MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE

GOVERNMENT OF MONGOLIA

NATIONAL ADAPTATION PLAN TO CLIMATE CHANGE MONGOLIA

2024-2030

March 2025

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FOREWORD

The world stands at a critical juncture in the global response to climate change, a challenge that no nation can afford to overlook. The adoption of the Paris Climate Agreement in 2015 marked a turning point, laying the foundation for global collaboration. Since then, further progress has been made, including through discussions at COP27 and COP28, increasing mentum for implementing comprehensive climate action. Mongolia stands committed to this shared vision, and our National Adaptation Plan (NAP) to Climate Change is a testament to our dedication to climate resilience and sustainable development.

The NAP reflects Mongolia's urgent and strategic response to the escalating impacts of climate change on our communities, environment, and economy. Designed as a comprehensive roadmap, the NAP prioritizes actions to reduce vulnerabilities, strengthen resilience, and integrate adaptation across all sectors. Our country faces unique challenges—natural disasters such as dzud, droughts, floods, and extreme weather events disrupt lives and livelihoods every year. The NAP targets these vulnerabilities directly, focusing on priority areas such as water resources, agriculture, public health, infrastructure, and ecosystem protection.

Through the NAP, Mongolia sets forth a framework for sustainable adaptation, aligning national policies and development goals with the realities of a changing climate. The NAP emphasizes building capacity, enhancing knowledge and research, and fostering a culture of resilience. Moreover, it highlights the need for innovative technologies and financing mechanisms to effectively implement adaptation actions, ensuring that Mongolia's most vulnerable communities and critical ecosystems are safeguarded. The Plan's targets and measures are grounded in the principles of inclusivity, sustainability, and practical action, setting a clear path toward a climate-resilient future.

The successful implementation of the NAP will require collaboration and commitment from all levels of society—government, private sector, local communities, and international partners. It is through these partnerships that we will be able to enhance our adaptive capacity, mobilize resources effectively, and translate the NAP into tangible results on the ground. The NAP also recognizes that adaptation is not just a policy requirement but an opportunity for Mongolia to innovate and transform, creating resilient systems that support sustainable economic growth and improved livelihoods.

As Mongolia navigates its path forward, the NAP serves as a cornerstone of our climate strategy. It is a living document, designed to evolve with our needs and experiences, reflecting the dynamic nature of climate risks and opportunities. By building on the NAP's framework, we aim to create a resilient, adaptive Mongolia that thrives in the face of climate change.

On behalf of the Government of Mongolia, I would like to express my gratitude to our partners, experts, and stakeholders for their dedication and contributions to the development of the NAP. It is with shared purpose and determination that we can advance this ambitious agenda and build a sustainable and resilient Mongolia for generations to come.

ODONTUYA Saldan   Minister of Environment and Climate Change, Mongolia

ACKNOWLEDGEMENT

1. INTRODUCTION

Photo credit: MECC

1.1 RATIONALE

To tackle the challenges and risks posed by climate change and achieve climate-resilient development, the Government of Mongolia (GoM) has recognized the need to develop a comprehensive National Adaptation Plan. This Plan builds on the foundation of the "Building Capacity to Advance the National Adaptation Plan Process in Mongolia" project (NAP Project), led by the Ministry of Environment and Climate Change (MECC), supported by the United Nations Environment Programme (UNEP), and funded by the Green Climate Fund (GCF).

The National Adaptation Plan to Climate Change aims to strengthen Mongolia's climate resilience by identifying and implementing targeted adaptation measures that address the nation's most vulnerable biophysical and socio-economic sectors. It spans a seven-year period from 2024 to 2030, offering a clear framework for adaptation to anticipated climate impacts and supporting sustainable development.

The following five key task components were undertaken to develop the NAP:

1. **Assessment of the Current State and Future Projections (2030-2050):** A comprehensive review of Mongolia's climate change adaptation status was carried out, establishing baseline conditions and making projections for future impacts up to 2050. This assessment examined the effects on ecosystems, water resources, land management, air quality, public health, urban development, and sectors like livestock and crop farming. By reviewing existing research and studies, the assessment highlighted the vulnerabilities and risks faced by these sectors, setting a foundation for targeted adaptation measures.

2. **Identification of Adaptation Needs:** An in-depth analysis was performed to evaluate the need for climate change adaptation, focusing on legal frameworks, policies, governance structures, and institutional contexts. Stakeholder engagement was central to this process, ensuring that socio-economic impacts at national, regional, and local levels were addressed comprehensively. This included identifying risks, underlying causes, and potential solutions to climate-related challenges, and outlining opportunities and requirements for effective adaptation.

3. **Stakeholder Consultations on Adaptation Strategies:** A series of consultations at national and sectoral levels were facilitated to evaluate the status and strategies for climate change adaptation, and to discuss the draft NAP. Experts from key sectors, government agencies, and professional organizations participated, contributing their insights. The drafting team also conducted outreach in all provinces to gather localized feedback, ensuring that the Plan reflected the diverse needs and contexts of communities across Mongolia.

4. **Drafting the National Adaptation Plan to Climate Change (2023-2030):** The draft NAP was developed based on legal, policy, governance, and institutional frameworks, as well as adaptation measures and action-oriented indicators. This work aligned with national, regional, and sectoral long- and mid-term development strategies, disaster risk management plans, and Mongolia's Third and Fourth National Communications under the United Nations Framework Convention on Climate Change (UNFCCC). Additionally, the NAP was designed to be consistent with documents such as Mongolia's Nationally Determined Contributions (NDCs) and other key policies.

5. **Implementation Approach and Principles:** To guide the effective implementation of the NAP, a set of principles and approaches were established. These include insights into sector-specific considerations, geographic factors, and key implementation indicators, emphasizing the interconnectedness of these elements. The development process integrated sector-focused research, evaluation methodologies, data analysis, system dynamics modeling, simulations, and spatial analysis to create a robust and flexible framework for adaptation.

The NAP outlines a path for Mongolia to strengthen its resilience to climate change, integrating adaptation strategies into broader development policies. The success of the NAP relies on collaboration and active participation across all levels of society, including government institutions, the private sector, local communities, and international partners. Together, we can ensure a sustainable, climate-resilient future for Mongolia.

1.2 METHODOLOGICAL APPROACH FOR THE NAP DEVELOPMENT

The technical guidelines[1] established by the NAP Project, which outline a detailed five-step approach for developing the National Adaptation Plan to Climate Change, were rigorously followed throughout the plan's formulation. The first two phases, "Laying the Groundwork" and "Preparedness," were completed, producing essential reports and methodologies that defined the framework, context, and rationale for the NAP.

The NAP development process was grounded in extensive research, assessments, and findings from related projects conducted by professional institutions, ensuring alignment with Mongolia's policies and regulatory standards. Furthermore, the plan was crafted in accordance with best practice recommendations from prominent international entities, including the United Nations Framework Convention on Climate Change (UNFCCC), World Meteorological Organization (WMO), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), Green Climate Fund (GCF), and the Intergovernmental Panel on Climate Change (IPCC). This alignment ensures that the NAP is not only consistent with global standards but is also tailored to the specific climate challenges faced by Mongolia.

Recognizing the country's unique vulnerabilities and priorities, the NAP integrates supplementary measures designed to effectively respond to Mongolia's socio-economic and environmental context. These additional provisions are grounded in the core principles of adaptive planning, such as inclusivity, sustainability, and strategic foresight. This integrative approach ensures that the NAP is both robust and flexible, providing a comprehensive framework to enhance Mongolia's resilience to the impacts of climate change, while remaining responsive to evolving national and global circumstances.

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[1] Technical Guidance for Implementing the National Adaptation Plan Process of Mongolia, NAP Project, Ministry of Environment and Tourism (MET), Green Climate Fund (GCF), United Nations Environment Programme (UNEP), 2021

TABLE 1. Next Steps for NAP implementation

Strategy	Actions and Focus Areas
1. Establish Institutional Structures and Coordination	• Operationalize Coordination Mechanisms: Set up a cross-sectoral coordination body to ensure effective oversight and collaboration across ministries, regions, and stakeholders. • Define Roles and Responsibilities: Clearly assign roles to ministries, agencies, and local authorities, providing capacity development to facilitate efficient adaptation planning and implementation.
2. Mobilize Resources and Financial Planning	• Develop a Comprehensive Financing Strategy: Secure a combination of national budgets, international climate finance (e.g., GCF, Adaptation Fund, Loss and Damage), and private sector investment to support NAP activities. • Access Climate Funds and Partnerships: Engage with global climate finance mechanisms, development partners, and potential investors to build a pipeline of adaptation projects. • Innovate Financial Instruments: Explore alternative funding options, such as blended finance, carbon trading, and green bonds to enhance financial sustainability.
3. Build Technical Capacity and Knowledge Transfer	• Enhance Technical Capacity and Skills: Implement capacity-building programs for government staff, local authorities, and stakeholders, focusing on climate vulnerability assessments, project management, and monitoring systems. • Create Knowledge-Sharing Platforms: Develop knowledge-sharing mechanisms to facilitate the exchange of best practices, research findings, and experiences among key stakeholders at the local, regional, and national levels.
4. Develop Sectoral and Local Adaptation Action Plans	• Formulate Sector-Specific Adaptation Plans: Translate NAP objectives into detailed plans for key sectors, such as agriculture, water resources, health, and infrastructure, with clear targets, timelines, and responsibilities. • Localize Adaptation Efforts: Develop regional and community-level action plans tailored to specific climate risks and vulnerabilities, with active involvement from local stakeholders to ensure context-based solutions.
5. Implement Monitoring, Evaluation, and Learning (MEL) Systems	• Establish a MEL Framework: Develop a robust system for tracking progress, assessing the effectiveness of adaptation measures, and ensuring transparency. Include indicators, baselines, and protocols for data collection and reporting. • Regular Review and Adaptive Management: Conduct periodic reviews and assessments to refine and adjust adaptation measures based on new data, emerging risks, and lessons learned.
6. Foster Stakeholder Engagement and Public Awareness	• Engage Stakeholders Continuously: Build inclusive platforms for dialogue and collaboration with government entities, private sector actors, NGOs, and communities to foster buy-in and shared responsibility. • Raise Public Awareness and Climate Literacy: Launch campaigns and educational programs to increase understanding of climate change impacts and the importance of adaptation, empowering communities to participate actively in the NAP.

7. Promote Ecosystem-Based Adaptation and Nature-Based Solutions	• **Implement Nature-Based Strategies:** Utilize ecosystem-based adaptation (EbA) approaches, such as forest restoration, sustainable pasture management, and watershed protection, to enhance natural resilience. • **Conserve and Restore Natural Resources:** Integrate sustainable management and conservation practices for critical ecosystems into adaptation efforts, improving community and ecosystem resilience to climate change.
8. Advance Data Collection, Research, and Technology for Adaptation	• **Enhance Climate Data and Information Systems:** Strengthen data collection, modeling, and climate monitoring to improve evidence-based adaptation planning and access to reliable information for all stakeholders. • **Adopt Advanced Technologies:** Promote innovative technologies for climate adaptation, such as early warning systems, resilient agricultural techniques, water management solutions, and renewable energy to reduce vulnerabilities.
9. Leverage International Cooperation and Partnerships	• **Engage in International and Regional Collaboration:** Foster partnerships with international organizations, development partners, and neighboring countries to share knowledge, technical expertise, and financial support. • **Participate in Global Climate Platforms:** Actively contribute to global climate forums under the UNFCCC and other international agreements, ensuring Mongolia's NAP aligns with global standards and benefits from shared experiences and resources.
10. Ensure Continuous Learning and Plan Adaptation	• **Iterative NAP Review and Updates:** Regularly review the NAP to incorporate new scientific data, evolving risks, and insights from implementation experiences to keep the plan dynamic and responsive. • **Integrate Lessons Learned:** Document and integrate lessons from ongoing adaptation projects and stakeholder feedback to improve future planning and implementation strategies.

By following these strategic next steps, Mongolia's NAP will effectively support the country's transition towards a resilient, adaptive society, capable of withstanding and managing the impacts of climate change through integrated planning and collaborative action.

Photo credit: MECC

2. NATIONAL ADAPTATION PLAN TO CLIMATE CHANGE

Mongolia's National Adaptation Plan to Climate Change outlines a comprehensive strategy to address the impacts of climate change, with clearly defined Objectives, Targets, and Measures across critical environmental, social, and economic sectors. The NAP's primary goal is to build resilience and enhance adaptive capacity, mitigating vulnerabilities and improving readiness for climate-related disasters through coordinated and multi-sectoral efforts.

Mongolia's National Adaptation Plan to Climate Change outlines a comprehensive strategy to address the impacts of climate change, with clearly defined Objectives, Targets, and Measures across critical environmental, social, and economic sectors.

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2.1 OBJECTIVE, TARGETS, AND MEASURES

Objective of the NAP:

To enhance the capacity of Mongolia's environmental, social, and economic sectors to adapt to climate change, strengthen resilience against natural and weather-related disasters, and reduce vulnerability and associated risks.

This objective is realized through 15 Targets, consisting of 2 cross-cutting targets and 13 targets across 8 priority adaptation sectors, resulting in 99 specific actions.

Overview of Cross-Cutting Targets

1

Target 1: Strengthening the Policy and Institutional Framework for Adaptation

Objective: Enhance policies, legal structures, and organizational capacities to support climate change adaptation across all sectors.

Actions (11): Develop and align adaptation policies, build institutional capacity, improve governance, and coordinate cross-sectoral adaptation activities.

2

Target 2: Enhancing Knowledge and Capacity Building

Objective: Improve climate change adaptation knowledge and capacity among stakeholders through research, training, and information dissemination.

Actions (10): Expand research activities, provide climate information services, and enhance capacity through training programs targeting government bodies, local communities, and private stakeholders**.**
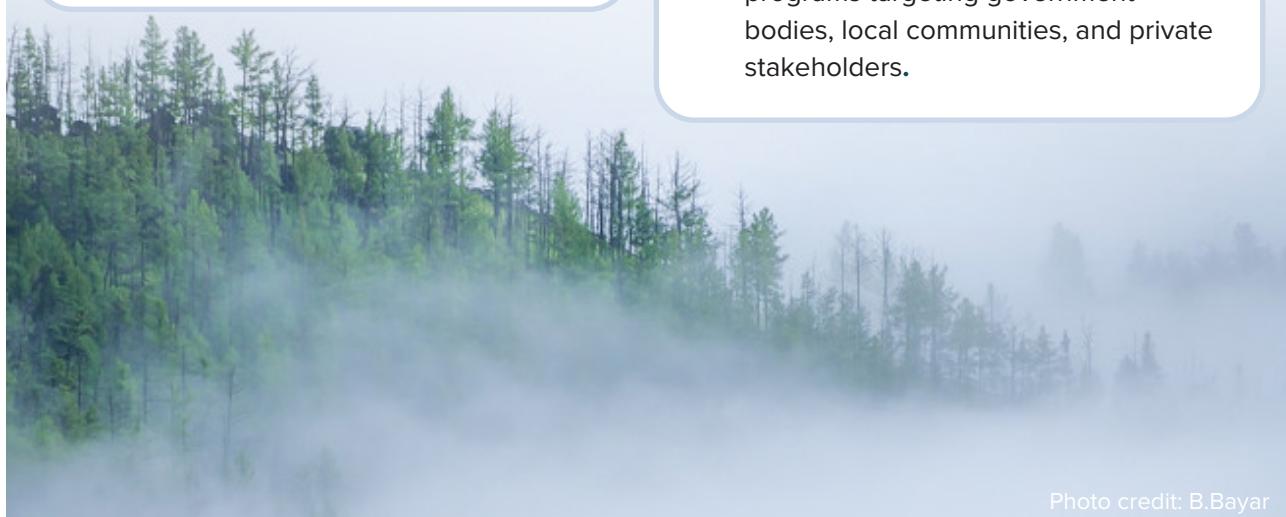
Photo credit: B.Bayar

Adaptation Priorities and Sector-Specific Targets

1. Ecosystems, Biodiversity, Land Degradation, and Desertification

Target 3: Enhancing Ecosystem and Biodiversity Resilience

Objective: Improve the adaptive capacity of ecosystems and biodiversity.

Actions (7): Implement restoration programs, conserve habitats, and integrate ecosystem-based approaches to reduce degradation.

Target 4: Mitigating Desertification and Land Degradation

Objective: Reduce desertification, land degradation, and permafrost loss.

Actions (6): Utilize sustainable land management practices, protect soil health, and prevent land degradation.

2. Water Regime, Resources, and Supply

Target 5: Monitoring and Sustainable Management of Water Resources

Objective: Establish a continuous water monitoring system using advanced technology for sustainable management.

Actions (5): Implement water quality monitoring, improve data management, and develop policies for sustainable water usage.

Target 6: Enhancing Water Ecosystem Services and Supply

Objective: Strengthen water ecosystem services by conserving and restoring water resources, utilizing technology to boost surface water.

Actions (10): Employ integrated water management, enhance catchment area protection, and promote water conservation technologies.

3. Forestry Sector

Target 7: Developing Climate-Resilient Forestry and Wood Industries

Objective: Establish climate-resilient forests and sustainable wood-based industries.

Actions (5): Promote afforestation, sustainable forest management, and conservation efforts to enhance forestry's adaptive capacity.

4. Weather and Climate-Induced Natural Disasters

Target 8: Reducing Climate-Induced Disaster Risks

Objective: Minimize risks from climate change-induced disasters and improve resilience.

Actions (6): Build disaster-resistant infrastructure, enhance community resilience, and improve disaster risk management systems.

Target 9: Establishing Early Warning Systems

Objective: Develop multi-hazard, impact-based early warning systems to enable quick and effective responses to extreme events.

Actions (4): Integrate advanced forecasting technology, develop early communication systems, and train local emergency response teams.

5. Animal Husbandry and Grassland Management

Target 10: Sustainable Livestock Systems and Pasture Management

Objective: Foster sustainable livestock management that aligns with water and pasture resources and is climate-resilient.

Actions (6): Introduce advanced grazing and breeding techniques, improve herd quality, and maintain healthy pastures.

Target 11: Enhancing Livestock Productivity and Market Access

Objective: Improve livestock quality, reduce pasture overuse, and develop value chains for marketable livestock products.

Actions (4): Strengthen animal health, enhance feed efficiency, and develop export markets for livestock products.

6. Crop Farming

Target 12: Promoting Climate-Resilient Crop Production

Objective: Sustainably develop high-yield crops through climate-adapted technologies and soil conservation.

Actions (6): Promote drought-resistant crop varieties, adopt advanced irrigation methods, and practice soil fertility enhancement.

Target 13: Enhancing Soil Conservation and Farming Practices

Objective: Protect and sustain soil fertility through climate-smart agricultural practices.

Actions (4): Increase organic farming, apply soil conservation techniques, and utilize renewable energy in farming processes.

7. Public Health

Target 14: Strengthening Climate-Resilient Health Systems

Objective: Enhance research, preparedness, and capacity-building to mitigate climate-related health risks.

Actions (7): Develop climate-health risk assessments, improve public health education, and strengthen health infrastructure for better climate adaptation.

8. Social Security and Livelihood

Target 15: Establishing Social Protection and Risk Reduction Systems

Objective: Create social safety nets, protection systems, and insurance mechanisms to reduce the vulnerability of communities.

Actions (8): Identify and support vulnerable groups, provide income diversification opportunities, and build local capacity for sustainable livelihoods.

Photo credit: D.Narantuya

TABLE 2. **Summary of Objectives, Targets, and Measures**

Components	Targets	Actions
Objective: Enhance capacity for climate adaptation, strengthen resilience, reduce risks.	15	99
Cross-Cutting Elements	2	21
Adaptation Priorities:		
1. Ecosystems, Biodiversity, Land Degradation	2	13
2. Water Regime, Resources, and Supply	2	15
3. Forestry Sector	1	5
4. Weather and Climate-Induced Disasters	2	10
5. Livestock Husbandry and Grassland	2	10
6. Crop Farming	2	10
7. Public Health	1	7
8. Social Security and Livelihood	1	8

Total: 15 Targets and 99 Actions across cross-cutting elements and sectoral adaptation priorities.

2.2 SUMMARY AND ANALYSIS

The NAP takes a multi-pronged approach to climate adaptation by promoting an enabling environment for cross-cutting adaptation measures and targeted sectoral strategies. Through integrated approaches in ecosystem restoration, water management, and disaster risk reduction, the plan strengthens resilience across Mongolia's natural systems.

Key highlights include:

- Strengthening Policy and Institutional Support: Establishing the legal and policy basis for climate adaptation and capacity-building among stakeholders.

- Resilient Ecosystem Management: Enhancing adaptive capacities in biodiversity, land, and water systems through restoration and sustainable resource use.

- Improving Livelihoods and Social Welfare: Building adaptive capacity within the livestock and agricultural sectors while focusing on health systems and social protection to address vulnerabilities of at-risk populations.

- Disaster Preparedness and Early Warning Systems: Reducing risks through multi-hazard monitoring, early warning systems, and disaster-resilient infrastructure.

The plan underscores the importance of integrated, sustainable, and inclusive adaptation efforts, with a focus on reducing risks and fostering long-term resilience across sectors and communities. By implementing its 99 prioritized actions, the NAP aims to achieve Mongolia's overarching adaptation goals, leading to a sustainable and climate-resilient future. (See the Annex for the detailed Action Plan).

3. CLIMATE CHANGE IN MONGOLIA: IMPACTS, THREATS AND RISKS

The NAP process in Mongolia undertook an in-depth assessment of previous research findings to evaluate both the current status and future projections of climate change. This involved a detailed analysis of the potential impacts, vulnerabilities, and risks that climate change poses across socio-economic sectors, environmental components, and ecosystems.

Photo credit: MECC

3.1 CURRENT CLIMATE CHANGE AND ITS FUTURE PROJECTIONS

The assessment presented in this section is based on the research undertaken by the Information and Research Institute of Meteorology, Hydrology and Environment (IRIMHE) included in the Fourth National Communication (NC4) of Mongolia under UNFCCC[2].

3.1.1 Past Climate Change

Greenhouse gas (GHG) concentration and emission: Since 1992, Mongolia has conducted monitoring and measurement of greenhouse gases (GHGs) in collaboration with the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL) of the United States. The monitoring station, located in Erdene Soum, Dornogovi Province, serves as one of the key GHG monitoring stations representing Northeast Asia within the global network. The data collected over the years indicate a steady rise in the concentration of GHGs in Mongolia's atmosphere. Specifically, the average carbon dioxide (CO_2) concentration has increased from 354.6 parts per million (ppm) to 413.3 ppm, reflecting a 16.5% rise. Methane (CH_4) levels have also risen from 1808 to 1968 parts per billion by volume (ppbv), marking an 8.8% increase (NEMA, 2023).

Mongolia's GHG inventory, covering the period from 1990 to 2020, was comprehensively developed and reported in the Second Biennial Update Report (BUR2), which was submitted to the UNFCCC Secretariat in late 2023. According to the BUR2 estimates, the total GHG emissions in Mongolia amounted to 20.9 million metric tons of CO_2 equivalent (Mt CO2e) in 2020[3].

Change in the air temperature: Over the past 83 years (1940-2022), Mongolia has experienced a substantial rise in average terrestrial atmospheric temperatures, reflecting the broader global trend of climate change. The recorded temperature increases have been particularly pronounced during the winter, with a rise of 3.2°C, and to a lesser extent in the summer, with an increase of 1.6°C. The overall annual average temperature has risen by 2.46°C. Notably, the warming trend has intensified since 1988.

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[2] The Fourth National Communication (NC4) of Mongolia under UNFCCC, 2023 (in finalization stage)
[3] The Second Biannual Updated Report of Mongolia, 2023

Certain regions of Mongolia have experienced even greater deviations from historical temperature records, with increases exceeding 3°C. These include the northern areas of Khuvsgul, Arkhangai, and Tuv; the eastern regions of Selenge and Dornod aimags; and rural areas of Darkhan-Uul. Such regional variations highlight the localized impact of climate change across Mongolia, particularly in the northern and eastern parts of the country.

Change in the precipitation: From 1940 to 2022, Mongolia has experienced a slight upward trend in annual cumulative precipitation. Notably, winter precipitation (October to March) has increased by 19.6%. However, there has been an overall increase in the number of dry days, particularly when comparing the drier period from 1996-2011 to the wetter period from 1977-1983.

Geographical variations in precipitation trends are evident across Mongolia. The central regions have faced a decrease in precipitation, ranging from 10-30%, with the eastern part of Dundgovi aimag experiencing an even more significant decline of over 30%. Meanwhile, projections indicate that other regions of the country are likely to see an increase in precipitation, suggesting a shifting pattern of rainfall distribution.

Change of climate extreme indices: Both the maximum daily temperatures and minimum daily temperatures across Mongolia have increased, while the number of cold days throughout the entire country has recorded a decreasing trend. When examining the period characterized by the highest number of days with heavy precipitation, it becomes evident that 54% of such occurrences took place between 2000 and 2020. This trend serves as a clear indicator of the heightened frequency of heavy precipitation events, primarily attributable to the influence of climate change.

3.1.2 Future climate change projections

The future climate projections for Mongolia highlight significant warming trends and shifts in precipitation patterns over the next century. These projections, developed by the Institute of Research and Information on Meteorology, Hydrology, and Environment (IRIMHE), incorporate state-of-the-art climate modeling techniques from the Coupled Model Intercomparison Project Phase 6 (CMIP6) and findings from the IPCC 6th Assessment Report (AR6). Utilizing various Shared Socio-economic Pathways (SSPs) under different emissions scenarios (low, medium, and high), the analysis provides an ensemble mean forecast of the possible climate trajectories for Mongolia up to 2100.

Photo credit: MECC

TABLE 3. Summary of projected climate changes and their expected impacts, key adaptation and mitigation strategies for building climate resilience in Mongolia

Category	Details
Projected Temperature Changes (°C)	- By 2030: Increase of 0.7-1.4°C - By 2050: Increase of 1.1-2.9°C - By 2080: Increase of 1.2-6.5°C, depending on emissions scenarios
Regional and Seasonal Variations	
Winter Warming	The most significant temperature increase is expected in winter, leading to more frequent and intense dzuds, challenging livestock survival, and potential infrastructure damage from thawing permafrost.
Summer Heatwaves	More frequent and prolonged heatwaves, averaging an extension of 3 days, increasing heat stress on agriculture, productivity loss, and water demand.
Projected Changes in Precipitation Patterns	
Winter Precipitation Increase (%)	By 2080: Expected increase of 9-55% in winter precipitation, resulting in deeper snowpacks and possibly more severe dzuds.
Summer Dryness	Stable overall summer precipitation, but an increase in consecutive dry days leading to frequent and severe droughts, threatening agriculture and water resources.
Slight Increases in Autumn and Spring	Autumn and spring will see slight precipitation increases, potentially extending the growing season but increasing flood and soil erosion risks.
Changes in Extreme Weather Events and Climate Variability	
Reduction in Cold Days and Cold Spells	A reduction of 9-37 cold days per year and shorter cold spells by 3 days, potentially disrupting seasonal cycles and impacting agriculture and water cycles.
Increase in Heatwaves and Extended Dry Periods	Summers will experience longer heatwaves and drier conditions, exacerbating drought impacts, desertification, and heat stress on crops and livestock.
Impacts on Key Sectors and Resources	
Agriculture and Pastoralism	Vulnerable to increased temperatures and reduced water availability; risks include declining crop yields, pasture degradation, and increased livestock mortality.
Water Resources and Hydrology	Changing precipitation and warming temperatures affect river flows, lakes, and groundwater, impacting water supply for agriculture, drinking, and hydropower, especially in semi-arid regions.
Ecosystems and Biodiversity	Diverse ecosystems face pressures from temperature rise and changing precipitation, leading to desertification, forest fires, habitat loss, and biodiversity decline.
Adaptation and Mitigation Strategies	
Sustainable Water Management	Emphasizes water conservation, efficient irrigation, and improved storage infrastructure to tackle water scarcity and support agriculture.
Climate-Smart Agriculture and Pasture Management	Promote resilient crops, sustainable grazing practices, and soil conservation methods to combat desertification and soil degradation.
Disaster Preparedness and Risk Reduction	Strengthen early warning systems for dzuds, droughts, and floods to protect livelihoods and ensure timely responses to extreme weather events.

3.2 CLIMATE CHANGE IMPACT AND RISK
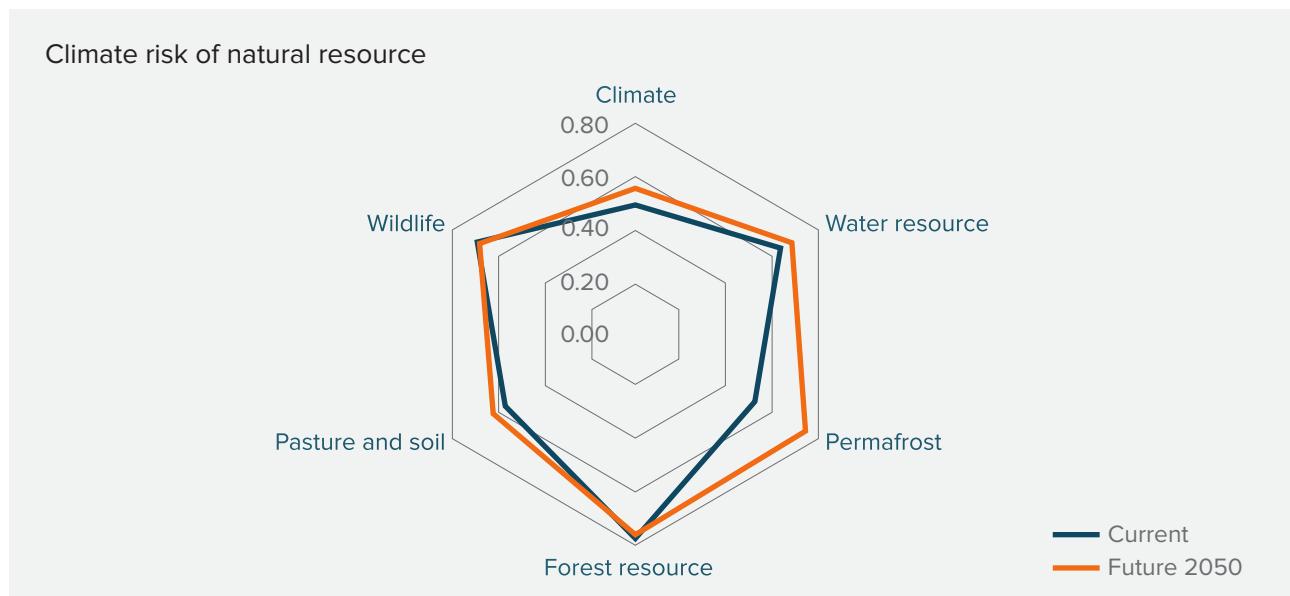
The assessment presented in this section relies on the Fourth National Communication to the UNFCCC, along with pertinent research and studies conducted by various institutions, research organizations, and individual researchers.

According to the climate risk assessment of sectors sensitive to climate change, as well as evaluations of current and future vulnerability and resilience indices, risk indicators have been established for environmental and socio-economic sectors (NAP, 2023).

The assessment highlights that Mongolia's biophysical environment faces increasing adverse impacts, vulnerability, and risks across various sectors due to climate change, as illustrated in Figure 1. The natural resource sector—comprising pastures, soils, forests, permafrost, and glaciers—alongside socio-economic sectors such as livestock, crop farming, and infrastructure, exhibit high vulnerability and risk indices. Notably, these indices are projected to experience significant increases, ranging from 0.23 to 0.38, compared to current levels. This trend underscores the growing need for targeted adaptation strategies and resilience-building measures across Mongolia's critical natural and socio-economic systems.

FIGURE 1. **Climate change vulnerability and risk index of natural resources in Mongolia**

Source: Fourth National Communication, 2023

3.2.1 Climate-Related Hazards and Disasters

In Mongolia, weather and climate-related disasters are a significant concern, with an average of 55 such events occurring annually. Over the past 80 years, there has been a noticeable rise in both the magnitude and frequency of these disasters, posing escalating challenges to communities, infrastructure, and the natural environment. The most frequently occurring events include windstorms (encompassing both wind and dust storms) and snowstorms, which together account for about 42% of all disasters—each making up 21% individually.

Other prevalent disaster events include:

- **Flash and River Floods:** Representing 14% of all recorded events, these floods pose a significant threat to rural areas, agricultural lands, and water resources.

- **Lightning Strikes:** Responsible for 12% of all disasters, these incidents can cause fires and damage to infrastructure, as well as pose direct threats to human safety.

- **Hailstorms:** Accounting for 7% of disaster occurrences, hailstorms have direct impacts on agriculture, damaging crops and reducing yields.

Other less common but impactful disasters—such as extreme cold spells, droughts, and heatwaves—collectively make up the remaining 6%.

The consequences of these extreme weather events have been substantial. Between 2001 and 2021, Mongolia experienced 539 fatalities attributed to climate and weather-related events, highlighting the significant human impact. Additionally, the country faced:

- **Livestock Losses:** Approximately 29.773 million livestock were lost due to events such as dzuds (harsh winter conditions), droughts, and other extreme weather, significantly affecting the livelihoods of herders and the agricultural economy.

- **Economic Damages:** The financial toll from these extreme events over the two-decade period reached approximately 681.8 billion MNT. These losses reflect damages to homes, infrastructure, and agricultural assets, disrupting socio-economic stability, particularly in rural and nomadic communities.

This increasing trend in weather and climate disasters not only indicates a growing vulnerability to the impacts of climate change but also underscores the urgent need for disaster preparedness, risk reduction strategies, and adaptation measures to mitigate future losses. These measures must address not only immediate disaster response but also long-term resilience, particularly in sectors such as agriculture, water management, and infrastructure development.

Drought, Dzud[4]: Droughts and dzuds are prolonged climatic events that inflict significant damage on the socioeconomic aspects of the country. Correlations of Mongolia's drought-summer index and long-term wheat yield, and the dzud index and trends of livestock losses are very significant. The frequency of drought has been increasing and since 1995 the drought condition intensified. Furthermore, the increased frequency of drought conditions has contributed to the rise in dzud occurrences. According to future climate projections, it is anticipated that drought frequency may rise by 5-45%, while the frequency of dzuds is expected to increase by 4-40%.

Wildfire: The area with risks of forest fire due to climate warning, and drought is likely to increase by 9%. The area at risk of forest fires due to climate warnings and drought is projected to increase by approximately 9%.

Flood: In the event of conditions similar to the 1966 flood occurred in Ulaanbaatar, with an area of 24.9 km² inundated, it is estimated that by 2050, with the projected increase in maximum daily precipitation due to future climate change, this area is expected to expand by 20.8%.

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[4] A dzud (a Mongolian term that describes 'severe winter conditions'', sometimes spelled "zud") is a cold-season disaster in which anomalous climatic (i.e., heavy snow and severe cold) and/or land-surface (snow/ ice cover and lack of pasture) conditions lead to reduced accessibility and/or availability of forage/pastures, and ultimately to high livestock mortality during winter–spring. (UNDRR)

4. ENVIRONMENTAL AND SOCIO-ECONOMICAL IMPACT OF CLIMATE CHANGE

4.1 ENVIRONMENT AND CLIMATE CHANGE

4.1.1 Water Resources

Mongolia's total water resources are approximately 596.8 km^3, with lakes holding the largest share (532 km^3), followed by glaciers (19.4 km^3), rivers (34.6 km^3/year), and groundwater (10.8 km^3). Glacier meltwater plays a crucial role in sustaining water supply during dry seasons. Groundwater, valued for its reliability and quality, is widely used for drinking, livestock, and irrigation.

In 2018, water quality monitoring at 168 sites revealed that polluted areas include the Tuul River downstream of Songino and Altanbulag Soum, as well as the Khagt River in Selenge, impacted by urban, industrial, and agricultural activities. These findings highlight the urgent need for targeted water management, pollution control, and sustainable conservation efforts to protect Mongolia's water resources.

River runoff:

Projections from the ECHAM5-RegCM4 model indicate that there will be minimal change in the average river runoff in the Arctic Ocean basin by 2020 compared to the current baseline. However, by 2050, the model suggests an increase of approximately 8.9 mm, which is expected to further rise to around 15.6 mm by 2100. This upward trend reflects the effects of climate change on hydrological cycles and water availability in the Arctic drainage areas.

During the same period, river runoff patterns in other basins are also expected to shift:

- In the Pacific Ocean basin, the average river runoff is projected to increase by 4.0 mm by 2050 and further rise by 6.2 mm by 2100, relative to the baseline period of 1986-2005. This indicates moderate but consistent changes in water flow, potentially affecting the region's hydrology and water resource management.

- The Central Asian internal basin is expected to see more modest increases in average river runoff, with a projected rise of 2.1 mm by 2050 and 4.3 mm by 2100. While these increases are smaller compared to other basins, they still

represent a gradual change in water dynamics over time.

These projections highlight region-specific trends and emphasize that the Arctic Ocean basin is likely to experience the most significant increase in river runoff, followed by the Pacific Ocean and Central Asian internal basins. Such changes in river runoff have implications for water resource availability, flood risks, and the management of water systems across different regions in Mongolia.

Water balance:

The ECHAM5-RegCM4 model results provide projections for changes in water balance elements by 2030 across Mongolia's major river basins. While the river runoff in the primary basins is expected to remain relatively stable, there are notable increases anticipated in certain river systems:

- Significant River Runoff Increases:

  Tuul River: Water levels are projected to rise by 128 mm.

  Kharaa River: An increase of 71 mm is expected.

  Eroo River: Water levels are anticipated to rise by 52 mm.

  Selenge and Orkhon Rivers (middle streams): Projected increases of around 115 mm are expected.

Headwaters of Major Rivers:

The annual runoff is projected to increase significantly, ranging between 60 to 174 mm per year, indicating a substantial rise in water availability at these critical points in the river systems.

Photo credit: MECC

4.1.2 Projected Evaporation Changes in the Pacific Ocean Basin Rivers

The river basins draining into the Pacific Ocean are expected to experience increased water evaporation, with several rivers facing notable changes:

*   **Kherlen River:** Projected evaporation is expected to reach 95 mm per year.
*   **Onon River:** Evaporation levels are anticipated to increase by 88 mm per year.
*   **Ulz, Galiin, and Khalkh Rivers:** The projected evaporation levels are 52 mm, 67 mm, and 41 mm per year, respectively.

These increases in evaporation rates could lead to reduced river flows and heightened water stress in certain areas, especially during dry seasons.

*   Evaporation Projections for the Central Asian Internal Basin Rivers

In the rivers flowing through the Central Asian Internal Basin, significant increases in evaporation rates are expected:

*   **Khovd River Basin:** An increase of 74 mm per year in evaporation is projected.
*   **Zavkhan River:** The most substantial rise is expected, with evaporation increasing by 138 mm per year.
*   **Khungui and Baruunturuun Rivers:** Evaporation is projected to increase by 107 mm and 85 mm per year, respectively.
*   **Turgen River:** A more moderate rise of 45 mm per year is anticipated.
*   **Tes River:** Expected to see a significant increase in evaporation, around 130 mm per year.

Additional projections in the southern river systems include:

*   **Southern Altai Mountains:** Southern river systems are expected to experience evaporation increases of around 20 to 30 mm per year.
*   **Southern Khangai Mountains:** Evaporation rates are projected to be much higher, ranging between 182 to 313 mm per year.
*   **Southern Gobi of Altai:** Expected increases in evaporation reaching around 299 mm per year.
*   **Gobi of Galba-Oosh-Dolood:** Projected evaporation rates are substantial, varying from 160 to 295 mm per year.

These projections highlight a trend towards increasing evaporation rates across most of Mongolia's river systems, particularly in the Central Asian Internal Basin and southern regions, where evaporation could exceed river flow, leading to potential water scarcity and ecosystem stress.

Such changes in the water balance, with increased runoff in certain river basins and heightened evaporation in others, underscore the complex interplay between water availability and climatic factors. It emphasizes the need for adaptive water management strategies to address potential challenges related to water resource allocation, ecosystem health, and the livelihoods of communities dependent on these river systems.

Water temperature:

The monthly average water temperature of April to October in the Arctic Ocean basin as observed between 2005 to 2020, is protected to increase by 0.6°C based on the previous estimation conditions, but in the period of 2020-2030 it is projected to increase further by 0.4°C. The average water temperature in the Arctic Ocean basin for the months of April to October is expected to rise by 0.9°C by 2050 and 2.6°C by 2080, relative to the 2020 level. This projection is based on anticipated changes in air and soil surface temperatures, as indicated by the high greenhouse gas (GHG) emission scenario of RCP8.5, using the ECHAM5-RegCM4 model.

In the Pacific Ocean basin, the average monthly water temperature has already risen by 0.7°C based on observational data from 2005 to 2020. Furthermore, it is projected to continue increasing by approximately 0.3°C by 2030, 0.9°C by 2050, and 2.6°C by 2080. In the Central Asian Internal basin, the average monthly water temperature has experienced a 0.6°C increase according to observational data from 2005 to 2020.

Moreover, it is expected to continue rising, with an average increase of 0.3°C by 2030, 1.0°C by 2050, and a significant 2.6°C by 2080 when compared to the levels in 2020.

Lake:

The projected scenario indicates a decline in the total area of lakes and wetlands, with a reduction of 11.5% by the year 2030 compared to the pre-1940 period and a 2% decrease from 2020. This decline is expected to impact the lake water resources and significant decrease in the long-term average annual volume (20 km^3 approximately). Large and big lakes have remained unchanged in terms of water area, and volume, but overall larger lakes have shifted towards the category of small lakes, while small lakes have decreased and shifted towards the category of small ponds. Several small ponds have dried up, leading to an increase in the category of dry depressions in wetland classification.

Water quality:

Currently, climate change has had little to no discernible impact on water quality. However, future projections suggest that an increase in evaporation may lead to higher mineral content in river and lake water. Changes in the water regime, coupled with reduced water availability, could make these water sources more susceptible to pollution from human activities. This underscores the growing demand for drinking water and sanitation facilities to ensure a safe and sustainable water supply.

In Mongolia, there are over 600 glacial lakes located in 42 provinces. The total area covered by these glacial lakes is distributed as follows: 67.34% in Bayan-Ölgii Province, 16.58% in Uvs Province, 14.13% in Khovd Province, 1.69% in Govi-Altai Province, 0.14% in Khövsgöl Province, and 0.11% in Zavkhan Province.

The water resources contained in these glacial lakes have decreased over the years. In 2002, the total volume of water was 19.4 km^3, but by 2017, it had decreased to 15.7 km^3, indicating a reduction of 3.7 km^3. This declining trend is expected to persist and potentially intensify, leading to growing concerns regarding its potential impacts on water availability and sustainability.

Photo credit: EBA project

4.1.3 Forest

Forest change factors: The changes in Mongolia's forest cover can be attributed to the following main factors or drivers:

Human-related factors:

The country's growing population has led to increased human activities in all forest regions, particularly a surge in local activities within the forests, resulting in adverse effects on forest cover, including increased instances of forest fires and other impacts. The increasing urban population has driven urbanization, and this, in turn, has led to further urban expansion, accelerating the demand for products from the forest industry.

Socio-economic factors:

The rapid economic growth has facilitated government opportunities to finance tree planting, afforestation, and pest control efforts. However, due to the increasing demand for raw materials driven by the country's overall economic growth, there has been an added pressure on forest resources. This additional strain on forests, arising from the production of timber and non-timber forest products, has led to concerns of unsustainable logging practices.

Techno-management factors:

The limited capacity of forest management has a direct impact on issues like forest fires, unsustainable and unplanned logging, which are ultimately leading to increased forest degradation and deforestation. The use of outdated and ineffective forest fire techniques, coupled with inadequate forest fire management practices, is also a contributing factor.

Natural factors:

Studies suggest that climate change is leading to an increase in insect pests and reducing the natural rehabilitation capacity of forests. The frequency of natural disasters, including floods, droughts, and desertification resulting from climate change, has been on the rise. These events, in turn, exacerbate other challenges such as increased snowfall, wildfires, and pest infestations in Mongolia's northern forest. Additionally, intensify the effects due to thawing permafrost on the forests.

Forest cover change and risks:

Due to climate change, there has been an increase in forest fires during dry summers, a surge in insect pests, a decrease in soil moisture levels, and alterations in the growth and seed dispersion patterns of woody plants. According to Mongolia's Third National Communication to the UNFCCC (2017) it is projected that by the end of this century, Mongolia's lowland forested areas will decrease by 4-6%, whereas the upper forest boundary in high mountain regions is expected to shift upwards due to permafrost melting and increased heat accumulation. The impacts of forest fires and insect pests are on the rise, and by the end of this century, they are projected to increase by 2 to 9 times compared to the baseline.

Policy, legal environment:

Mongolia's legal, policy, and law enforcement capacities, and institutional coordination are not sufficient to proactively address unsustainable forest practices, and prevent from forest fires, illegal logging, livestock grazing, and others.

One key strategy to enhance resilience of the boreal forest under the climate change, is to implement Sustainable Forest Management, which includes promoting forest health and biodiversity conservation, sustainable timber harvesting, ecosystem restoration, and improvement of forest management practices.

The implementation of these measures has led to the revitalization of forest health, improved water quality, enhanced habitat conditions, reduction in soil erosion, increased resilience to insect pests, and decreased the availability of fallen trees as potential fire ignition sources. Implementing ecologically sound forest plantations such as planting ecologically significant tree species, in naturally significant areas, including watersheds, contributes to overall ecosystem preservation and further enhances the state of forest ecosystem resilience.

Photo credit: G.Bayarkhuu

4.1.4 Wild flora

Very rare, rare plants and their conservation.

Under the impacts of climate change, habitat degradation, natural disasters, and negative human activities, the number of plant species in the red list of threatened species is on the rise (CR – critically endangered, EN-endangered, VU-vulnerable)[5]. Therefore, in order to enhance the coverage and protection status of plant types and species classified as endangered through assessments, it is essential to revise the list of extremely rare and rare plants outlined in the appendix of the Law on Natural Plants. Moreover, addressing the distribution of plants and conducting resource assessments, as well as research efforts at the relevant level, should be incorporated into and aligned with the climate change adaptation measures and needs.

External factors and threats to plants.

The species included in the regional threat categories (CR, EN, VU) according to the criteria of the IUCN Red List face various threats. Among these species, 59.3 percent are threatened by habitat loss and degradation due to human activities, 47.3 percent are at risk from natural disasters, 45.3 percent are endangered due to internal factors, and 38.6 percent are in danger due to resource use (Nyambayar et al., 2012)[6]. The primary factors contributing to the diminishment of Mongolian plants include overgrazing of pastures, drought, harvesting for medicinal purposes, and reduced regeneration.

4.1.5 Wildlife

According to the criteria of the IUCN Red List, Mongolia has several species classified as endangered or vulnerable. Out of 64 fish species, 2% are critically endangered, 13% are endangered, and 8% are vulnerable. Among the total of six amphibian species, 67% are classified as vulnerable. When it comes to carnivores, 11% of the 21 species are classified as vulnerable, and 28% are classified as endangered. Bird species show 10% of the 476 registered species as endangered (0.6% critically endangered, 1.7% endangered, and 3.3% vulnerable). Among mammal species, 1% are extinct, 2% are endangered, 11% are critically endangered, 3% are classified as vulnerable, and 6% are classified as endangered.

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[5] Urgamal M. 2017. Conservation of flora diversity and Red list (chapter 4.2). Vol III: "Biological diversity of Mongolia", Environment of Mongolia (I-V volumes). Ministry of Environment and Tourism, Ulaanbaatar.

[6] Nyambayar D., Oyuntsetseg B., Tungalag R. (compiled). Jamsran Ts., Sanchir Ch., Bakhman S., Soninkhishig N., Gombobaatar S., J.E.M.Bayille, Tsendeekhuu Ts. (editors) (2012). Red List of plants of Mongolia and conservation planning. Regional Red List Vol 10. Zoological Society of London, National University of Mongolia (in Mongolian and English languages).

4.1.6 Pasture

The assessment of Mongolia's grasslands in 2020 reveals that the composition of plant species has undergone a significant deterioration compared to the reference level. This deterioration is observed in almost 70% of the total grasslands. On average, to maintain ecological sustainability, there should be 62 sheep per 100 hectares of land. However, in 2019, there were 105 sheep / 100Ha (or 147 when considering the number of animals in each 'bag', 'horoo' per territory), which stands as one of the primary contributors to pasture degradation and overgrazing.

4.1.7 Land and Desertification

In 2020, Mongolia's desertification assessment revealed that a staggering 76.9 percent of the total land area, equivalent to 120.3 million hectares, had experienced degradation. Within this area, 4.7 percent falls into the severe degradation category, while 18.6 percent faces severe conditions. Notably, desertification and land degradation have affected 50-70 percent of the administrative units in Dornogovi, Dundgov, Umnogovi, Gobi-Sumber, Gobi-Altai, Bayankhongor, Uvurkhangai, and Tuv provinces[7]. The leading natural factors contributing to desertification are intensified droughts driven by climate change. Additionally, human-induced factors such as excessive livestock numbers and inappropriate pasture use are significant contributors.

4.1.8 Permafrost

Permafrost distribution and area change.

Permafrost in Mongolia delineates the southern margin of the permafrost region of Western Siberia. The south of the country does not have permafrost, and permafrost is concentrated in northern areas and on the high elevations of four large mountains (Jambaljav et al., 2017). In 1971, permafrost zones encompassed 63% of Mongolia's territory , but by 2016 this coverage had diminished to just 29.3%. In other words, potential area for the spread of premafrost has decreased by 33.7% in the last 45 years (1971-2016). Also, the southern boundary of permafrost was moved to the north and/or upland by 178 km in the Khenti range and 94 km in the Khangai range, and 240-900 m in the Altai range.

Socio-economic, ecological consequences of permafrost degradation.
The impacts of climate warming on permafrost are evident through various changes, including desertification, the depletion of springs and streams, and alterations in the groundwater's hydrological cycle within mountain systems. These shifts can have far-reaching consequences, ultimately resulting in ecological imbalances.

Photo credit: MECC

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[7] Information and Research Institute of Meteorology, Hydrology and Environment https://eic.mn/dldbase/

Photo credit: MECC

4.1.9 Protected Areas

It is considered essential to implement adaptation measures within Protected Areas, with a particular focus on safeguarding the land and developing location-specific strategies. As of 2020, Mongolia has designated approximately 21% of its land, equivalent to 32.8 million hectares, across 120 locations under special protected areas within its network. This proactive conservation approach has helped protect approximately 50% of rivers and river basins, 40% of forested areas, and around 350 species of rare and highly endangered flora and fauna. The "Vision-2050" long-term development policy of Mongolia (2020) introduces the objective of "preserving and cherishing the value and benefits of nature while maintaining the equilibrium of the primary ecosystem." It sets out the target of increasing the proportion of special protected areas in the country to 27% by 2025, 30% by 2030, and a long-term goal of achieving 35% by 2050.

Photo: sodonsolution.org
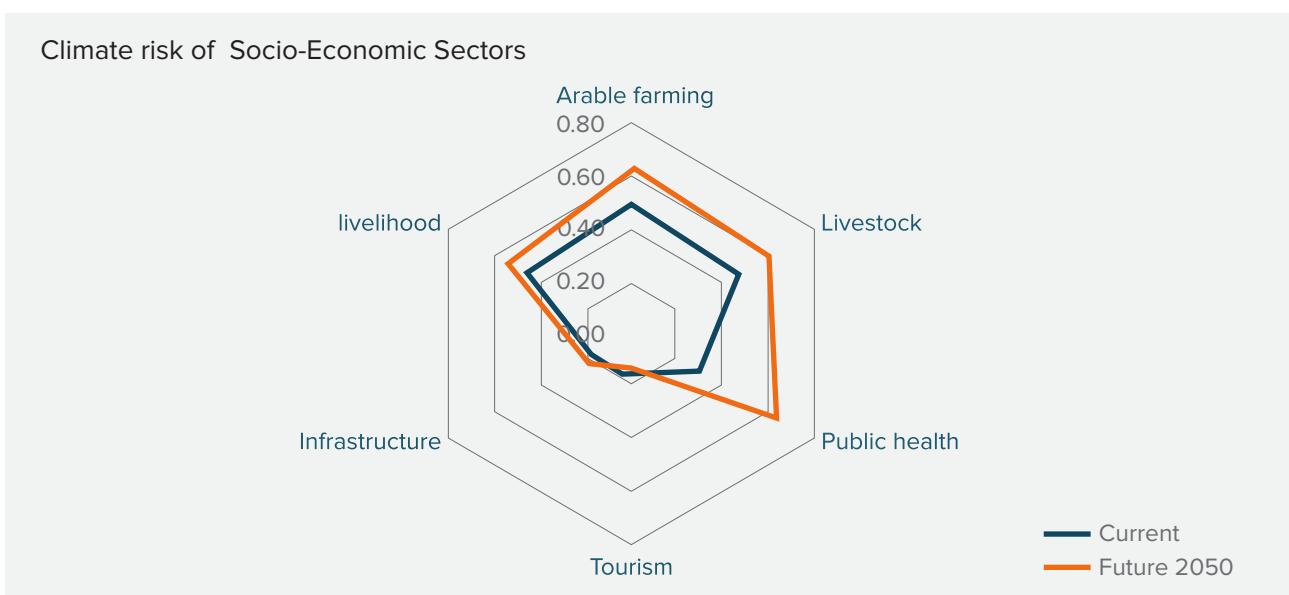
4.2 SOCIAL SECTOR AND CLIMATE CHANGE

In accordance with the climate risk assessment of sectors susceptible to the impacts of climate change and the assessment of existing and future vulnerability/resilience indices, risk indicators for environmental components were determined (NAP, 2023). The current and future state of vulnerability and risks of Mongolia's socio-economic sectors is characterized by increasing adverse impacts, vulnerability and risks due to climate change in various sectors except the tourism sector, as assessed and shown in Figure 2. In the context of tourism sector, the climate comfort condition is likely to increase, winter events are becoming less risky, and for other sectors, transitioning to 1-2 level higher risk categories is anticipated.

FIGURE 2. Climate change vulnerability and risk index of socio-economic sectors of Mongolia

Source: Fourth National Communication. 2022

4.2.1 Population and Migration
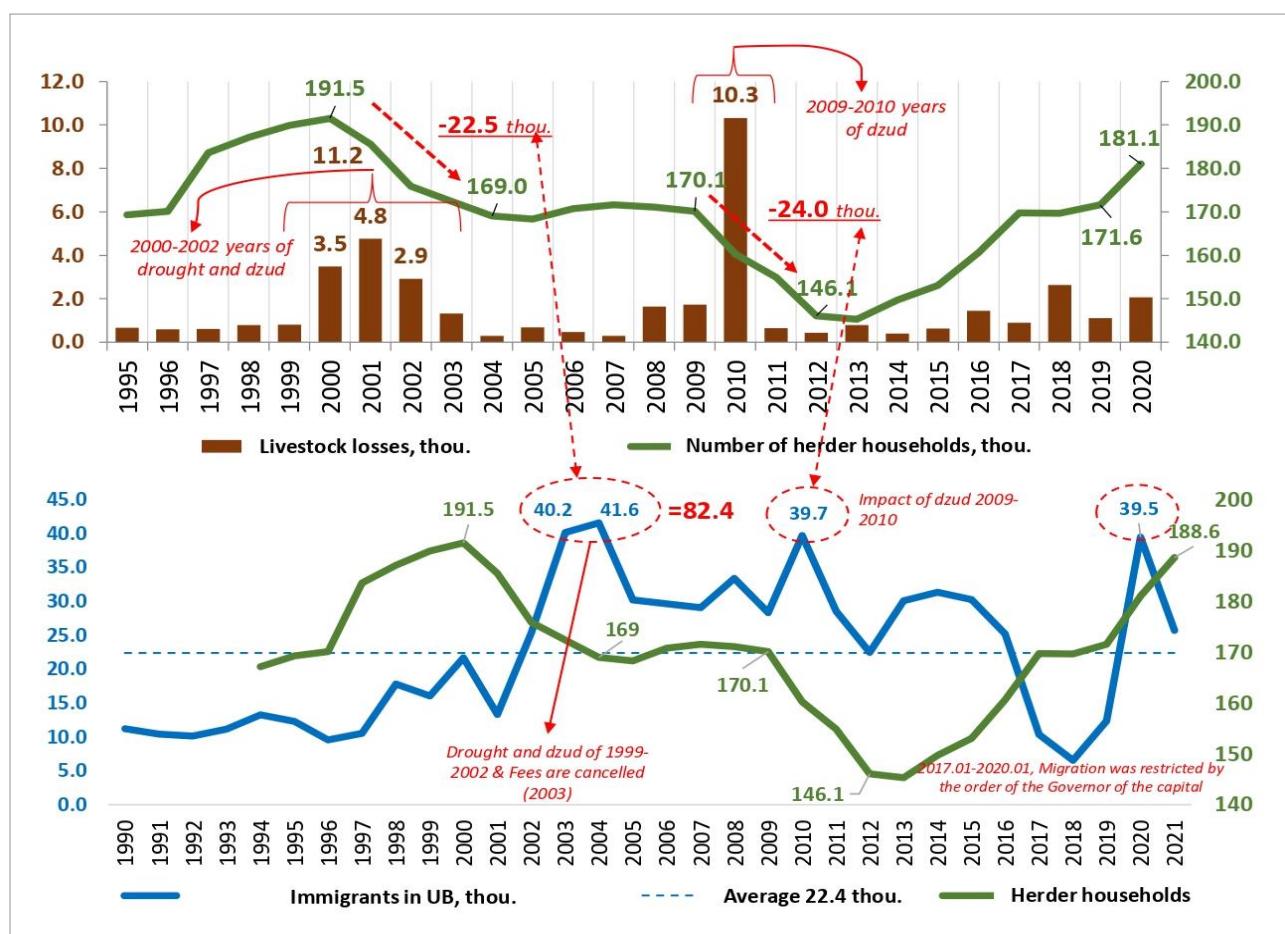
Mongolia is one of the vulnerable countries to climate change in terms of its socio-economic system, with high exposure to impacts of climate change considering its population distribution, geographical conditions, lifestyles, and economic structures[8,9]. The population reached 3.4 million[10] by the end of 2021 and is anticipated to grow to approximately 5 million[11] by 2045. The population is distributed across urban and rural areas, with a predominantly agriculture (livestock and crop farming) based economy and lifestyle. In 2021, 69% of the total population resided in urban regions, with 48% of the inhabitants concentrated in Ulaanbaatar[12].

Population change:

In Mongolia, poverty and migration are mainly originating from rural areas, and climate change has a large impact on this matter (Altanbagana and Saruul, 2021).

FIGURE 3. The number of livestock lost to drought and zud, the number of rural herder households, and the dynamics of the number of people migrating to Ulaanbaatar, 1990-2020,

8 Altanbagana M. 2017. "VULNERABILITY: Socio-ecological system of the rangelands". ISBN 978-99929-3-882-9. Published in Soyombo Printing LLC. Ulaanbaatar.

9 Chuluun T., Altanbagana M., Dennis Ojima, Tsolmon R. and Suvdantsetseg B. 2017. "Vulnerability of Pastoral Social-Ecological Systems in Mongolia". Springer International Publishing AG 2017: Rethinking Resilience, Adaptation and Transformation in a Time of Change. Editors: Wanglin Yan and Will Galloway. ISBN 978-3-319-50169-7. pp 73-88. Switzerland.

10 National Statistical Office. 2019. Publication of Statistics of Mongolia. Ulaanbaatar.

11 National Statistical Office. 2017. Updated population projections for 2015-2045. ISBN 978-99973-79-32-0. Ulaanbaatar

12 Institute of Geography and Geoecology, MAS. 2020. "Revision of the Basis of the Theory for Regional Development of Mongolia, Integrated Method and Methodology" fundamental research project's report (ШуСс-2019/48). Funded by Mongolian Foundation for Science and Technology. Ulaanbaatar.

This chain effect has the potential to ultimately hinder the implementation of Mongolia's major development goals. Climate change and natural disasters are one of the causes of population migration from rural to urban areas[13].

In the past 30 years (1990-2020), 691,900 people migrated from the countryside to Ulaanbaatar, equivalent to the population of seven large provinces and 46 per cent of Ulaanbaatar's current population.

Looking at the past 30 years of migration, the highest numbers were 40,200 in 2003, 41,600 in 2004, 39,700 in 2010, and 39,500 in 2020.87 Migration in these years was due to the impact of drought and dzud in 1999-2002, the impact of dzud in 2009-2010, and the invalidation of the capital city governor's order limiting migration from January 2017 to January 2020. During the same period, 122.1 thousand people migrated to Ulaanbaatar city due to dzuds, which is 29% of the total migrants.

The 2010 population and housing census reported that Mongolia's population had reached 2,754.7 thousand. Between 2000 and 2010, it saw an increase of 381.2 thousand people, averaging 34.6 thousand per year, and or by 1.5 percentage. According to the 2020 state census of population and housing, Mongolia's population has now expanded to 3,296.8 thousand, marking a five-fold increase since 1918, 61.3 percentage rise since 1990, and an average annual growth of 2.2 percent since 2010.

Demographic load/burden:

The socio-economic impact of the population's age structure is quantified through the measure of demographic load, which calculates the number of dependents per 100 individuals capable of providing for them. Mongolia experienced its highest demographic burden in 1969, with one dependent per working-age person, a considerably high ratio. By 2010, the working-age population constituted the majority of the total population, leading to a substantial reduction in the demographic load. However, by 2020, this load had reached 55.3, marking an increase of 10.4 units since 2010. In the future the overall demographic load is expected to decrease, although the burden of elderly dependents will rise. It's important to note that this situation can vary significantly from one region or province to another[14].

Population Density:

Over the past two decades, there has been a shift in the relative uniformity of population distribution, leading to the emergence of densely populated areas around industrial and transportation hubs. This has resulted in significant variations in population density across the country. While there have been no major shifts in the location and density of Mongolia's population over the last thirty years, certain areas stand out as population centers.

4.2.2 Climate Change Impacts and Its Vulnerability

The guidance provided by the NAP project delivers comprehensive insights into the impacts and risks associated with climate change on both Mongolia's population and society[15], and provide comprehensive definitions, explanations of Mongolia's climate change, vulnerabilities, impacts, and risks. This extensive resource has also enabled the formulation of conclusions in relation to climate-related socio-economic impacts and associated risks[16].

Rural population and livelihood:

Climate change poses a significant threat to the livelihoods of rural communities and nomadic herders, which constitutes approximately 20% of the population, as their traditional way of life

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[13] Altanbagana Myagmarsuren, Saruul Galtbayar "Climate Change Impact on Social and Economic Sectors in Mongolia". Proceedings of the Environmental Science and Technology International Conference (ESTIC 2021). Atlantis Press, Springer Nature. Link: https://www.atlantis-press.com/proceedings/estic-21/125962220. DOI:10.2991/aer.k.211029.008.

[14] Institute of Geography and Geoecology, MAS. 2025. "Spatial patterns and influencing factors of internal population migration in Mongolia (2022-2024)" fundamental research project's report (ШУТБИХХЗТ-2022/190). Funded by Mongolian Foundation for Science and Technology. Ulaanbaatar.

[15] An overview of climate change impacts on livelihoods, biodiversity and health for vulnerable communities, and a handbook to identify adaptation strategies, 2021

[16] An overview of climate change impacts on livelihoods, biodiversity and health for vulnerable communities, and a handbook to identify adaptation strategies, 2021

heavily relies on water and pasture resources. This demographic is particularly vulnerable to climate impacts. Moreover, it's worth noting that the proportion of herders within the overall population has been decreasing over time. For instance, it stood at 25.2% in 1985, increased to 30.7% in 1995, declined to 26.1% in 2005, dropped further to 20.7% in 2015, and reached 18.7% in 2018 (S. Enkh-Amgalan, 2019).

Indicators for assessing the vulnerability of the livestock sector include:

- Social and economic, e.g. animal mortality and the economic hardships faced by herders.

- Losses of ecosystem services such as the degradation of pastures, acceleration of desertification, decreased plant productivity, reduced species diversity, water resource scarcity, and increased forest and wildfires.

- Varying climate change impacts and disparities in terms of poverty, age (particularly among children), and gender within the affected population.

The vulnerability will continue to increase, but there is a lack of comprehensive research on the impact of climate change on herders' livelihoods, vulnerability risks, and their future trends at the level of local communities and herder households at the national level.

Population, settlement and replacement:

In the last 30 years, urbanization in Mongolia has been on the rise. Enhanced infrastructure in both central and rural areas, along with improved access to quality education and healthcare, has increasingly attracted people, making urban centers a reliable source of employment and income. For instance, the urban population's proportion of the total population was 21.6 percent in 1956, 40.2 percent in 1963, 44.0 percent in 1969, 51.2 percent in 1979, 57.1 percent in 1989, 56.6 percent in 2000, and 67.9 percent in 2010. However, by 2020, this factor reached to 67.8 percent[17].

Impacts on vulnerable groups:

The impacts of climate change, drought, and arid conditions are influencing rural poverty and social vulnerability, particularly through their effects on the livestock sector. Urban and rural populations exhibit varying abilities to withstand and adapt to the risks resulting from climate change, depending on their household income and living conditions. It is evident that individuals with lower incomes, impoverished communities and herders are more susceptible to these effects.

Adaptive capacity is directly linked to a reduction in vulnerability. The measurement of climate change adaptation is science-based and tailored to specific spatial characteristics. It involves assessing the climate change vulnerability of the "herder-livestock-pasture" system and conducting a policy analysis at the local level. More specifically, the IGG assesses the ecological, social, and economic vulnerability to climate change at the local level in Mongolia. This is achieved by identifying and analyzing the relationships between the key variables and indicators of climate change vulnerability and calculating an integrated vulnerability index. A total of 21 ecological, social, and economic vulnerability variables and indicators have been initially selected to develop a pastoral and socio-economic vulnerability index. These include factors such as livestock numbers, forage preparation, herders' education levels, insurance take-up rates, poverty rates, bank savings and loan amounts, the number of health professionals, and migration patterns[18]. Some of the findings from the ecological, social, and economic vulnerability assessment at the local level were taken into account and contributed to the development of the NAP.

Research has shown that among herding families, those who are classified as poor and have a small number of animals (typically up to 100 or 200 heads) are more vulnerable to the impacts of natural disasters. For instance, during the period from 2000 to 2002, rural poverty surged by 33%

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following a drought, and one in every three people experienced its effects. As poverty levels decrease, the proportion of middle and upper-class citizens will rise. Thus, it is important to integrate climate objectives into the poverty alleviation strategies, as to reduce vulnerability of social groups both in urban and rural areas and enhance their capacity for adaptation. In light of this, it is sensible to include rural poverty as a criterion for fortifying adaptive capabilities to climate change[19].

Damages caused by natural disasters.

Between 1970-1990, Mongolia has experienced an estimated 25-30 disasters annually, resulting in damages of 5-7 billion MNT per year. However, since 1990, these damages have escalated to 10-12 billion MNT per year (excluding drought), underscoring an increasing risk of disasters. Research has revealed that within herding families, individuals classified as poor and those with smaller herds (typically up to 100 or 200 animals) are disproportionately affected by these natural disasters. For instance, during the

period from 2000 to 2002, following a drought, rural poverty surged by 33%, impacting one in every three people.

In 2019, rural areas in Mongolia were home to 32.1% of the population, equivalent to approx. 1 million people out of a total of 3.2 million. Among these, there were 171 thousand herding households, constituting 20% of all households. A significant 89.4% of the country's total livestock, amounting to 63.4 million animals, were owned by these livestock herders, for whom animal husbandry is the primary source of livelihood. Within the livestock herding households, those with herds of up to 100 animals made up 21.2%, totaling 36.5 thousand households, while households with up to 200 animals accounted for 40.4%, equivalent to 69.4 thousand households. This indicates that the households with small herds (up to 100 or 200 livestock) is not a minority group, and these groups identified as vulnerable to climate change impacts.

Photo credit: montsame.mn

[19] Altanbagana Myagmarsuren, Saruul Galtbayar "Climate Change Impact on Social and Economic Sectors in Mongolia". Proceedings of the Environmental Science and Technology International Conference (ESTIC 2021). Atlantis Press, Springer Nature. Link: https://www.atlantis-press.com/proceedings/estic-21/125962220. DOI:10.2991/aer.k.211029.008

4.2.3 Public Health and Climate Change

Climate change impacts and risks.

Climate change is contributing to an increase in cardiovascular disorders, diarrhea, malnutrition, and infectious diseases, particularly among children. This trend raises concerns about the potential emergence of new infectious diseases and the resurgence of existing ones in the future. Furthermore, the growing frequency of natural disasters like floods, heavy rains, storms, and strong winds heightens the risk of fatalities, mental distress, homelessness, and delayed access to medical care and services. While certain efforts have been made in areas such as education, research, advocacy, and interdisciplinary collaboration, aligned with WHO resolutions and national health sector adaptation strategies, these measures are insufficient to effectively mitigate the impact of climate change on public health. Moving forward, Mongolia's healthcare sector must take a more realistic approach to identifying and planning climate adaptation measures and fostering robust cooperation.

The guidance on adaptation priorities and climate change scenarios provides indicators and vulnerability assessments for the years 1986-2005 and risk indices for 2046-2065, categorized by province. The vulnerability index designates Uvs, Zavkhan, and Dundgovi provinces as the "most vulnerable." On the other hand, Khuvsgul and Bulgan provinces are classified as the "least vulnerable." In terms of future impact and risk, Uvs, Hovd, Govi-Altai, and Dundgov provinces are deemed "at the highest risk," while Khuvsgul and Selenge provinces have received a "low-risk" as assessed.

Diseases among the population. The average incidence of diseases among the population over the last decade (2011-2020) reached at 7,969.8 cases per 10,000 population. However, in 2019, the number of cases per 10,000 population surged to 11,298.2, marking a notable increase of 3,328.4 cases over the 10-year average and a 1.9-fold rise compared to the rate in 2010.

Infectious Diseases:

Over the past decade (2011-2020), a total of 31 different infectious diseases were recorded nationwide, with an average rate of 157.2 cases per 10,000 population. As of 2019, a total of 45,200 cases of 27 types of infectious diseases were reported nationwide, marking a 1.5% decrease from the 10-year average but a 7.5% increase from the previous year. The incidence of infectious diseases per 10,000 population was 143.2, representing a 15-point decrease from the 10-year average but a 9-point increase from the previous year. When comparing the incidence of infectious diseases by province, the capital city, and regions, it was found that Ulaanbaatar city and provinces in the eastern region had rates 25-44 per 10,000 people higher than the national average. Within the eastern region, Dornod and Sukhbaatar provinces experienced higher incidence rates in 2019 compared to the national average.

Non-communicable diseases:

The prevalence of non-communicable diseases within the population surged by 1.8 times from 2010 to 11,298 cases in 2019. Notably, diseases related to the respiratory and cardiovascular systems remain the leading causes of morbidity and mortality among the population, and the absence of any declining trends underscores their urgency as significant public health concerns. In the period from 2010 to 2019, the incidence of respiratory and circulatory diseases exhibited links with climatic factors such as air temperature, precipitation, wind speed, and relative humidity. Pneumonia (coded J10-J18) emerged as the most frequently reported ailment during this time frame. It displayed a modest inverse correlation with average air temperature and a mild positive association with relative humidity and precipitation. In contrast, heart attack cases (coded I20-I25) showed an inverse relationship with air temperature, precipitation, and relative humidity.

Heat-related ailments and cardiovascular diseases:

When considering the population's health in Ulaanbaatar, Mongolia, it is essential to note the increasing frequency of high-heat days. Between 1985 and 1995, there were 201 such days, and this number rose to 385 between 1996 and 2005. In the subsequent decade, from 2006 to 2015, there were 373 high-risk heat days. These figures have

since fluctuated, with recorded days ranging from 4 to 56, suggesting a potential for further increase in the future.

A significant correlation exists between mean air temperature and healthcare-seeking behavior. Notably, when temperatures exceeded 18°C, the total number of hospital admissions increased by 1.17% after just one day, and this trend remained statistically significant for 15 days. Conversely, when temperatures remained below 18°C, the hospital admission rate rose by 1.30% after 15 days, a statistically significant trend[20].

Photo credit: news.mn

4.2.4 Zoonotic Infections

Climate change is recognized as a key driver that enhances the transmission of infections through vectors, thereby influencing the species, dynamics, and geographical distribution of tick vectors (Batima P., 2005)[21]. In a study conducted in Mongolia, it was anticipated that climate change could lead to the emergence of over 20 tick species in the region (Kaifer D, 2010)[22]. As of 2016, there were records of 16 species of Ixodes ticks from 5 different genera and 1 species of Ixodes (B. Boldbaatar, 2016). Ixodes types of ticks exhibit their highest activity levels during spring and autumn when the soil temperature ranges from 5-7°C. They feed on blood throughout the summer and become inactive during the winter. Tick populations significantly increase during rainy summers and warm winters. Investigations into tick-borne infections reveal that Ixodes persulcatus is a widespread tick species in Selenge province. It has been associated with infection rates of 26.14% for Anaplasma phagocytophilium, 11.75% for Anaplasma platys, and 70.9% for rickettsial infections.

Based on research into mosquito-borne infections, it was observed that mosquito activity in Selenge province peaked during the hours of 07:00-09:00 in the morning and 18:00-20:00 in the evening when air humidity was elevated and wind speeds were low. There was a mild positive correlation between mosquito numbers and air temperature, as indicated by a correlation coefficient (r) of 0.36 with p<0.001. Additionally, a weak positive correlation was established with statistical significance in relation to relative air humidity[23].

As revealed by a study on the transmitter of marmoset plague, it was observed that the average air temperature in the Ugalz Mountains of Gobi-Altai province during May and June was +9.9°C. In May and June of 2012, it was recorded at 12.85°C, reflecting an increase of 2.94°C. Furthermore, during the previous survey, several species, such as the red-headed shrike, yellow warbler, and yellow warbler, which were not previously observed in this research area, are common representatives of desert and dry steppe fauna. Their presence suggests changes in vegetation cover due to aridity, indicating alterations in species composition within the area. For instance, the Bozlog squirrel, typically associated with desert and dry steppe environments at elevations of 2,450-2,660 meters, or mountain steppe, was observed in this area, supporting the hypothesis that more favorable habitat conditions have emerged due to the effects of aridity.

[20] Turner LR, Conell D., Tong S. Exposure to hot and cold temperatures and ambulance attendances in Brisbane, Australia: a time-series study, 2013:10.

[21] Batima P., Natsagdorj I., Gomboluudev P., Erdenetsetseg B., Observed climate change in Mongolia, 12 June 2005, Ministry of the Environment (Japan) Global Environment Bureau, Policy Planning Division, Research and Information Office, Climate change of Mongolia" Output from GCM

[22] Keifer D., Pfister K., Tserennorov D., Bolormaa C., Otgonbaatar D., Samjaa R., Burmeister E.G, Kiefer M.S, Current state of Ixodadae research in Mongolia, Erforch.biol. Ress. Mongolei. 2010 (11):405-418.

[23] Undraa B., Burmaajav B., Uyanga B., Dolgorkhand A., Oyunchimeg S., Baigalmaa B., Otgonbayar D., Purevdulam L. Report of the project "Climate change and improved vector-borne disease control", 2011-2012.

4.2.5 Key Economic Sectors Affected by Climate Change

According to the studies, the negative impacts of climate change outweigh the positive ones in Mongolia due to the specific conditions of the country, such as geographic location, fragile ecosystems, economic structure, level of development, people's way of life and main source of livelihood, etc.

Mongolia's economy is highly dependent on the region's long-term climate regimes and resources, as well as on actual weather and climate conditions. Therefore, the potential impacts of climate change on key sectors of the economy which are very vulnerable to climate change such as livestock, arable farming, and infrastructure were assessed.

4.3 MAJOR ECONOMIC SECTORS AND CLIMATE CHANGE

4.3.1 Livestock Sector

Current status.
In the context of Mongolia's Third National Communication, a quantitative assessment was conducted to measure the impacts of climate change on various socio-economic sectors, including ecosystems, animal husbandry and agriculture, using data from a dynamic climate model (TNC, 2018). In this assessment, the quantitative impact results were standardized into a uniform unit of measurement and then evaluated based on both current vulnerability and anticipated future risk indices. The evaluation of these indices places the current state of these sectors in the "vulnerable" category, with an expected transition to the "high-risk" category by 2046-2065[24].

Human factors play an increasingly significant role in elevating vulnerability and the likelihood of adverse climate change impacts on the agricultural sector. Primarily, pastures, which are a fundamental element for the sustainable development of animal husbandry, have been misused, exceeding their carrying capacity. This improper utilization has had an effect on pasture degradation.

Due to shifts in herders' practices related to managing their income-generating activities, the animals to sheep herds has increased by 2.1 times, and the animal-to-pasture area ratio, or pasture

load, has surged by 2.4 times over the past 31 years. Many researchers assert that Mongolia's pastures can theoretically support up to 74.3 million sheep heads annually[25]. However, the livestock count at the end of 2021 stands at 114.4 million sheep heads, a staggering 54.1 percent above the sustainable carrying capacity.

In total, 69 percent of pastures across all locations within the grassland monitoring network have undergone transformations away from their natural state and have degraded[26]. Distinct alterations in plant communities have been observed in the pastures of soums, and provinces, particularly in areas where the carrying capacity of pastures has been exceeded.

The shedding time for goat cashmere occurs 5-10 days earlier in spring, while sheep wool shedding time remains nearly unchanged[27].

A comparison was made between the current reference levels and future trends for the period of 2030-2050 based on a study of the changing impact parameters of climate change on agriculture. Regarding temperature, 90th percentile of maximum temperature in summer season is expected to increase by 1.6-3.3℃, while the number of frost days per year is anticipated to decrease by 9.5-19

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[24] TNC, 2018

[25] A.Bakey "Scientific rationale of sustainable development of agriculture in Mongolia", 2020

[26] "National report on the state of grasslands in Mongolia", MOFALI, Swiss Development Agency, "Green gold" project, 2015

[27] Radnaa G. "Livestock impact assessment", IRIMHE, 2023

days. In terms of precipitation, daily precipitation intensity (pav) and Maximum number of consecutive dry days in summer remain relatively stable. This suggests that over the next 30 years, there will be a general tendency towards increased aridity, which will negatively impact both animal husbandry and agricultural production.

4.3.2 Grassland and Soil Degradation

According to the 2020 assessment of Mongolia's grassland status, there has been a change in the composition of plant species in nearly 70% of the grasslands compared to the reference level. When considering the level of degradation, the results indicate that 31.1% of the total area in the national grassland monitoring is classified as not degraded (level I or normal), 17.7% as slightly degraded (II), 22.4% as moderately degraded (III), 17.9% as severely degraded (IV), and 11.0% as severely degraded (V) or entirely lost its pasture quality.

According to studies on changes in livestock numbers and density, there has been an increase in the migration of large animals to the eastern region over the last decade, in addition to the overall rise in livestock numbers. Moreover, there is a rising trend of herdsmen intentionally reducing their livestock numbers during dry and drought years, which is one of ways for adaptation to climate change (B. Erdenetseg et al., 2022). In a scenario of moderate greenhouse gas emissions, by 2050 the land areas with biomass content of higher than 12 g/m^2, and 8.1-12 g/m2 are likely to cover extensive areas in the mountainous regions of Khangai, Khuvsgul, Khent, and both the western and eastern parts of the country. However, under conditions of high greenhouse gas emissions (RCP8.5) and more intense warming, these areas are expected to significantly shrink, with only the northern portion of the region, including Khuvsgul Mountains, Khangai, and Khenti Mountains, maintaining slightly higher biomass concentrations. Additionally, the above-ground biomass or yield in the western and Gobi regions is anticipated to decline considerably.

The primary cause for the anticipated decrease in pasture yield in the future is the intensified warming during the warm season. This warming trend is expected to coincide with minimal increases in precipitation during the growing season, which may not be sufficient to support soil nutrient levels. Consequently, Mongolia, with its arid and semi-arid climate, fragile ecosystem, and heightened vulnerability to climate change, faces a substantial risk.

Approximately 65 percent of the grasslands across various monitoring points in the grassland network have undergone alterations, shifting away from their natural state and experiencing degradation[28]. Notably, these changes are particularly evident in the plant communities of the soums and provinces, where the carrying capacity of pastures has been exceeded.

4.3.3 Arable Farming and Agricultural Productivity

Cropland soil.

In 1961-1963, a comprehensive joint expedition involving Mongolia and Russia conducted a thorough study of the cropland, identifying 1.7 million hectares suitable for cultivation. Within this arable land, 76.6% consists of black soil, with the remaining 17.5% being brown soil. However, a more recent analysis of agricultural soil, performed by the Institute of Plant and Agricultural Science between 2008 and 2013,

Photo credit: montsame.mn

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[28] "National report on the satte of grassland in Mongolia", MOFALI, Swiss Development Agency, "GreeGold" project, 2015

revealed that 67.0% of the total 926.4 thousand hectares of cultivated land contains less than 2.5% humus, and 13% possesses up to 3% humus content. Furthermore, this analysis indicates that 66.7% of the soil has low levels of phosphorus and potassium. These findings collectively suggest that soil fertility across agricultural fields throughout the country falls below the average. Additionally, the results of soil analysis demonstrate that various levels of erosion affect the entire 926.4 thousand hectares of cultivated land, with 53.3% displaying significant erosion, 30.4% indicating moderate erosion, and 17.2% showing minor erosion.

Intensive mechanical cultivation practices in crop production have had a significant adverse impact on soil fertility in areas with short-term fallow rotations, resulting in a substantial increase in erosion. Research indicates that, given current technological conditions, an annual loss of 1.03-1.16 t/ha of humus occurs from the soil's surface (0-20 cm) within agricultural fields.

Currently, more than 90% of all grains, over 60% of potatoes, and approximately 70% of cultivated fodder are reliant on non-irrigated conditions for their growth. Consequently, during years characterized by drought and heatwaves, the planting season is shortened, leading to significant per-hectare yield losses. Experts have determined that the rise in the number of hot days exceeding 26°C during the sixth and seventh months of the growing season adversely impacts the yield of winter wheat. When considering future changes in wheat yield (under RCP4.5) for 2020, 2050, and 2080, it is projected to decrease by an average of 4% from the current level (1986-2005), with anticipated reductions of 14% and 21% for 2050 and 2080, respectively[29].

Impacts and risks of climate change on arable farming.

Mongolia's agriculture is mainly non-irrigated. In this context, the climate warming and decrease in precipitation during the growing season is likely to pose a serious risk to agriculture, especially grain farming. Some studies have shown how climate change has led to cropland erosion, declining soil productivity, and depleted groundwater resources. In particular, declining rainfall during the growing season and increasing drought are adversely affecting grain production. In addition, the rapid melting of permafrost soils in Mongolia's Khangai region affects soil moisture availability and regimes. According to a study on crop growth conducted using DSSAT v.4.6 model at the IRIMHE, wheat yields are likely to decline by 9-37% between 2020 and 2080, assuming the continued use of current techniques and technologies. However, on the other hand, favorable conditions might be created by climate change such as a longer growing season and the increase in heat supply. These improved conditions could increase early spring planting, planting new drought-resistant crops, twice-yearly harvest of short-growth period plants in some potential regions, and possible winter planting opportunities, etc.

4.3.4 Infrastructure and Climate Resilience

Climate change will have a significant impact on roads and railways, bridges, buildings, and urban infrastructure and utilities. Due to the fact that permafrost is widespread in Mongolia, the melting of permafrost, the reduction of soil freezing depth, and changes in the groundwater regime will affect infrastructure, altering its basic design and geotechnical and climate parameters. Some studies suggest that the permafrost soils of the Nogoon Nuur area in Ulaanbaatar city were degraded significantly since 1970s increasing its temperature by 1.30C and deep in the soil. Therefore, it is necessary to make detailed re-estimations of these geotechnical and climate parameters to re-calculate the strength of roads, bridges and buildings as many of these will often be built on rapidly melting soils. It should also be borne in mind that the increase in natural disasters may pose an additional risk to infrastructure.

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[29] Gantsetseg B. "Crop production imapct assessment"

5. ADAPTATION NEEDS, OPPORTUNITIES AND RISK PREVENTION

Photo credit: Yad.Adiya

5.1 ADAPTATION STRATEGIES FOR CLIMATE CHANGE

In Mongolia, adaptation measures can be classified as passive adaptation, active adaptation, and proactive adaptation. The traditional lifestyle of local herder communities in Mongolia was based on pastoralism, which was featured by high exposure to natural hazards. At the same time, it has inherited adaptive capacity, gained throughout thousands of years experiences, overcoming stressful impacts associated with climate variation and fluctuations of climate parameters. Thanks to that situation, the passive adaptation measures without notable financial implications can be practiced. Newly developing economy sectors like agriculture, infrastructure, mining, and urban development, and social sectors like social protection and human health sectors would require more active adaptation measures with significant financial implications and technology development needs. The focus should be made on proactive adaptation measures, although those measures might require, to some extent, a paradigm shift and extensive innovation in respect of finance, technology, and management.

5.2 POLICY FRAMEWORK FOR ADAPTATION POLICIES, PLANS AND MEASURES

The scope, direction, and objectives of climate change adaptation policies, planning, measures, and activities are well-aligned with several key development policies and programs in Mongolia. These include:

i. "Vision-2050" Mongolia's long-term development policy (2020), Mongolia's five-year development guidelines for 2020-2025 (2020), and the 2020-2024 Action Plan of the Government of Mongolia (2020), "New Revival Policy" (2021), Resolution on some measures to be taken to ensure food supply and security (2022); Environmental Target Program (2023);

ii. Government Resolutions: "Vegetables" National Program (2017), National Program to Support the Development of Intensive Animal Husbandry (2018), Human Development Target Program (2023), Social Development Target Program (2023);

iii. Nationally determined contributions to the Paris Agreement (NDC, 2019); the "action plan for implementation of nationally determined contribution" (2021), as approved by the National Climate Committee.

5.3 ADAPTATION STRATEGIES FOR KEY SECTORS

5.3.1 Water Resource Management

Water resources cumulated in icy snow and glaciers are projected to decrease significantly, with an expected decline to 14.2 km^3 by 2025, 13.0 km^3 by 2030, and 10 km^3 by 2050. To address this challenge, several measures need to be planned and undertaken such 2.1 km^3 of glacier melt and a further 5.1 km^3 of water resources by 2050 needs to be stored in various reservoirs, including those in Khovd (such as Tsagaan, Altangadas, Buyant, Asgat river, and Bukhmuren (Munguntaiga, Russia), Bulgan, Tsenkher, Koshoot (Khovd), as well as in the reservoirs of Kharkhiraa, Turgen, and Namir (Uvs), Zuil (Sutai, Gobi-Altai), Bogd river (Otgontenger, Zavkhan), Bayan, Gorkhon (Munkhsaridag, Khuvsgul) rivers through the establishment of ponds, water storage and fish breeding reservoirs. Additionally, these efforts need to include interventions addressing water supply in the Great Lakes Depression Lakes, Tsetseg, Dariv Tsagaan, Tonkhil, and Achit Lakes through regulation of water regimes of lakes.

In accordance with the value and distribution of the aridity index, specific adaptation principles are followed, adaptation actions are to be implemented for each climate zone. These include:

In humid and sub-humid regions:

To address the water supply in the these regions holistically by undertaking measures such as the establishment of reservoirs, hydroelectric power plants, fish breeding ponds. This will be achieved in river basins originating from mountainous regions with abundant precipitation and glaciers.

To support the flow regulation capacity of river basins by enhancing the quality of forest areas in the Khangai, Khentii Mountains, and Khuvsgul Mountains. Similarly, water collection measures and the redirection of flow to support the central agricultural areas, Gobi, and steppe regions will be implemented, particularly in river basins such as the Selenge River and its tributary Orkhon. Additionally, measures will be taken to address the water supply

needs of wildlife and livestock farming in arid and semi-arid climates, including the construction of hay irrigation ponds, ditches, and fish breeding ponds, water patches at the lower border of the climate zone.

Semi-humid and arid regions:

In steppe, dry steppe, and desert regions, as the aridity index increases, many small lakes will be dried up. The management of water resources will be carried out at this basin, internally, by delivering water to the lakes of the river beds and transferring the flow to Onon, Kherlen, and Khalkh rivers.in the Pacific Ocean basins, such as from the Onon River to the Ulz River.

Semi-arid and arid regions:

To establish water storage facilities in low evaporation areas at the upstream and and midstream of the Baidrag, Ongi, Taats, Ar-Aguit, and Tuin river basins, addressing water supply challenges in river basins, while rejuvenating and safeguarding ecosystems of lakes, water bodies, and wetlands (in accordance with the Ramsar Convention), including Ulaan, Orog, Taats Tsagaan, Haya lakes etc., to build the capacity and infrastructure necessary to regulate the water regimes effectively.

Adaptation measures and activities will be carried out as follows:

- The construction of Managed Aquifer Recharge (MAR), underground water reservoirs and infiltration wells will be conducted through collaborative efforts between the government, private sector, provincial authorities, mining and other sectors, including light and heavy industries.

- Activities to protect and fence springs will be implemented by herders, herder groups and local communities to facilitate livestock irrigation across all climate zones.

- On a national and regional scale, numerous large-scale projects will be undertaken based upon

the Parliament and Government decisions in the water sector. These projects will encompass the storage of rain and snow runoff and glacier meltwater, the regulation of water regimes in Great Lakes depression lakes, the management of river flows within the lake valleys, the diversion of water from the Selenge and Orkhon Rivers to arid and steppe regions. Additionally, projects will involve water resource accumulation and the regulation of

lake water and ecosystems, the establishment of fish breeding ponds, well construction, spring protection, and deliberate groundwater recharge through the redirection of dry creek flows. The implementation of Managed Aquifer Recharge (MAR) facilities will be coordinated at various levels, from the national government down to provincial, district, forest, and herder communities.

5.3.2 Forest sector

Photo credit: NAP project

Boreal forest:

Mongolia's boreal forests encompass a diverse range of coniferous and deciduous tree species that stretch across the forest steppe, taiga, and mountainous regions. These forests are primarily dominated by four key tree species: Siberian larch (Larix sibirica), Siberian cedar (Pinus sibirica), Scots pine (Pinus sylvestris), and Siberian spruce (Picea obovata) (УАӨТХН, 2017). Among the deciduous trees, the most common varieties include Asian white birch (Betula platyphylla), Uliangar (Populus tremula), and poplar (Populus laurifolia). Positioned at the ecological transition zone between the northern Siberian taiga forests and the southern steppes, these forests predominantly thrive on mountain slopes within an elevation range of 800 to 2500 meters above sea level. Siberian larch stands as the dominant tree species, constituting approximately 80% of the forest's composition, with the remaining 10% comprised of other tree varieties. These forests exhibit a modest average annual growth rate of 113.9 cubic meters per hectare. They are characterized by low annual productivity,

slow growth patterns, vulnerability to factors such as drought, fire, and insect-related damages, and limited expansion into non-forest areas.

Saxaul forest:

The saxaul forest, found in the southern regions of the country, thrives within the arid and barren steppe zones with a relatively sparse crown cover, typically below 10 percent, and occasionally growing taller than 4 meters. This forest ecosystem is primarily characterized by the presence of dominant species such as Haloxylon ammodendron, Populus diversifolia, various Tamarix species, and Caragana. The saxaul forest plays a vital role in reducing sand migration, stabilizing the surrounding sand dunes, and serving as a valuable source of fuel for local communities. Although the biomass above the reed forest is relatively low, with an annual growth rate of approximately 1 meter per hectare, its significance in mitigating climate change might be limited. However, it holds substantial socio-economic importance by creating a habitat for both plant and animal species in arid regions while also supporting the livelihoods of desert-dwelling communities.

5.3.3 Agriculture sector

The primary objectives and guiding principles for agricultural adaptation to climate change are articulated in Mongolia's key development policy documents. Notably, specific targets pertaining to climate change adaptation within the sector are outlined in section 6.6.2 of Mongolia's long-term development policy, "Vision - 2050"[30]. These objectives encompass the preservation of soil fertility and moisture, the prevention of land degradation and desertification, and the rehabilitation of damaged and degraded land.

Furthermore, in section 6.4.1, the policy seeks to enhance consumption and production productivity through the adoption of eco-friendly and efficient advanced technologies. Additionally, section 6.4.2 emphasizes the reduction of greenhouse gas emissions and an increase in carbon absorption within the agricultural sector. In section 8.3.1, the document proposes strengthening of adaptive capacities to climate change and risk-bearing, as well as the development of a smart system underpinned by insurance, registration, and information, in alignment with the principles of the green economy in agricultural production.

Within the framework of Mongolia's Nationally Determined Contribution[31] to the global climate change goals, the primary adaptation goals for the two major agricultural sectors are determined as follows.

- Achieving ecosystem balance through enhanced pasture management is the primary objective of the livestock sector.
- At the national level, the primary objective of agricultural sector adaptation is to decrease the proportion of fallow land in non-irrigated crops, promote the cultivation of mid-late crop varieties, expand irrigated crop production through the adoption of water-efficient technologies, and harness snow and rainwater to enhance crop yields in a sustainable manner.

- Regarding the agricultural sector, the uptake of innovative climate-resilient technologies has been slow, and there remains a high prevalence of fallow land within crop rotations. For instance, the Biennial Report (BUR1) from 2015-2020 outlined three objectives related to agriculture, such as transitioning away from traditional land plowing methods to prevent soil erosion. However, it was determined that the implementation of these measures has been inadequate[32].
- In the adaptation plan, it is essential to address the following aspects related to establishing a policy and legal framework for agricultural sectoral adaptation to climate change, as well as the structure and organization of inter-sectoral coordination. These include:

The policy on the livestock sector's adaptive technology aims to ensure ecosystem balance through enhanced pasture management. To achieve this goal:

- Implement management practices to regulate livestock numbers, types, and structural composition in alignment with pasture carrying capacity.

Photo credit: NAP project

- Enhance animal health services and establish a smart registration and information system for monitoring livestock and their associated materials and products, elevating meat processing standards, and expanding export opportunities.

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[30] https://legalinfo.mn/mn/detail/15406, "Vision - 2050" On approval of the long term development policy of Mongolia, Raliament resolution, №52, 2020

[31] INDC_Full-Document_MON_2016.pdf

[32] "Actions to mitigate GHG emissions" chapter, The Fourth National Communications, MET, CCRCC, GGGI, 2022

- Support the growth of intensive agriculture by enhancing the quality and viability of animal breeding.
- Incorporate environmentally sustainable, and advanced techniques and technologies within animal husbandry practices.

The policy on the agricultural sector's adaptive technology dedicated to preserving soil fertility, moisture, and combating desertification. To achieve this goal:

- Promote the comprehensive adoption of zero-fertilization technology in agricultural production.
- Decrease the proportion of fallow land in non-irrigated crops while increasing the inclusion of bean crops in crop rotation.
- Implement smart water-saving technologies to optimize irrigation practices.
- Cultivate crop varieties using drought, disease, and pest-resistant seeds.

- Enforce ecologically friendly plant protection measures for sustainable agricultural practices.

The institutional policy on the adaptation of the agricultural sector focused on enhancing the resilience and risk management capacity of producers and industries. To achieve this goal:

- Establish a legal framework for the reform of technology policies.
- Establish structures within the Ministry of Food, Agriculture, and Light Industry, as well as local-level organizations responsible for adaptation.
- Create a sustainable advisory (extension) service mechanism with the aim to enhance the knowledge, and change the attitude, behaviour, mindset of herders and farmers and supporting them to adapt new methods and technologies.
- Apply adaptation criteria when providing economic incentives to agricultural producers, such as subsidies, incentives, investments, and taxes.

5.4 DISASTER RISK MANAGEMENT

In the realm of climate and disaster risk, two interconnected concepts stand out: climate change adaptation and disaster risk reduction. This synergy offers several benefits, including the mitigation of future risks through strategic policies and collaborative investments, the efficient allocation of necessary funds and resources, and the execution of adaptation measures through disaster preparedness and planning. Therefore, the primary approach to address climate and disaster risk lies in the combined efforts of climate change adaptation and disaster risk reduction activities.

To limit global warming to below 2°C, the Paris Agreement mandates that each country must take steps to curtail greenhouse gas emissions, establish adaptation objectives, and concentrate on diminishing vulnerability, enhancing resilience, and

bolstering adaptive capabilities. As outlined in 1-4 of Article 8 of this agreement, actions and measures directed at reducing the adverse effects of weather and climate-related disasters shall be put into practice[33]. These measures encompass:

- Early warning systems
- Disaster preparedness
- Long-term catastrophic events
- Recurring or severe, destructive disasters
- Comprehensive risk evaluation and management
- Risk insurance
- Non-economic losses
- Capacity of diverse socio-economic strata, their livelihoods, and ecosystem potential

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[33] (Article 8 of the Paris Agreement and Decision 1/CP.21 Paragraphs 48–52 (FCCC/CP/2015/L.9/Rev.1

5.5 ADAPTATION IN THE HEALTH AND SOCIAL PROTECTION

The needs for climate change adaptation and risk mitigation in the public health sector include:

- According to the World Health Organization (WHO), there is a direct or indirect connection between climate change and human health, with both infectious and non-infectious diseases potentially linked to climate change. However, the specific relationships between climate change and various diseases require further comprehensive research and analysis, both domestically and internationally.

- The level of knowledge, attitudes, and practices related to the impact of climate change on public health and its prevention is currently insufficient. Over 50,000 healthcare professionals and specialists working in the sector need to enhance their knowledge, skills, and capacity to effectively address climate-related health issues.

- In Mongolia, around 500 healthcare institutions, including facilities in remote areas, provide medical services to the local population. Ensuring timely and high-quality healthcare during natural disasters remains a pressing challenge.

The assessment of the location and quality of healthcare facilities and the establishment of disaster preparedness measures with minimal damage are essential.

- Continuous monitoring of the biological characteristics, distribution, and migration patterns of disease-causing agents such as viruses, bacteria, infectious insects, and rodents is crucial for disease prevention and management. Additionally, research on climate conditions, water quality, availability, and food safety—factors influencing public health—needs to be expanded and specialized researchers should be trained.

- Successful adaptation to the consequences of climate change and extreme weather events necessitates close collaboration not only among health organizations but also with environmental, infrastructure, finance, communication, transportation, food, agriculture, and urban development entities. A coordinated, multi-sectoral approach is vital for addressing climate-related health challenges effectively.

Photo credit: NAP project

6. IMPLEMENTATION FRAMEWORK FOR THE NAP

Photo credit: Yad.Adiya

6.1 CORE PRINCIPLES AND MULTI-STAKE-HOLDER ENGAGEMENT

The following principles will be adhered to in implementing the NAP:

- The implementation of the NAP to achieve climate change adaptation goals will be harmonized with "Vision-2050," Mongolia's long-term development policy, and other mid-term development documents;

- Allocate resources within relevant ministries, government bodies, and other organizations (referred to as relevant stakeholders) will their areas of responsibility to fulfill the objectives outlined in the NAP;

- Ensure multi-stakeholder participation;

- Rely on public-private partnership;

- Based on research and analysis;

- Effevctive cooperation on the development of short-term plans, budgets, projects under the NAP;

- Utilize cooperative mechanisms such as partnerships, advocacy, leadership, and promotion to implement of the NAP;

- Enhance capacities of industry and services Educational and research institutions at all levels, as well as foreign projects and programs, will be directed toward enhancing the capacity of industry and service providers to address and adapt to the impacts of climate change.

- Information networks and tools will be employed to disseminate scientific knowledge and information aimed at fostering the right attitudes and adaptive behaviors among the population regarding climate change.

- Interdisciplinary collaborative research projects and programs will be launched in the field of climate change, its effects, and adaptation.

- The adoption of advanced, modern methods and technologies for climate change adaptation will be supported across all sectors.

- The Integrated Plan will maximize the utilization of available domestic and foreign sources of financing.

- Continuous monitoring of the implementation of the NAP will be conducted, with necessary adjustments made flexibly when needed.

6.2 NAP IMPLEMENTATION, MANAGEMENT AND COORDINATION MECHANISMS

The NAP will be implemented in accordance with laws and regulations while aligning with policies and plans in the national development, environmental, social, and economic sectors. This alignment will encompass various documents and policy frameworks, including: "Vision - 2050" for long-term development; Monitoring and evaluation criteria and achievement levels of Mongolia's long-term development policy; the Parliamentary Resolution No. 23 of 2020, which endorses the "Five-year development guidelines for 2021-2025 in Mongolia"; Investment Program for 2025 (Appendix 2 of Parliament Resolution No. 23 of 2020); "2020-2024 Action Program of the Government of Mongolia"; Parliamentary Resolution No. 24 of 2020 approving the "Implementation Plan for the Implementation of the 2020-2024 Action Program of the Government of Mongolia"; Government Resolution No. 203 of 2020, featuring "Monitoring and evaluation criteria and achievement levels of the 2020-2024 action program of the Government of Mongolia" (Appendix 1); Government Resolution No. 203 of 2020, outlining the "Government Policy on Public Health" (Appendix 2); Parliamentary Resolution No. 81 of 2001; 2022 end-of-year report from the Ministry of Family, Labor and Social Security; 2022 implementation report for the "Five-year development guidelines for 2021-2025"; the "New Revival Policy"; and adherence to Mongolia's national contribution targets for implementing the Paris Agreement (as detailed in the Annex of Government Resolution No. 407 of 2019). This comprehensive approach ensures that the NAP aligns with the overarching development strategies and evaluation mechanisms of Mongolia, promoting a harmonized and effective implementation process.

The National Climate Committee (referred to as the National Committee) will have the responsibilities for managing and coordinating the NAP and ensuring effective collaboration among stakeholders. The National Committee will work to incorporate the objectives, goals, and measures of the NAP into the annual plans and budgets of relevant ministries, government agencies, local administrative bodies, and affiliated organizations. This will involve supervising the implementation process, assessing goal attainment, and ensuring that financial and other resources are allocated appropriately. The National Committee will conduct biennial evaluations of the progress in meeting the objectives and measures defined in the NAP, including the established indicators. It will compile and present a comprehensive report based on these assessments.

6.3 FINANCING STRATEGY FOR THE NAP

The implementation of the NAP Action Plan is estimated to cost approximately US$7.8 billion by 2030. The adaptation financing gap is around MNT 1.72 trillion (approx. US$499 million annually), primarily due to high investment costs in the water and forest sectors. To address this gap, Mongolia will pursue a multi-source financing strategy, which includes:

• Government budget allocations
• Private sector investment (domestic and international)
• Development partners and concessional funds

To maximize the funding potential, Mongolia's NAP financing strategy emphasizes presenting adaptation needs for emphasizing biodiversity and ecosystem benefits rather than a per capita basis. This allows Mongolia to tap into a broader funding landscape, including sources aligned with the UN Convention on Biological Diversity and the UN Convention to Combat Desertification.

6.3.1 Adaptation Solutions (AS)

To streamline funding and implementation of the 99 adaptation actions, seven Adaptation Solutions (AS) have been identified:

1. **Peatland Restoration:** Enhancing biodiversity and restoring ecosystem functionality; estimated cost: US$2.8 billion.

2. **Riparian Forestry:** Restoring and sustainably managing areas bordering water bodies; estimated cost: US$1.3 billion.

3. **Maintaining Soil Fertility:** Implementing sustainable soil management practices; estimated cost: US$32 million.

4. **Pastureland Management:** Sustainable grassland management to mitigate climate impacts; estimated cost: US$68 million.

5. **Agroforestry:** Planting trees as part of the "Billion Trees" national initiative; estimated cost: US$3.2 billion.

6. **Resilient Health Systems:** Strengthening health systems to address climate-related health challenges; estimated cost: US$3.9 million.

7. **Resilient Cities:** Enhancing urban resilience to climate change impacts; estimated cost: US$390 million.

TABLE 4. Funding Distribution for Adaptation Solutions (US$ thousands)

Adaptation Solution	Total Budget	Central Government	Local Government	Development Partners	Private Sector
Peatland Restoration	2,807,703	1,183,707	290,465	1,316,092	17,438
Riparian Forestry	1,317,655	524,986	204,928	361,937	225,804
Soil Fertility	32,107	9,367	4,683	4,979	13,078
Pastureland Management	67,690	17,031	11,856	15,620	23,183
Agroforestry	3,218,129	1,351,364	1,154,411	285,353	427,000
Resilient Health	3,909	2,802	421	528	157
Resilient Cities	390,703	197,925	175,397	17,002	379

TABLE 5. Dominant Proponent Groups for Adaptation Solutions

Adaptation Solution	Dominant Group	Budget (US$ thousands)
Peatland Restoration	Concessional funds	2,749,662
Riparian Forestry	Corporates	1,103,497
Soil Fertility	SMEs/Corporates	24,937
Pastureland Management	Concessional funds	37,798
Agroforestry	Concessional funds	3,208,081
Resilient Health	Government	3,909
Resilient Cities	Government	352,949

6.3.2 Stages of NAP Implementation

The NAP will be implemented in two stages, each with a unique financing profile:

- **2025-2027 (Initiation Stage):** Total adaptation spending of US$1.37 billion, with US$0.34 billion from the government, US$0.35 billion from concessional funds, US$0.17 billion from development partners, and US$0.51 billion from the private sector.

- **2028-2030 (Replication and Scaling-up Stage):** Total adaptation spending of US$6.41 billion, with

US$0.79 billion from the government, US$0.60 billion from concessional funds, US$0.30 billion from development partners, and US$4.72 billion from the private sector.

By employing this comprehensive approach, Mongolia aims to achieve sustainable climate adaptation outcomes while leveraging financing from multiple sources to close the adaptation gap and ensure long-term resilience.

6.4 MONITORING AND EVALUATION OF THE NAP

6.4.1 National Monitoring and Evaluation System

Mongolia's legal framework for Monitoring and Evaluation (M&E) has evolved to support national development policies and ensure transparent and effective implementation. Key laws shaping the M&E environment include:

- **Law on Development Policy, Planning and Management (2020):** Establishes principles for nationwide development policy, prescribes reporting mechanisms, and defines the structure for M&E across various levels of government.

- **Law on Monitoring and Inspection of the Parliament of Mongolia:** Outlines the roles and responsibilities for inspection and monitoring at the legislative level.

- **Law on Civil Service (Articles 52–55):** Specifies mandates for sector ministries, including internal audits, policy implementation oversight, and evaluation mechanisms.

Under the Law on Development Policy, Planning and Management (2020), "Common Procedures for Monitoring and Evaluation of Policy Documents and Administrative Organizations" guide M&E activities, stipulating that all ministries and regional governors' offices must have designated M&E units or personnel. These units are responsible for monitoring implementation, conducting audits, and ensuring activities align with policy objectives. Furthermore, each sector ministry is required to develop specific M&E guidelines that are subject to the Minister's approval.

In 2022, Government Resolution No. 474 established the Government Control Implementation Department and formed an Evaluation and Monitoring Team, which is managed by the Government Secretariat to facilitate cross-sector alignment of actions. Reporting from government bodies is compiled and submitted to various oversight institutions, including the Ministry of Finance, the Ministry of Economy and Development, the Parliament, the National Audit Office, and the National Statistical Office (NSO).

Photo credit: NAP project

6.4.2 Framework for NAP Monitoring & Evaluation in Mongolia

The M&E framework for the NAP is based on international best practices and lessons learned, with the following principles:

- Leverage existing systems and data sources.
- Keep the framework simple and tailored to Mongolia's context, priorities, and capacities.
- Ensure an inclusive and participatory approach, incorporating gender considerations.
- Monitor both adaptation processes and outcomes with SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) indicators.
- Harmonize the NAP indicators with national priorities, such as the "Vision - 2050" development strategy.
- Integrate continuous learning within M&E activities to adapt and improve.

The objective of the M&E system for the NAP is to establish a robust mechanism to track progress, assess outcomes, communicate findings, and incorporate new lessons to guide future adaptation decisions.

Photo credit: MECC

M&E Framework Structure:

1. **Impact Level:** Achieving increased resilience and reduced vulnerability to climate change in Mongolia through sustainable actions, with the following key outcomes:
   - Resilience increased
   - Vulnerability decreased
   - Sustainability improved

2. **Process Level:** Enhancing adaptive capacity and fostering an enabling environment for climate adaptation through improved outputs.

3. **Outcome Level:** Achieving adaptation outcomes across key sectors (8 identified sectors):
   - Ecosystems, Biodiversity, and Land Degradation
   - Water Resources and Supply
   - Forestry
   - Weather and Natural Disasters
   - Livestock and Grassland
   - Crop Farming
   - Public Health
   - Social Security

4. **Activity Level:** 99 actions with specific indicators and targets are detailed in the NAP Action Plan to achieve these outcomes.

Implementation and Reporting Mechanism: Each implementing organization is responsible for monitoring NAP implementation and reporting to the Ministry of Environment and Climate Change (MECC). The MECC, through its dedicated M&E and Internal Auditing division, will:

- Compile and analyze reports
- Evaluate progress against NAP objectives and targets
- Assess the impact of adaptation measures
- Provide feedback and recommendations for improvements
- Facilitate training and capacity-building on M&E outcomes

A biennial evaluation of NAP progress will be conducted by the MECC, with external audits scheduled for 2025 and 2029. These evaluations will assess the effectiveness and sustainability of adaptation actions and inform adjustments to the NAP as needed.

TABLE 6. Summary of M&E Activities and Responsibilities

Activity	Timing	Purpose	Content	By Whom	For Whom
Periodic progress reports and internal reviews	Quarterly	Routine supervision of NAP implementation	Inputs and outputs	MECC, sector ministries	Government Secretariat
Annual performance reports	Annual	Assess progress toward NAP objectives and implementation challenges	Annual outputs and targets	MECC, sector ministries	Government Secretariat, Parliament
Midterm reviews/ external audits	2026, 2030	Evaluate results and challenges to support decision-making and program revision	Outcomes and targets	MECC, external evaluators	Government Secretariat, Parliament
Final review and evaluation reports	Post-2030	Evaluate final results, impacts, relevance, efficiency, sustainability, and derive lessons for future policies	Outcomes, targets, impacts	MECC, external experts	Government Secretariat, Parliament
Learning and capacity-building events	Annual	Facilitate knowledge-sharing and skill development for all stakeholders involved in NAP processes	Workshops, seminars, training	MECC, NSO, educationists, external experts	Government Secretariat, MECC, Oversight Committees

6.5 CONCLUSION

Mongolia's NAP monitoring, evaluation, and financing strategy effectively meets the IPCC AR6 requirements by establishing a robust, multi-tiered M&E framework that is participatory, inclusive, and integrated across sectors. The strategy emphasizes cross-sectoral adaptation outcomes, stakeholder involvement, and a phased financing approach to ensure sustainable adaptation actions.

The focus on building resilience, closing the financing gap, and harmonizing with global adaptation objectives sets the foundation for a sustainable future where Mongolia can effectively navigate the complex challenges of climate change, leveraging both national capacities and international partnerships for a resilient and adaptable society.

ANNEX

Annex I:
NATIONAL ADAPTATIONPLAN TO CLIMATE CHANGE: MONGOLIA 2024- 2030

Resolution of the National Climate Committee, No.01, dated March, 11, 2024

Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
				Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
								SB	LB	PP	OS		
Target 1													
Vision 2050 6 MFDG 6.4.2 NDCIP 1.1.1 SDG 13.2	Improve the policy, legal, structural, and organizational environment for the climate change adaptation of environmental, social, and economic sectors.	Newly developed laws and regulations to coordinate inter-sectoral relations	Number	-	8	9	207,380.0					Environ-ment	Science, Economy, other related bodies
1 Vision 2050 7.3.21 MFDG 6.4.2, 7.3.3 NDC 3.1.4	**Action 1.1.** Establish legal regulations to ensure integrated coordination for reducing disaster risks induced by climate, water, and weather, and adapting to climate change, and improve intersectoral coordination.	Approved legal documents (regulation) governing intersectoral relationships	Number	-	1	2	20.0	100				MECC	MOFALI, NEMA, NAMEM
2 Vision 2050 7.3.19 MFDG 6.4.2, 7.3.3	**Action 1.2.** Revise and implement standards, norms, and regulations that account for the impacts of climate change, permafrost distribution, floods, and strong winds and storms in the planning of urban development and infrastructure (roads, railways, water, energy, heating, and communication networks).	Revised standards, norms and regulations	Number	-	30	100	600.0	90	10			MUDCH, MRT, MoE	MECC, MED

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
3	Vision 2050 6.3.1 MFDG 6.3	**Action 1.3.** Revise the livestock supply, agricultural and forestry irrigation regimes and norms, industrial and mining water usage norms, increase the percentage of water use in circulation mode, and improve the continuous monitoring system of water use.	Percentage of revision of water use and consump-tion norms	Percent	-	2	14	5,800.0	40			60	MECC, MOFALI, MMI	MoE, MoF
			Percentage of enterprises applying irrigation water meters and citizens, enterprises with water meter.	percent	-	45	60							
4	Vision 2050 9.2.34 MFDG 2.5.6	**Action 1.4.** Revise and enforce norms and regulations for flood flow calculation, assessment methods and standards for quality of protective structures, and water passing capacity based on international methodologies.	Number of renewed standards	number	-	1	1	500.0	100				MECC	MUDCH, NAMEM, Water Agency, NEMA
			Number of cities and settlements assessed	number	1	2	22 (Capital city and aimag centers)							
5	Vision 2050 6.2.4 MFDG 6.4.2	**Action 1.5.** Include provisions in the Forest Law, the General Land Law, and other relevant laws and regulations to provide tax incentives for nurseries, increase greenhouse gas absorption, and expand collaborative conservation management.	Revised and approved legal documents	number	-	2	1	30.0	100				MECC	Forest Agency, MOFALI

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
6	Vision 2050 6.2, 6.4.15 MFDG 6.2	**Action 1.6.** Approve and ensure implementation of the National Biodiversity programme and Action Plan.	Implemen-tation of the National Biodiversity Programme and Action Plan	percent	-	60	95	197,400.0	30	20	40	10	MECC	MOFALI, MES, MAS, University and Higher education institutions, private sector, others
7	Vision 2050 6.1.1, 6.4.15 MFDG 6.2 NDCIP 3.5.4	**Action 1.7.** Conduct ecological and economic valuation of natural resources based on the value of ecosystem services in stages, and establish a legal framework for tax regulation.	Resolution approving the revised ecological and economic valuation of animals by species and type.	number	1	-	1	420.0	80			20	MECC	MoF, Profes-sional Organi-zation, MAS, institute
			Resolution approving the revised ecological and economic valuation of natural plants by species and type.	number	1	-	1	500.0						MoF, Profes-sional Organi-zation, MAS, institute
			Resolution approving the revised ecological and economic valuation of the forest.	number	1	1	1	150.0					MECC	MoF, FA, Professional Organization
			Resolution approving the revised ecological and economic valuation of water.	number	1	1	1	150.0					MECC	MoF, WA, Professional Organization
			Resolution approving the revised ecological and economic valuation of land and other resources	number	1	1	1	250.0					MECC	MoF, ALAGAC, MAS, research institutes

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)					
									SB	LB	PP	OS	Main	Co-imple-menting
8	Vision 2050 8.3.9 MFDG 8.3	**Action 1.8.** Establish and enforce a regulation to evaluate the sustainability of livestock producers' in aminal husbandry every two years based on ecological, economic, and social responsibility criteria.	Revised and enforced regulations	number	-	1	1	1,300.0	50	20	30		MOFALI	MECC, MED, ALAGAC, Profes-sional associa-tions
9	Vision 2050 8.3 MFDG 6.4.2 MNHP 4.4.2	**Action 1.9.** Increase the capacity at the national and local levels to plan and implement priority actions aimed at changing the attitudes of herders and farmers towards adapting to climate change and reducing risks, and establish regulations to enhance the accountability of management at all levels of government.	Newly developed and revised and approved legal regulations	number	-	1	2	130.0	50	10	40		MOFALI	MECC, MoF MES, Sectoral Profes-sional associa-tions
10	Vision 2050 6.4.12, 7.3.22, 8.3.2 MFDG 6.4.2	**Action 1.10.** Improve the legal environment of the insurance system for pastoral livestock husbandry and open field farming, and improve the conditions for commercial banking and foreign and domestic investment.	Legal regulation of the updated improved insurance system	number	-	1	1	100.0	70	20	10		MOFALI	MECC, MoF, FRC, Insurance compani-es

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
11	Vision 2050 6.4 MFDG 6.4.2	**Action 1.11.** Establish legal framework for the responsibilities of organizations at all levels and intersectoral cooperation in regard to the impact of climate change on public health and the corresponding response to be taken.	Legal regulation on the adverse effects of climate change and its response to hygiene and other law implement-ation	number	-	2	2	30.0	100				MoH	MECC, MJHA, other related bodies
	Target 2													
Target 2	Vision 2050 6 MFDG 6.4.2 SDG 13.3	Strengthen the knowledge and capacity of stakeholders of the environmental, social, and economic sectors on climate change adaptation, and provide information by expanding research activities.	Share of budget in GDP allocated for science and technology	percent	0.2	2.5	3	9,300.0					Environ-ment, Educa-tion, Science, Agricul-ture	Educa-tion, Science, Economy, other related bodies
			Number of persons in capacity strengt-hening training	thous. Persons	10.0	150	350							
12	Vision 2050 2.4. MFDG 2.4.1.	**Action 2.1.** Gradually increase the budget for the development of science and technology	Share of budget in GDP allocated for science and technology	percent	0.2	2.5	3.0	850.0	40		40	20	MAS	MES, MoF
13	Vision 2050 7.3.21 MFDG 6.4.2	**Action 2.2.** To conduct detailed sectoral studies on the adaptive capacity of the infrastructure sector to climate change continuously over the long term, ensuring accessible financing and creating tangible investments.	The percentage of total funding provided by the STF for research on climate change adaptation	percent	10	50	70	2,800.0	40		40	20	MES, STF	MOFALI, SBC , univer-sities, higher education institutes, research institutes

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)					
									SB	LB	PP	OS	Main	Co-imple-menting
14	Vision 2050 2.5	**Action 2.3.** "Consider the impact of climate change, floods, and permafrost changes and distribution in urban planning, construction, and engineering structure planning."	Percentage of projects and measures that have conducted studies	percent	-	30	95		20	20		60	MUDCH, MRT, MMI	ACCGO, Related Ministries
15	Vision 2050 6 MFDG 6.4.2	**Action 2.4.** Create and operationalize a sustainable structure of agricultural advisory (extension) services	Number of aimags that have implemen-ted a sustai-nable extension (advisory service) program	number	4	12	21	1,500.0	40	20	30	10	MOFALI, MULS	MES, related RI
			Number of provinces that have implemen-ted a sustai-nable extension (advisory service) program	thous. House-holds	10	50	150							
16	Vision 2050 2.2, 6.4, MFDG 2.2.2.	**Action 2.5.** Organize training sessions for local communities including herder women on climate financing opportunities, funding source, advanced methods and technologies for adaptation at the national and local levels, and innovative products to raise awareness and strengthen their capacity	Number of trainees (at least 30% women)	thous. Persons	-	100 (at least 30% women)	200 (at least 30% women)	500.0	30	30		40	CCRCC, ACCGO	MEee, MOFALI, Private sector

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
17	Vision 2050 6.4. MFDG 6.4.2.	**Action 2.6.** Conduct phase-by-phase research and develop risk mapping related to the distribution, resources, focal activations, features of vegetation and infection of carrier species (ticks, mosquitoes, fleas,midges, rats etc.).	Number of newly conducted survey	number	10	3	5	400	30		70		NCZD ZDRC	MoH MES
18	Vision 2050 2.2. MFDG 6.4.2.	**Action 2.7.** Identify population segments vulnerable to climate change and conduct a gender analysis on the impact of climate change in their livelihoods	Number of studies with gender analysis	number	-	1	5	1500	50	30	10	10	MAS, MFLSP,	NEMA, NAMEM , MES, IO
19	Vision 2050 2.2. MFDG 2.2.2.	**Action 2.8.** Organize activities of information, training and awareness aimed at reducing the risk of carrier-borne infections for the risk group population.	Number of cases of zoonotic diseases (per 10,000 population)	per mill	107 (0.3)	100 (0.3)	100 (0.3)	100.0	50	50			MoH	NCZD , NCCD, ZDRC
20	Vision 2050 2.2. MFDG 2.2.2. SDG 13.3 NEHP 3.4.1	**Action 2.9.** Organize activities to increase the knowledge of the population on the topic of "The impact of climate change on and consequences for the health of the population and adapting to climate change"	Number of activities undertaken to protect public health	number	-	5	10	150.0	70	30			MoH, MES	Aimag, capital city ESU, HU

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding	Type of funding sources (%)				Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	SB	LB	PP	OS	Main	Co-imple-menting
21	Vision 2050 2.2. MFDG 2.2.2.	**Action 2.10.** Organize capacity building sessions at national level on climate change risks and adaptation measures for the government officials, women, and vulnerable groups to climate change.	Participants of regional trainings (sex- disagg-regated data to be collected)	percent	10	20	60	1,500.0	50	15	25	10	MECC, MFLSP	Aimag, District GO, CCRCC
Adaptation priority 1: Ecosystem, biodiversity, land degradation and desertification														
Target 3	Vision 2050 6.1, 6.2 MFDG 6.4.2 SDG 15.2, 15.5 NDCIP 3.5	Improve capacity of ecosystem and biodiversity to climate change.	Size of gazetted area for special protection	percent	21.1	27	30	92,953.0					Environ-ment	Agri-culture, Science, local administ-ration
22	Vision 2050 6.1.4 MFDG 6.1.1	**Action 3.1.** Take under special protection and improve management of at least 35 percent of each main representative ecosystems, and entire ecosystems that are unique and vulnerable to climate change.	Size of gazetted area for special protection	percent	21.1	27	30	57,100.0	20	10	60	10	MECC, Aimag and capital city GO and Citizen Khural	Profes-sional Organi-zation, MAS, research institute
23	Vision 2050 6.2.1 MFDG 6.2.2	**Action 3.2.** To maintain and protect biological diversity and genetic resources, to create a database of genetic resources and to regularly update the information and data.	Number of genetic resource catalogue and database with sustainably operation	number	Prelimi-nary design is develo-ped	1	1	1,600.0	60		40		MECC, MES, MDDC	Profes-sional Organi-zation, MAS, university and higher education institutes
			Newly established genebank	number	1	-	2	20,000.0	80		20		MECC, MES	MAS, university and higher education institutes

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
24	Vision 2050 6.2.3 MFDG 6.2.2	**Action 3.3.** Ensure implementation of the Natural resource use fee through increasing reinvestment of revenue from natural plant and animal use fees.	Reinvest-ment of revenue from natural plant and animal use fees for measures towards animal protection and breeding.	percent	12.4 percent in 2020	50	maintain without decrea-sing below 50%	600.0	20	80			Gover-nors of levels, CRKH	MECC, Ministry of Finance, Profes-sional Organi-zation, MAS, research institutes
			Reinvest-ment of revenue from natural plant and animal use fees for measures towards animal and plant protection and sustainable use.	percent	8 percent in 2020	15	maintain without decrea-sing below 15%	600.0	10	90			Gover-nors of levels, CRKH	MECC, MoF, profes-sional Organi-zation, MAS, research institutes
25	Vision 2050 6.2.3 MFDG 6.2.2	**Action 3.4.** Take action to intentionally breed, cultivate, and protect the habitats of endangered and rare animals and plants that are susceptible to exploitation and vulnerable to climate change."	Species of cultivated plants	number	10.0	20.0	30.0	4,000.0	15	40	10	35	MECC	MES, MAS
			In situ protected plant species	number	53.0	93.0	133.0	1,300.0	40	20	20	20	MECC	MES, MAS
			Intentionally of ex situ protected plant species	number	31.0	50.0	70.0		40	20	20	20		
			Species of endangered and rare animals for which measures have been taken to sustain their habitats and that have been intentionally bred.	number	3.0	8.0	12.0	53.0	40	10	30	20	MECC	MES, MAS

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
26	Vision 2050 6.2.2 MFDG 6.1.2, 6.2.2 NDCIP 3.5.1	**Action 3.5.** Assess the conservation status of animal and plant species according to the criteria of the International Red list (IUCN 2001), and determine and implement conservation measures for endangered species.	Plant species that have been assessed according to the Red list.	number	1,876.0	3,000.0	6,702.0	800.0	80		20		MECC	Aimag GO, Profes-sional Organi-zation, MAS, research institutes
			Animal species that have been assessed according to the Red list.	number	654.0	523 (bird species	700.0	700.0	80		20		MECC	
27	Vision 2050 6.1.2 MFDG 6.1.2 NDCIP 3.5.2	**Action 3.6.** Conduct phased studies on the distribution and resources of plant and animal species nationwide, and periodically determine the resource changes.	The number of plant species whose geograp-hical ranges have been studied	number	5	2	16	5,200.0	80		20		MECC	MAS, RI, Aimag GO, Profes-sional Organi-zation
			The number of animal species whose habitat and resources have been determined, cumulative total.	number	3	6	21							
28	Vision 2050 6.1.2 MFDG 6.1.2 NDCIP 3.5.3	**Action 3.7.** Establish a comprehensive surveillance and control system for changes in the population number, habitat, and species migration of wild animals due to climate change	Number of comprehen-sive monitoring survey of the wildlife movement due to climate change	number	0	1	4	1,000.0	90			10	MECC	Aimag GO, Profes-sional Organi-zation, MAS, research institutes
Target 4	Vision 2050 6.2 MFDG 6.4.2	Reduce desertification, land degradation and permafrost loss.	The share of severely and strongly degraded land areas in the total area	percent	very strong 4.7 strong 18.6	not more than 4.7% very strong and not more than 17% strong.	not more than 4.0% very strong and not more than 15% strong	37,170.0					Environ-ment, Const-ruction, Trans-port, Agri-culture	Economy, Science, other related sectors

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)					
									SB	LB	PP	OS	Main	Co-imple-menting
29	Vision 2050 6.2.8 MFDG 6.2.1	**Action 4.1.** Reducing the area of land affected by desertification and degradation by implementing actions to protect and increase water resources by establishing forest strips suitable to the geographical location and regional features in areas affected by desertification.	The size of the afforested area in oases	Ha	-	183	915	2,500.0	30	30	10	30	MECC	MOFALI, MED, Aimag GO, Professional organi-zations
			Number of protected springs and oases	number	3433	3,900.0	4,900.0	20,070.0	20	60	10	10	MECC, WA	ACCGO
			The size of the area where desertification protection measures have been taken (protection against and limitation of sand movement, land rehabilitation, cultivation)	Ha	200	800.0	1,800.0	1,600.0	50	20	30		MECC	Other related Ministries, Aimag GO, Profes-sional organi-zations
30	Vision 2050 6.2, MFDG 6.1, 6.2	**Action 4.2.** Peatlands should be taken under special state protection and promote rehabilitation and sustainable use of degraded lands	The percentage of peatlands taken under state special protection	percent	60.0	65.0	90.0	900.0	80		20		MECC	Aimag GO
			Projects and measures implemented aiming at restoration of peatlands, increasing greenhouse gas sequestration, and proper utilization and protection of wetland ecosystems.	number	2	4	6	6,000.0	20		80		MECC	Aimag GO
31	Vision 2050 6.1, 6.2 MFDG 6.1, 6.2	**Action 4.3.** Implementation of pilot projects for nature-based conservation measures, specific to regional features to improve regional ecosystem capacity to recovery, to protect forest and biodiversity.	Number of benchmark projects in the ecoregions	number	1 (Mazaalai prog-ramme)	2	5	1,400.0	30		70		MECC	MAS, RI, Aimag GO, Profes-sional Organi-zation

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding	Type of funding sources (%)				Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	SB	LB	PP	OS	Main	Co-imple-menting
32	Vision 2050 6.2.9 MFDG 6.2.4	**Action 4.4.** Implement sustainable use and ecological restoration based on grassland ecosystem capacity for recovery	Level I-V criteria for evaluating the recovery capacity of grassland ecosystems		As of 2020, 43% of the total pastures is at level 1, 29% at level II, 16% at level III, and 12% at level IV.	Target to get 43% to level I, 30% to level II, 22% to level III, and 10% to level IV.	Target to get 43% to level I, 30% to level II, 22% to level III, and 5% to level IV.	800.0	80		20		MECC, MOFALI	ALAGAC, Aimag GO
33	Vision 2050 6.2 MFDG 6.4.2	**Action 4.5.** Create a comprehensive map of permafrost distribution in Mongolia through expansion of detailed study of permafrost distribution and monitoring in necessary regions and areas.	The number of boreholes for detailed permafrost distribution research and monitoring.	number	90	100	150	900.0	80		20		MECC, Institute of Geo-graphy and Geo-ecology, MAS	NAMEM
34	Vision 2050 7.3.19, 6.2 MFDG 6.4.2	**Action 4.6.** Introduce environmentally friendly engineering solutions in areas with permafrost to reduce permafrost loss and mitigate impacts on infrastructure, buildings, and engineering structures.	The number of infrastructure projects implemented with technological solutions to mitigate the effects of permafrost.	number	1	2	10	3,000.0	80		10	10	MUDCH, MRT	MECC, MAS, research institutes
					Adaptation priority 2: Water regime, reserve and supply									
Target 5	Vision 2050 6.3.8 MFDG 6.3	Ensure operational information and services by developing and launching permanent and continuous water resources and quality monitoring networks based on advanced technology and innovation.	Newly established monitoring sites conducted on water resources and quality	number	1 for surface water moni-toring, 5 for ground-water	10 for surface water moni-toring, 10 for ground-water	100 for surface water moni-toring, 15 for ground-water	4,500.0					Environ-ment, Economy	Environment, Science, Construction, Emergency, Digital development

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
35	Vision 2050 6.3.8 MFDG 6.3.4	**Action 5.1.** Enhancing rational use and water resources management through introducing environmental flow standards based on hydrological and biological prerequisites.	Number of river basins newly introduced environ-mental flow standards.	Number of river basins	3	4	29	500.0	100				MECC	MES, MAS
36	Vision 2050 6.3.8 MFDG 6.3.4	**Action 5.2.** Introduce technology for monitoring and analysis of glaciers, lakes, and reservoirs, and automate the transmission of data on water regime, through development of and supporting the development of micro-class national satellite technology.	Percentage of national data of satellites used for area monitoring of glaciers and lakes	percent	0	0	80	2,800.0	50		50		MDDC , MED,	MECC
37	Vision 2050 6.3.8 MFDG 6.3.4	**Action 5.3.** Establish a monitoring network for water quality and recharging rate of ground water resources in Managed Aquifer Recharge (MAP) facility sites.	Number of MAR monitoring sites	number	1 in Baga-nuur, in 2022	2	10	300.0	40			60	MECC, MMI	Water Agency, RBA, Aimag GO
38	Vision 2050 6.3.8 MFDG 6.3.4	**Action 5.4.** Conduct monitoring and regulation of the effectiveness of the reforestation for shadowing effect in the flood plain area for regulation of the thermal regime of water, based on water ecosystem study and analysis.	Number of observation points for biological monitoring of water.	number	101	112	153	100.0	40			60	MECC	NAMEM, Forest Agency, RBA, Aimag GO

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
39	Vision 2050 6.3.8 MFDG 6.3.4	**Action 5.5.** Improve the observation of the dynamics of ground water resource monitoring system through expanding the surface and ground water interaction and balance monitoring network.	Number of restored and newly established observation networks	number	2	5	15	800.0	50			50	MECC	NAMEM, Water Agency
Target 6	Vision 2050 6.3 MFDG 6.3	Strengthen adaptation capacity through enhancement of ecosystem services by catchment of water resources in humid and temperate regions, as well as appropriate use, protection, and restoration of water resources, and the introduction of advanced technologies to increase surface water resources.	Accu-mulated amount of melting water from ice sheets and glaciers.	km³	0	1.1	6.4	13,505,321.3					Environ-ment, Eco-nomy	Environment, Science, Construction, Emergency, Digital Development, Local Administration
40	Vision 2050 6.3.9, 6.3.10, 6.3.11 MFDG 6.3.2 NDCIP 3.3.4	**Action 6.1.** Accumulate a total of 6.4 km³ of water resources, melting from snow pack and glaciers in the river basins of Khovd (including Altangadas and Bukhmurun), Bulgan, Kharhiraa, Turgen, Zuil, Khushuut, Namir, Bayan, and Gorkhon rivers.	Accu-mulated amount of melting water from ice sheets and glaciers.	km³	1 (Feasibility assessment conducted, Erdeneburen HPS to use 1.1 km³ water for energy///)	1.1	6.4	5,946,371.3	50	10	40		MECC, MED	MoE

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding	Type of funding sources (%)				Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	SB	LB	PP	OS	Main	Co-imple-menting
41	Vision 2050 4.2.37 MFDG 6.3	**Action 6.2.** Conduct a regional strategic environmental impact assessment of the planned hydropower station and water complex structures in the Selenge River Basin, and implementing integrated management of transboundary water resources, elaborate justifications for transferring and utilizing these resources in the basin and water flow diversion to the Gobi regions while ensuring their protection.	Regional strategic environmen-tal impact assessment, and report	number	Assess-ment TOR is develop-ed. (received by Russia and MG.)	1	1	7,600.0	100				MECC	MoE, MoF, MED
			Number of justifications for transferring and utilizing of water resources and surveys conducted.	number	1	2	3							
42	Vision 2050 6.3.9, 4.2.37 MFDG 6.3	**Action 6.3.** Develop feasibility studies for establishment of hydropower stations and river flow regulation facilities in the Selenge and Orkhon river basins as well as Orkhon-Ongi and Shuren HPSs.	Number of developed feasibility studies	number	0	1	2	15,750.0	90	10			MED	MECC, MoE, MMI
43	Vision 2050 6.3.9, 6.3.10, 6.3.11 MFDG 6.3.2	**Action 6.4.** Implement projects for the construction of Managed Aquifer Recharge (MAR) facilities for ground water recharging and construction of recharging boreholes through public private partnership in desert and steppe regions.	Number of MAP facilities increasing the land and water resources	number	1	4	235	92,400.0		40	10	50	MECC	MMI, MOFALI, MoF, RBA

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)					
									SB	LB	PP	OS	Main	Co-imple-menting
44	Vision 2050 6.3.10, 6.3.11, 9.2.19 MFDG 6.3.2	**Action 6.5.**	Number of ponds, smal scale traditional ponds, underground reservoir, overflowing sites, and drifts and channels for snow accumulation and pipelines for water transfer.	number	0	20	80	13,000.0	20	30		50	MECC, MUDCH	MOFALI, Aimag soum GOs

Build ponds for hay and crop irrigation and ponds for breeding of fish and aquatic animals, and create overflooding sites by constructing traditional small-scale ponds in temperate and semi-humid areas, in order to solve water supply of wildlife and livestock in dry and semi-dry climate areas through channeling and piping, thus increase the water resources and water reservoir capacity and the transfer of flow.

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	SB	LB	PP	OS	Main	Co-imple-menting
45	Vision 2050 6.3 MFDG 6.3	**Action 6.6.** Creating conditions for irrigation of pastures, cultivation and planting of fruits and berries, vegetables and fish farming for household use through diverting water to drying up lakes, located in flood plains of rivers.	Number of lakes and ponds fed by diverted water (total 500 lakes in place)	number	1	4	80	12,000.0	60	20		20	MECC	MOFALI, Aimag soum GOs
46	Vision 2050 6.3 MFDG 6.3	**Action 6.7.**	Number of reservoirs and flow regulation facilities	number	0	1	4	3,500,000.0	30	10	60		MECC	MED, MOFALI, MoF

In addition to establishing water storage and solving the water supply problems along rivers in the low evaporation area of the lakes basin, in the head water and the middle reach of river basins of Baidrag, Ongi, Taats, Ar-Aguit, and Tuin rivers, introduce the "Evaporation Management" method for restoration of lake and aquatic ecosystem of Ulaan, Orog, Taats Tsagaan, Haya and other lakes, located in the Valley lakes and ensure required capacity and infrastructure for their protection and regulation of lake water regime.

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
47	Vision 2050 6.2, 8.3 MFDG 6.2	**Action 6.8.** Take measures to regulate the thermal regime of river and lake water and protect the ecosystem benefitting from the flood plain and near shore forest shadows in catchment areas, thus support the breeding of taimen, Thymallus arcticus and other endemic freshwater fish species, and develop sport fishing.	Number of fish breeding ponds	number	10	15	50	6,200.0	20	30		50	MECC	MoF, MOFALI
48	Vision 2050 6.3, 6.2.4 MFDG 6.3	**Action 6.9.** To increase the forested area in the Tuul, Orkhon, and Kherlen river basins and the proximity to ensure flow and forest regulation, to support afforestation for the lake shore protection, and to improve the capacity or river flow regulation coefficient of the forest.	Value of the river flow regulation coefficient	-	0.42	0.42 and more	0.421 and more	3,800,000.0	40	10	30	20	MECC	NAMEM, MoF, Forest Agency
49	Vision 2050 6.3.8 MFDG 6.3.4	**Action 6.10.** Mitigation of the decrease rate of the groundwater level by enhancing the ground water regime and recharge rate in the ground water areas of the capital's centralized water supply sources and by afforestation with native plants.	Amount of water level decrease	M	-10 m (in 2014)	-16m (10 %)	-15m (60%)	112,000.0			50	50	MECC	Capital city GO, WSSA, EPA, Forest Agency, Water Agency

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
	Adaptation priority 3: Forest sector													
Target 7	Vision 2050 6.2.4 MFDG 6.4.2 NDCIP 3.4	Resilient and adapted to climate change forest and wood sector is developed.	Size of forest covered area	percent	8.28	8.7	9	11,607,490.0					Environ-ment, Const-ruction, Agri-culture	Environ-ment, local administ-ration
50	Vision 2050 6.2.4, 9.2.5, 9.2.8 MFDG 6.2.5	**Action 7.1.** Establish of forest seed resources	Amount of seeds to get ready	t/a	12000	14000	20000	8,000.0	50	50			MECC	Forest agency, Forest unit, Profes-sional Organiza-tion
			Permanent seed plot for selection of coniferous and deciduous tree seeds	Ha	100	150	300	4,540.0	50	50			MECC	Forest agency, Forest unit
			Plantation area for selection of seeds for coniferous and deciduous trees	Ha	1	330	410	5,150.0	50	50			MECC	Forest agency, Forest unit
51	Vision 2050 6.2.4, 9.2.5, 9.2.8 MFDG 6.2.5 NDCIP 3.4.2	**Action 7.2.** Implementation of the national movement "Billion trees"	Size of afforested area	thous. ha	10.7	13.0	500	8,600,000.0	50	30	10	10	MECC	Forest agency, ISFU, FPO
			Amount of trees and greenery per capita in cities and settlements	sq.m./capita	5.1	8	15	1,300,000.0		80		20	MUDCH	Gover-nors of cities and settle-ments, aimags, soums
			Size of the agroforestry area	thous. Ha	2.0	5.0	19.0	1,150,000.0	30	30	10	30	MOFALI	Forest agency, MoH, Aimag, soum GOs

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	SB	LB	PP	OS	Main	Co-imple-menting
52	Vision 2050 6.1.3, 6.2.4, 9.2.5, 9.2.8 MFDG 6.2.5 NDCIP 3.4.1	**Action 7.3.** Increase the restoration capability of natural forests by maintaining and protecting, thus improving the forest health.	Size of forest area where thinning is conducted.	thous. Ha	0.15	1.8	3	7,200.0	100				MECC	Forest agency, ISFU, FPO
			The size of the area that is limited and where harmful tree insects and diseases are being battled.	thous. Ha	185	450	550	73,500.0	50	50			MECC	Forest agency, ISFU, FPO
			Size of the area affected by wildfire, decrease.	Ha	130,000.0			420,750.0	50	50			MECC	Forest agency, ISFU, FPO, Aimag, capital city, soum, district Gos
53	Vision 2050 6.2.4 MFDG 6.2.5	**Action 7.4.** Clean off and process dead woods improving the forest state.	Forest area where forest thinning was done for clean off	thous. Ha	32	90	240	10,350.0	30	50		20	MECC	Forest Agency ISFU, FPO
			The amount of processed wood products out of dead wood	mill. Tug / year	50000	100000	200000	-					MOFALI	Forest Agency ISFU, FPO, Aimag, capital city, district GO
54	Vision 2050 6.2.4 MFDG 6.2.5	**Action 7.5.** Increase the unit wood utilization level of timber logged from forest use zone.	Processed unit wood utilization level.	percent	48	70	100	28,000.0		20	50	30	MECC, MOFALI	Aimag, capital city, district GO

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
Adaptation priority 4: Weather and climate induced natural hazards													
Target 8	Vision 2050 7.3.21 MFDG 6.4.2 NDCIP 3.6	Reduce the climate change-induced and ever intensifying disaster risks and improve resilience capacity.	Size of damage costs from natural disasters (million USD)	USD	99.3 million	121.143	121.143	1,202,100.0						
55	Vision 2050 7.3.21 MFDG 6.4.2	**Action 8.1.** Conduct a natural disaster risk assessment, intensified by the climate change impacts, at the territorial unit level, involving socio-economic sectors.	Number of sectors conducted detailed risk assess-ments	number	0	150	330	600.0			70	30	ACCGO, NEMA	MECC, NAMEM, MAS, Related Ministries
56	Vision 2050 7.3.21 MFDG 6.4.3	**Action 8.2.** Develop a unified database for weather and climate change disasters, risks, damage, risk insurance information, data sharing management and establish and sustainably operate an electronic platform for utilization in planning.	Number of sectors with expanded and integrated database	number	0 (respec-tive data-base is in place)	6	10	300.0				100	NEMA, NAMEM	MECC, Related Ministries
57	Vision 2050 7.3.21 MFDG 6.4.3	**Action 8.3.** Develop and introduce models on probability of weather and climate related hazards and their impacts.	Introduction of the models	-	Models on prob-ability of weather and climate related hazards is in place.	Model on im-pacts of weather and climate related hazards intro-duced.	Model on prob-ability of weather and climate related hazards and their impacts is intro-duced.	500.0	30		70		NEMA, NAMEM	DRI, IRIMHE, Aimag, soum GOs

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting	
									SB	LB	PP	OS			
58	Vision 2050 7.3.20, 7.3.21 MFDG 7.3.3, 6.4.3	**Action 8.4.** Incorporate methodologies for considering climate change and disaster risks into financing policies and mechanisms.	Method-ology for central and local budget planning considering the climate change risks.	-	Risks are not consid-ered in the aimag and soum funds.	A guide-line is devel-oped.	A guide-line is intro-duced.	300.0	40		60		MoF, MECC	Aimag Gos
59	Vision 2050 6.4.12, 7.3.22, 8.3.3 MFDG 6.4.3	**Action 8.5.** Optimize and activate the insurance system to reduce the climate and hydrometeoro-logical hazards and disaster risks.	Percentage of livestock covered by indexed livestock insurance.	percent	10	12	20	400.0	100				MoF, FRC	MOFALI, MRT, MECC, NEMA
60	Vision 2050 9.2.37, 7.3.19 MFDG 2.5.6	**Action 8.6.**	Number of cities,	number	0	22	30	1,200,000.0	50	50			Aimag and capital city GO	MoF, MUDCH, NEMA, MRT
Target 9	Vision 2050 6.4.13, 7.3.20, 7.3.21 MFDG 6.4.2	Establish multi-hazards impact based early warning systems, thus enabling immediate responses.	Percentage of accuracy of preventing and warning messages on dangerous and catastrophic weather phenomena.	percent	91.2 (2019)	93.2	100	140,000.0					Environ-ment	Emergen-cy, Science, other related sectors

Number of cities, settlements and infrastructures that ensured flood protection preparedness through assessment and renovation of the drainage lines.

Conduct assessment of the flood protection preparedness of Ulaanbaatar city, aimag centers, and settlements, ensure flood preparedness through taking measures towards assuring the safety, renovating and improving the drainage lines of facilities, taking actions directed to target groups at flood risk, and improving the passing and protection capacity of roads, bridges, and flood protection buildings.

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
61	Vision 2050 6.4.13, 7.3.20 MFDG 6.4.3 NDCIP 3.6.3	**Action 9.1.** Increase the forecasting and computing capacity of supercomputers, provide early warning of catastrophic events, and improve spatial and temporal accuracy, probability, and accuracy of forecasting.	Accuracy of early warning of preventing and warning messages on dangerous and catastrophic weather events.	percent	91.2 (2019)	93.2	100	10,000.0	20		80		MECC, NAMEM	MoF
62	Vision 2050 6.4.13, 7.3.21, 8.1.10 MFDG 6.4.3	**Action 9.2.** Establish and introduce an early warning system based on multiple impacts (drought, dzud, flood, strong wind, heavy snow and rain, etc.) at the urban and regional level.	The population received early warning messages on hazardous events within 3 hours.	percent	75	80	85	18,000.0	30		70		NEMA, NAMEM	ACCGO, MDDC , MOFALI, MoE, MRT, MUDCH, MECC
			Citizens capable of taking preventive and response measures against natural disaster risks	percent	-	30	80	10,000.0	30	30	30	10	ACCGO, NEMA, NAMEM	MECC, Related Ministries and organiza-tions
63	Vision 2050 6.4.13, 7.3.20 MFDG 6.4.3	**Action 9.3.** Improve and extend the hydrometeoro-logical and climate-related hazardous event monitoring network.	Number of Doppler radar networks.	number	1	3	8	56,000.0	80		20		MECC, NAMEM	NEMA
			Number of Doppler radar networks.	number	137	150	200	36,000.0	40		60			

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
64	Vision 2050 7.3.20, 7.3.21 MFDG 7.3.3, 6.4.3	**Action 9.4.** Encourage and reward voluntary activities for disaster risk reduction, promote the involvement and initiative of private sectors, non-governmental organizations, and individuals in disaster protection activities, and improve knowledge, information, and awareness among citizens and the community.	Performance of creation of financial mechanisms to encourage and reward voluntary activities and participation in disaster risk reduction	percent	0	30	100	10,000.0	70	20	10		NEMA, MECC	MoF
	Adaptation priority 5: Animal husbandry, rangeland													
Target 10	Vision 2050 8.3 MFDG 8.3, 6.4.2 NDC Vision 2050T 3.1	Develop a productive livestock sector that is compatible with pasture and water resources, based on advanced technologies for adaptation to climate change, and resilient to challenges and risks.	Pasture carrying capacity	Number of live-stock per ha (heads of sheep)	108.0	105.0	96.0	77,520.0					MOFALI, ACCGO	MECC, ALAGAC
65	Vision 2050 8.3.3, 8.3.4, 6.2.12 MFDG 8.3	**Action 10.1.** Set the boundaries of the winter-spring pastures of herders and their communities and ensure the management of the long-term use of the pastures by the herders.	Ratio of herders having the certificates for the use of land of their winter-spring camps to the total number of herders	percent	20	50	80	3,200.0	30	30	30	10	Soum CRKH, GO, Land agency	MOFALI, ALAGAC

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
66	Vision 2050 6.2.9, 6.2.12, 8.3.4 MFDG 6.2.1	**Action 10.2.** Review degraded and desertified pastures, introduce and localize such environmentally friendly technologies as rotation, fallowing, annual and perennial plant cultivation for restoration and improvement leading to enhancement of pasture condition and regeneration ability, as well as increasing the carrying capacity.	Rehabili-tated and improved pasture area	mill. Ha	6.5	20	60	1,400.0	10	30	40	20	ALAGAC, Soum GO, herders, citizen with lifestock	MOFALI, FAD, Projects and Program-mes
67	Vision 2050 8.3.4, MFDG 8.3.3 NCDIP 3.1.2	**Action 10.3.** Hydrological explorations to find water points on pastures will be carried out and deep wells, ponds built to improve the water supply of pastures.	Number of pasture water points identified by hydrological explorations	thous. .pcs	694	1144	1894	2,420.0	40	15	15	30	MOFALI, Aimag FAD, Soum AU	MECC, Water agency
			Number of pasture wells used	thous. .pcs	36620	37370	38620							
68	Vision 2050 8.3.4 MFDG 8.3.11	**Action 10.4.** Increase the amount of fodder self-prepared fodder by the herders' households by planting fodder plants in winter-spring camps of herders.	Number of herder households cultivating fodder crops	thous. House-holds	0.5	10	45	67,500.0	5	10	20	65	herders, Soum AU	Aimag FAD
			Cultivated area	Ha	150	3000	13500							
69	Vision 2050 8.3.4 MFDG 8.3.11	**Action 10.5.** Create the conditions for stocking grass and fodder (wholesale, storage) corresponding to the type and number of livestock of herders' households and balance the duties and responsibilities of herders and central and local government agencies in the event of a disaster.	Increase of hay amount prepared by herders	percent	(1.5 mill. tns)	50% in-crease	80 % in-crease	3,000.0	70	20		10	MOFALI, herders	Aimag FAD, Soum Aus
			Capacity of hay and fodder wholesalers and warehouses established in Gobi and steppe zones	percent	5	20	50							

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
70	Vision 2050 8.3.4 MFDG 8.3.11	**Action 10.6.** Implement the "New Cooperative-Prosperous Herder" action plan to mitigate the negative impacts and risks of climate change	Performance of Action plan implementa-tion	percent	-	30	95	-	100				CSM, MOFALI	Aimag and capital city GO
Target 11	Vision 2050 8.3.31, 8.3.32, 6.2.12 MFDG 8.3.4	Improve the quality and economic turnover of livestock herds, increase meat exports and reduce pasture loads	Rate, zone, location and year of avoidable loss of livestock	percent	6.9	2.8	2.8	38,910.0					Agri-cultur, Local administ-ration	Agri-culture, Local administ-ration, Projects and program-mes
71	Vision 2050 8.3.4, 6.2.12 MFDG 8.3	**Action 11.1.** Developing marketing strategies to enhance the sale of livestock and livestock products.	Number of livestock entered into economic turnover	mill. Head of sheep	6.3	10	20	110.0	15	5	10	70	MOFALI	MCGA, VC, MoFA, AU
72	Vision 2050 8.3.31, 8.3.32, 6.2.12 MFDG 8.3.4	**Action 11.2.** To make use of advanced technologies for raising lambs, two-years old calfs, foals, camels for the export of meat.	Share of young livestock used for meat production out of total young livestock.	percent	1	3	10	4,800.0	10	30	10	50	Soum GO, herders, herders with life-stock, legal entities	MOFALI, Aimag FAD
73	Vision 2050 8.3.18, 8.3.19, 8.3.21 MFDG 8.3.5	**Action 11.3.** Study and identify the causes of new and re-emerging veterinary infectious diseases caused by climate change, develop and implement response strategies, and reduce the spread of acute veterinary infectious diseases.	Number of types of new and re-emerging veterinary diseases	number	8	0	0	4,000.0	70		30		MOFALI, GDVM, IVM	Aimag VD, Soum VC
			Success rate of strategy implementa-tion	percent	0	100	100							

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding						Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
74	Vision 2050 8.3.18, 8.3.31, 8.3.32 MFDG 8.3.5	**Action 11.4.** Introducing technologies to track the registry of origin, movement of livestock, establish protected farms with veterinary quarantine, and reduce the number of livestock suffering from emerging and resurgent veterinary diseases.	Number of protected farms with quarantine	number	1	4	10	30,000.0	20	10	10	60	MOFALI, GDVM, Aimag FAD , Meat process-ingn indust-ries	Relevant projects and programmes, Aimag, soum GOs, VD, MNCCI, Professional associations
			Share of soums out of total introduced certified tracking technolo-gies.	percent	10	30	60								
			Volume of meat exported	Thous. Tn	80.3	83	85								
Adaptation priority 6: Crop farming															
Target 12	Vision 2050 8.3 MFDG 8.3, 6.4.2 NDCIP 3.2	Protect soil fertility and sustainably develop high-productivity crop production based on advanced technologies adapted to climate change by efficiently using the positive effects of climate change and mitigating the adverse impacts.	Share of straw mulched area with grain and fodder cultivation.	percent	3	8	20	32,850.00						
75	Vision 2050 8.3.23 MFDG 6.2.1, 8.3.1, 8.3.6	**Action 12.1.** Introducing of Minimum and zero tillage technology in the cultivation of crops and annual fodder plants.	Proportion of the area using reduced and zero-fertilization technology in the total grain and fodder plant cultivated area	percent	40	50	80	8700	30	20	10	40	MOFALI, Farmers	Research Institutes, state owned AC

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)					
									SB	LB	PP	OS	Main	Co-imple-menting
76	Vision 2050 8.3.23 MFDG 6.2.1, 8.3.1, 8.3.6	**Action 12.2.** Increase the number of crop rotations that are beneficial for the soil fertility and economically efficient, reduce the percentage of plain fallow, and increase the cultivation of leguminous and other food and fodder crops.	Share of plain fallow in crop rotation area	percent	60	40	20	2000	20	10	-	70	MOFALI, Farmers	Research Institutes
77	Vision 2050 8.3.6 MFDG 6.2.1, 8.3.1, 8.3.6	**Action 12.3.** Straw mulching of grain, fodder and technical plant cultivating fields.	The share of the straw mulched area in total grain and fodder plant cultivated area.	percent	3	8	20	3300	30	10	20	40	MOFALI, Farmers	Research Institutes
78	Vision 2050 6.3.10, 6.3.11, 8.3.6 MFDG 6.3.2, 8.3.11	**Action 12.4.** Build reservoirs, marshes, ponds to use snow and rain flood water for improving the water supply and use it for irrigation of fodder crops, potatoes and vegetables.	Number of newly constructed reservoirs, ponds and irrigation systems.	number	512	532	600	1850	30	20	20	30	MOFALI, Farmers	Research Institutes
79	Vision 2050 6.2.19 MFDG 8.3	**Action 12.5.** Units capable for increasing the amount of rain through cloud seeding and protecting against frostbite and hail will be established and operated in the main cultivation zones.	Number of units with the appropriate hardware.	number	0	5	10	5000	70	-	30	-	MECC	MOFALI, NAMEM
80	Vision 2050 8.3, 6.2.9, 6.2.4 MFDG 8.3.1, 6.2.5 NDCIP 3.2.2	**Action 12.6.** Grow a forest strip on the agricultural fields fenced off by farmers.	Length of established forest strip.	Km	355	900	2500	12000	30	20	-	50	MOFALI, Farmers	Forest Agency, Research Institutes

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
Target 13	Vision 2050 8.3.2, 8.3.6 MFDG 8.3.1	State of the-art advanced technologies will be introduced in crop production, ensuring the adaptation to climate change and the pre-conditions for sustainable harvesting.	Share of area where new varieties of seed are used and introduced in the total cultivated area.	percent	30	50	70	51,682.00					Agricul-ture	Agricul-ture, Science, local administ-ration
81	Vision 2050 8.3.6, 6.2.11 MFDG 8.3.11 APG 3.3.1, 3.3.3 NDCIP 3.2.1	**Action 13.1.** Introduction of drip irrigation and eco-synthetic film covering technology in the production of potatoes, vegetables and berries.	The size of the area where drip irrigation and eco-plastic film covering technology is introduced.	Ha	73	150	350	24282	10	10	20	60	MOFALI, Farmers	Research Institutes
82	Vision 2050 8.3.6, 6.2.11 MFDG 8.3.1 APG 3.3.1, 3.3.3	**Action 13.2.** Implement a project to introduce smart technologies in the management of plant protection, moisture, heat and fertilizer supply in agricultural production.	Number of projects implemen-ted in the field of smart technolo-gies.	number	1	5	15	10100	20	10	40	30	MOFALI, Projects and program-mes, Herder, Farmers	MED, MoF, Aimag GO, FAD , AUs of soums
83	Vision 2050 8.3.25 MFDG 8.3.1	**Action 13.3.** Introduction of crops and varieties resistant to drought, diseases and pests, improvement of seed supply of varieties.	Share of area where new varieties of seed are used and introduced in the total cultivated area.	percent	30	50	70	10300	30	20	20	30	MOFALI, Farmers	Research Institutes
84	Vision 2050 8.3.6 MFDG 8.3	**Action 13.4.** Increase the size of green spaces and increase the cultivation of fruit trees and shrubs.	The size of the area planted with fruit trees and shrubs	thous. ha	6.5	7.8	9.7	7000	10	10	10	70	MOFALI, Farmer, citizens	Aimag, Soum GO, FAD , AU

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
Adaptation priority 7: Public health														
Target 14	Vision 2050 2.2, 6.4. MFDG 2.2.2, 2.2.8, 6.4.2.	Generate new research data and evidence and strengthen response capacity to improve the knowledge and attitudes of the population, management of health institutions, physicians, and professionals about climate change for resilience building with less risks.	Number, share of health institutions with an integrated plan of adaptation and response to climate change.	percent	0	20	90	5,300.00					Health	Education, Science, Public health
85	Vision 2050 6.4. MFDG 6.4.2.	**Action 14.1.** Develop evidence-based gender-responsive public health recommen-dations versus climate change-induced morbidity and mortality.	Health impact and risk assessment of climate change including a gender analysis	number	1	1	2	1000	50	50			MoH, NCPH, MES NEMA	Aimag DoH, EA MMA
86	Vision 2050 6.4. MFDG 6.4.2. NEHP 3.3.1.1, NDCIP 3.7.3	**Action 14.2.** Conduct a national-level study of the impact and incidence of climate change on human health among the population (infectious, NCDs).	Number of new research	number	3	1	2	200	100				MoH NCPH	MMA
87	Vision 2050 2.2. MFDG 2.2.8. NDCIP 3.7.2	**Action 14.3.** Improve the capacity of doctors and specialists to provide health education	Share of doctors and professionals participated in the trainings	percent	20	60	100	300	40	20	40		MoH, NCPH	HDC, MoD, VC, NPA, LEMA, MTO, ZDRC

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
88	Vision 2050 2.2. MFDG 2.2.8. NDCIP 3.7.2	**Action 14.4.** Organize trainings to enhance the knowledge of zoonotic diseases and diagnostic capabilities of the staff of primary health service providing institutions.	Number, share of doctors, staff members of primary health service providing instit	percent	10	30	50	100	20	20	30	30	MoH NCZD	Aimag and capital city DoH
89	Vision 2050 2.2. MFDG 6.4.2.	**Action 14.5.** Develop and implement plans for health institutions at all levels to become environment-friendly health institutions resilient to climate change.	The number and share of institutions evaluated by the WHO's "Methodol-ogy for evaluating health facilities resilient to climate change and environment - friendly".	percent	0	20	40	500	45	25		30	MoH, Aimag and capital city DoH	NEMA MECC
			Number and share of health facilities with integrated climate change adaptation and response plans.	percent	0	20	90	1000	45	25		30	MoH, Aimag and capital city DoH	NEMA MECC
90	Vision 2050 2.2. MFDG 6.4.2.	**Action 14.6.** Integration of climate and geographic information in the electronic surveillance system to improve surveillance and response to zoonotic infectious diseases.	Number of newly carried-out surveillan-ces	number	4	1	5	600	55	45			NCZD NCCD MoH	ZDRC DoH
91	Vision 2050 2.2. MFDG 6.4.2.	**Action 14.7.** Upgrade the zoonotic diseases diagnostic capacity of health institutions.	Number of health fac ilities with upgraded diagnostic capacity.	number	0	2	5	1600	20		80		MoH MoF	DoH

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
Adaptation priority 8: Social security, livelihood														
Target 15	Vision 2050 2.1. 2.2.6, 3.3, 3.4, 8.3 MFDG 2.2, 3.3.3, 8.3.14	Welfare, protection and insurance preventive system is established to reduce the vulnerability through identification and building capacity of vulnerable to climate change impact groups and increasing their income.	Percentage of support provided to households vulnerable to climate change	percent	0.0	100.0	100.0	27,800.00					Labor, Social Safety	Science, Finance, Emer-gency
			Proportion of citizens of middle class and above	percent	71.6	72.0	75.0						Agri-culture	Food, Employ-ment
92	Vision 2050 2.1. MFDG 3.3.3, 8.3.14	**Action 15.1.** Conduct a vocational training program for vulnerable groups to climate change, women, and rural-to-urban migrants, who lost their livelihoods due to natural disaster.	Number of training sessions	number	0	1	5	1500	60	30	10		MFLSP, MED	MOFALI, MoF, NEMA
93		**Action 15.2.** Provide financial aid to households that have lost their livelihood sources due to natural disasters, to promote their livelihood.	Percentage of support provided to households vulnerable to climate change	percent	0.0	100.0	100.0	5000	100				MoF, MFLSP	MOFALI, NEMA
94	Vision 2050 3.3. MFDG 3.3.3, 8.3.1, MNHP 4.3.1	**Action 15.3.** Diversify income sources of rural households by promotion of herder initiatives to establish herder groups, communities and cooperatives.	Percentage of average income increase of rural households	percent	1 615.2 thous. MNT	10.0%	30.0%	1000	70	30			MOFALI, NSO	MFLSP, MED

	Policy rationale	Objective, target and actions	Indicator	Mea-suring unit	Result indicator			Funding					Responsible sector, implementing body	
					Baseline /2023/	Target level /2025/	Target level /2030/	Funding (MlnTug)	Type of funding sources (%)				Main	Co-imple-menting
									SB	LB	PP	OS		
95	Vision 2050 3.4. MFDG 3.3	**Action 15.4.** Promote employment opportunities for local communities including especially women through green jobs and production of ecoproducts	Production of eco-products	percent	0.0%	10.0%	30.0%	7000	5	20	45	30	MOFALI, MFLSP	IO, Local organi-zation
96	Vision 2050 3.4. MFDG 3.3	**Action 15.5.** Increase share of middle and upper-class citizens by improving public-private partnerships, and creating more permanent jobs in urban and rural areas.	Share of middle and upper-class citizens	percent	71.6	72.0	75.0	6000	70			30	MED, MFLSP, MOFALI,	NSO, Local organi-zation
97	Vision 2050 2.2.6. MFDG 2.2	**Action 15.6.** Increase the life expectancy of men in rural areas directly affected by climate change by increasing access to social welfare and health services.	Average life expectancy of men	number	67.6	68.0	70.0	6500	100				MFLSP, MoH,	NSO
98	Vision 2050 2.1. MFDG 2.1.12	**Action 15.7.** Increase enrolment rate of primary education	Primary education enrolment rate (sex-disaggreg-ated data to be collec-ted)	percent	96.8	97.5	99.0	300	100				MES	IO NSO
99	Vision 2050 3.1. MFDG 3.1.1, 3.1.2, APG 2.1.7, 2.5.1, 2.5.2, NDCIP 3.8.1	**Action 15.8.** Increase the percentage of social insurance coverage of herders by publicizing the importance of social insurance	Percentage of social insurance coverage of herders	percent	31.6	35.0	50.0	500	100				MFLSP, MOFALI,	NSO
TOTAL BUDGET								**27,040,276.3**						

Annex II:

NAP MONITORING AND EVALUATION FRAMEWORK

ANNEX: Overarching M&E Framework for Mongolia NAP

Impact / Outcome / Output	Indicators (Unit)	Baseline (Year)	Target (2030)	Source of Indicator	Data collection and Frequency	Responsible agency
IMPACT: INCREASED RESILIENCE AND LOWER VULNERABILITY THROUGH SUSTAINABLE ACTIONS AGAINST THE EFFECTS OF CLIMATE CHANGE IN MONGOLIA						
Resilience increased	Human Development Index (Value)	0.74 (2022)	0.76	HDI Report	UNDP. Every year	Human Development Report
Vulnerability decreased	Costs of Damages (mln USD/annum)	99.3 mln USD (2023)	90mln. USD (last 10 years average)	National Disaster Risk Report	Statistics, NSO. Every 5 years	NEMA
Sustainability improved	Percentage of land degradation (%)	22.9 (2021)	20	Vision 2050	Statistics, NSO. Every 5 years	Central governmental agency on land use
OUTCOME: ADAPTIVE CAPACITY AND ENABLING ENVIRONMENT FOR CLIMATE ADAPTATION IMPROVED (PROCESS):						
Output 1: Adaptation policy and legal framework for key sectors established, and inter-sectoral coordination and implementation mechanisms strengthened.	Approved intersectoral coordination system and percentage of implemented activities through coordinated management system (%)	0 (2021)	100%	MECC	MECC and UNFCCC Reports (yearly)	MECC / Cabinet of Government
Output 2: Knowledge and capacity of stakeholders in environmental and socio-economic sectors in the field of climate change adaptation science and technology information services strengthened.	Percentage of GDP used on science and technology sector (%)	0.2 (2021)	3.0	ME	Sectoral report and statistic (yearly)	ME
Output 3: Relevant data available and used for evidence-based climate change adaptation planning and implementation	Database with disaggregated climate relevant and social data	Scattered data available but not stored and used effectively	Central Database with relevant disaggreg-ated data for climate action in use	MECC, NSO	Periodical national and international climate reports	MECC, NSO

OUTCOME: ADAPTATION OUTCOMES IN KEY SECTORS ACHIEVED						
SECTOR 1: ECOSYSTEMS, BIODIVERSITY, LAND DEGRADATION AND DESERTIFICATION						
Output 1: the capacity to adapt to climate change by protecting biodiversity, flora and ecosystems, and reducing land degradation and desertification improved.	Size of area under protection %	20 (2019)	30	MECC	Statistic (yearly)	MECC
Output 2: Capacities for implementation of interventions to reduce the impacts of climate change and human activities on grassland ecosystems, land degradation and desertification strengthened.	Reduced area of land affected by desertification, %	76.9% of the total territory was desert (2020)	Not more than 70%	MECC	International Methodology (yearly)	MECC
SECTOR 2: WATER REGIME, RESOURCES AND SUPPLY						
Output 1: A permanent, state-of -art network for continuous monitoring of water resources and its quality to ensure the timely delivery of information and services established and maintained.	Number of restored and newly established observation networks.	2 (2021)	15	MECC	Sectoral Report	NAMEM
Output 2: adaptive capacity through the adoption of advanced technologies for the sustainable use, protection and restoration of water resources build.	Accumulated quantity of water from precipitation and glacier melt (km^3).	0 (2021)	6.4	NAP	Sectoral report and statistic (yearly)	Ministry of Economy and development
SECTOR 3: FORESTRY SECTOR						
Output 1: The resilience and adaptive capacities of forests to climate change enhanced.	Forested land (%)	7.9 (2019)	9	Vision 2050	Statistics, NSO. Every 5 years	MECC
	Forest area affected by fire, ha*1000	130 (2021)	50	NAP	Sector Statistic (yearly)	MECC
Output 2: Sustainable production and utilization of the forest waste resources, dead woods and non-timber products enhanced	Forest waste resources and dead wood used as raw materials for wood processing industry, thousand m^3/year	700 (2021)	1500	MoFALI	Sector Statistic (yearly)	Forestry agency, forest unit
SECTOR 4: WEATHER AND CLIMATE INDUCED HAZARDS						
Output 1: Preparedness, resilience, and capacities improved by conducting comprehensive disaster risk assessments	Management information system and a unified database to support making quick decisions created.	0 (2023)	System working and functional	NEMA strategy, #1.2	Sectoral Report (yearly)	NEMA
Output 2: Early warning system based on the multi hazards impact established.	Percentage of correct warnings of a hazardous and catastrophic weather phenomenon	91.2 (2019)	100	Strategy of NAMEM, 2021-2024.	Sector Reports Yearly)	NAMEM

SECTOR 5: LIVESTOCK & PASTURE						
Oputput 1: Sustainable pasture management practices mainstreamed by adjusting the livestock population to the pasture carrying capacity.	Rehabilitated and improved pastureland (million hectares)	6.5 in one year (2020)	60.0 in 7 years	MoFALI	Statistical data (yearly)	MULS, Research Institute of Animal Husbandry (RIAH)
Output 2: Grazing pressure reduced by enhancing herd quality and optimizing economic turnover.	Percentage of total calves and young livestock prepared for meat (%)	1% (2023)	10%	MoFALI	Statistical data (yearly)	Aimag, Soum, Governor's Office
SECTOR 6: CROP FARMING						
Output 1: soil conservation technology such as zero-tillage to reduce moisture loss and prevent mechanical erosion of soil implemented	Proportion of area using reduced and zero-tillage technologies, %	40 (2021)	80	MoFALI	Statistical Reports (Yearly)	MoFALI
Output 2: Modern, climate smart technologies in crop production introduced.	Area with drip irrigation technology introduced, Ha	73 (2023)	350	MoFALI	Sectoral report	MoFALI
SECTOR 7: PUBLIC HEALTH						
Outcome 1: Training and awareness raising among health professionals on the effects of climate change on human health introduced.	Number of health personnel who has knowledge on climate change and its health consequences (%)	0 (2023)	70.0	MOH	Sectoral report and statistic (yearly)	NCPH NCZD NCCD
Output 2: Capacity for early warning and response of threats and risks to public health caused by climate change in the health sector strengthened.	Number of health facilities which are assessed through the Climate resilience and environmental sustainable health faclity tool of WHO (%)	0 (2023)	40%	MOH	WHO methodology, quantitative survey (yearly)	Relevant agencies
	Percentage of health facilities which have a plan on Climate resilience	0 (2023)	20%	MOH	Sectoral report and statistic (yearly)	MOH
SECTOR 8: SOCIAL PROTECTION, LIVELIHOOD						
Outcome 2: The proportion of middle and above-class citizens increased through the creation of stable and guaranteed employment opportunities, and increasing overall income levels.	The average monthly income of herding households (increase %).	1,615.2 thous Tug (2023)	30.0%	NSO	Statistic (yearly)	NSO
Outcome 3: Improved coverage by social and welfare insurance systems for vulnerable groups.	Social insurance coverage of herdsmen (%)	31.6 (2023)	50.0	NSO	Statistic (yearly)	Ministry of Family, Labour and social protection

ABBREVIATIONS

1. Policy and programmes

Vision 2050	Long term development policy of Mongolia
MFDG	Mongolia's Five-Year Development Guidelines for 2021-2025
MNHP	Mongolian National Herder Programme
NEHP	National "Environmental Health" Program
NDCIP	National determined contribution implementation plan
SDG	Sustainable development goals

2. Classification of funding sources

SB	State budget
LB	Local budget
IPP	International projects and programmes
OS	Other sources (private sector etc.)

3. Organizations

GoM	Government of Mongolia
MED	Ministry of Economy and Development
MFA	Ministry of Foreign Affairs
MoF	Ministry of Finance
MECC	Ministry of Environment and Climate Change
MOFALI	Ministry of Food and Agriculture and Light Industry
MoD	Ministry of Defense
MRT	Ministry of Road and Transport
MUDCH	Ministry of Urban Development, Construction And Housing
MDDC	Ministry of Digital Development and Communications
MoE	Ministry of Energy
MoH	Ministry of Health
ME	Ministry of Education
NEMA	National Emergency Management Agency
NSO	National Statistics Office
GABP	General Authority for Border Protection
GIA	General Intelligence Agency
NPA	National Police Agency
MCGA	Mongolian Customs General Administration
IO	International Organization

ALAGAC	Agency for Land Administration and Management, Geodesy and Cartography
NAMEM	National Agency Meteorology and the Enviromental Monitoring
WA	Water Agency
WSSA	Water Supply and Sewerage Authority
FA	Forest Agency
NCPH	National Center for Public Health
FRC	Financial Regulatory Commission
IRIMHE	Information and Research Institute of Meteorology, Hydrology and Environment
ZDRC	Zoonotic Disease Research Center
HDC	Health Development Center
UHEI	University and Higher education Institutions
MAMS	Mongolian Academy of Medical Sciences
GDVM	General Department of Veterinary Medicine
MAS	Mongolian Academy of Sciences
SBC	Scientific Branch Council
IVM	Institute of Veterinary Medicine
IGG	Institute of Geography and Geoecology, Mongolian Academy of Sciences
RI	Research Institute
VC	Veterinary Clinic
NCZD	National Center for Zoonotic Disease
NCCD	National Center for Communicable Diseases
MNCCI	Mongolian National Chamber of Commerce and Industry
GO	Governor's Office
CRKH	Citizen Representative Khural
DES	Department of Education and Science
LMD	Land Management Department
VD	Veterinary Department
FAD	Food and Agriculture Department
FU	Forest Unit
DoH	Local Department of Health
LEMA	Local Emergency Management Agency
RBA	River Basin Administration
FPO	Forestry Professional Organization
LO	Local Organization
MSRM	Mongolian Society for Range Management
ISFU	Intersoum forest unit
AU	Agricultural Unit
AC	Agricultural Corporation
PS	Private Sector
MPP	Meat Processing Plants

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