.68%</td>
</tr>
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</table>
National targets to achieve land degradation neutrality by 2030

The following targets were defined as an outcome of the workshop.

- Reducing forest degradation:
  - Afforestation of 50% of forest transformed to grassland
  - Increase forested area in/around urban lands by 1.8 sq.km
  - Improve forest productivity on 12,138.51 sq. km are by improving forest management and forestry activities.

- Mitigating land degradation in grassland
  - Restoring 30% of grassland currently transformed to other lands
  - Improving 30% of grassland where productivity decline is observed

- Improving agricultural land use to prevent land degradation.
  - Increase productivity of 1260.5 sq. km of agricultural land (cropland) by establishing windbreaks, easing intrusion of livestock and promoting irrigated technologies.

- Restoring wetlands
  - Improve wetland productivity by 30%.
  - Restore 30% of wetland currently transformed to the other land cover classes.

Main activities to achieve targets are:

- To amend laws and regulations on land and land ownership;
- Newly develop law on pastureland or integrate pasture-related issues into relevant sectoral legislations;
- Law enforcement by strengthening coordination, public meetings;
- Improve government support on reforestation;
- Leverage UNREDD activities, especially related with forest management;
- Develop suitable technologies on pasture restoration;
- Increase research activities in wetlands;