

Adaptation strategies for improving the CO₂ sequestration in Mongolia's grasslands

*Qinxue Wang¹, Tomohiro Okadera¹, Eerdeni -¹, Masataka Watanabe², Ochirbat Batkhishig³

1. National Institute for Environmental Studies, 2. Research and Development Initiative, Chuo University, 3. Institute Geography Mongolian, Academy of Sciences

The rapid increase of energy consumption caused the sharp increase of CO₂ emission during last decades in Mongolia. However, changes to a warmer and drier climate resulted in a degradation of permafrost, a severity of water deficit or drought, and finally led a decrease in both biomass productivity and its carrying capacity, which finally caused a decrease of CO₂ sequestration by terrestrial ecosystems in Mongolia. In order to reduce the CO₂ emission or improve the CO₂ sequestration by terrestrial ecosystems, several adaptation strategies and techniques were proposed to the decision-makers as follows:

To reduce livestock numbers in accordance with local grassland carrying capacity

Our previous research showed that aggregate herds caused overgrazing in the central Mongolia, especially surrounding Ulaanbaatar City. It is unlikely that herders will spontaneously reduce their herd sizes, without adequate direct or indirect compensation. Irrigated grassland is not a suitable option for herders and breaking open grassland to sow pasture is officially discouraged for environmental vulnerability. Reseeding of degraded land may be possible, but need long term. In this study, we proposed to educate herds to reduce livestock numbers in accordance with local grassland carrying capacity, which was evaluated precisely in a high temporal and spatial resolution.

To promote sustainable grassland management and adaptation ability for climate change

Grassland management practices that sequester carbon tend to make systems more resilient to climate variation and climate change, thus, we proposed: 1) to promote sustainable rangeland management through the implement of national policies and investment plan; 2) to restore degraded lands for enhancement of production in areas with low productivity; 3) to enhance livestock quality, health and productivity through the improvement of pasture, fodder and water supplies; and 4) to promote the adaptation ability for climate change and natural disasters through the improvement of food safety and quality controlling, storing and transporting systems as well as market access networks.

To develop renewable energy technologies for the sustainability of nomadic pastoralism

Attention should be paid to reducing energy loss, so that negative environmental impacts are minimized. In such case, technological innovation plays an important role. Accordingly, in this study, we proposed to develop several renewable energy technologies, such as the Film-solar Power System for Gel, Renewable Energy Refrigeration System, and Solar Power Pumping System etc., which may contribute to not only a decrease in GHGs emission, smog and other pollutants, but also the sustainability of nomadic pastoralism, which might be the most effective way to protect the capacity of CO₂ sequestration in grasslands.

Acknowledgement

This study is supported by the project "Vulnerability assessment and Adaptation strategies for Permafrost regions in Mongolia" (2012-2014) funded by the Environment Research and Technology Development Fund, and the project "Development of Innovative Adaptation System and MRV Method for JCM in Mongolia" (2015-present) funded by Ministry of the Environment, Government of Japan.

Keywords: CO₂ Sequestration, Climate Change, adaptation strategies, Mongolia's Grasslands