



THE 2nd WORKSHOP ON SOCIAL-ECOLOGICAL SYSTEMS GOVERNANCE FOR SUSTAINABILITY

23-24 August 2019,

**Conference hall,
Mongolian Academy of Science**

Ulaanbaatar, Mongolia

PROCEEDING

Sustainable development
institute for western region
of Mongolia



SUSTAINABLE DEVELOPMENT
INSTITUTE FOR
WESTERN REGION OF
MONGOLIA



PROCEEDINGS OF THE 2nd WORKSHOP ON SOCIAL-ECOLOGICAL SYSTEMS GOVERNANCE FOR SUSTAINABILITY

23-24 August 2019 Ulaanbaatar, Mongolia

WORKSHOP ORGANIZER

- Sustainable Development Institute for Western Region of Mongolia,
- Head office, Mongolian Academy of Sciences,
- Institute for Strategic Studies, National Security Council of Mongolia,
- Institute of Geography and Geocology, MAS
- Future Earth Mongolian Committee



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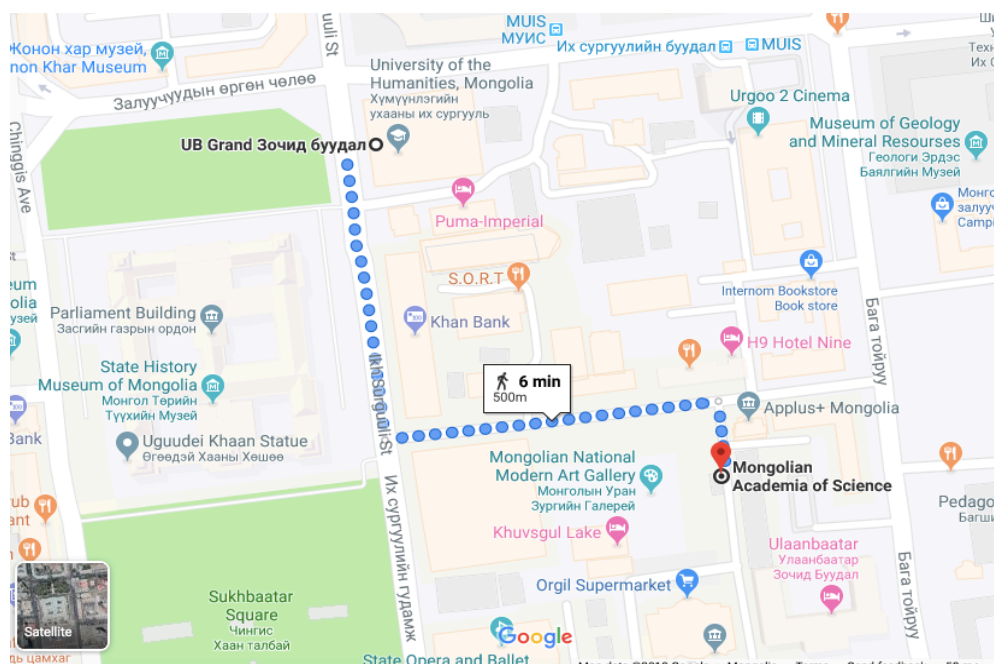
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AIM OF THE WORKSHOP

The 2nd Workshop on Social-Ecological systems Governance for Sustainability (SESGOS2019) – as a part of science-policy interaction project activity organized by Sustainable Development Institute for Western Region of Mongolia (SDIWOM) along with many partners. The aim of the workshop is bring together leading academic scientists, researchers, research scholars, decision makers, practitioners, policy formulators and local communities to exchange and share their experiences and research results on the all aspects of Social-Ecological Systems and its Governance in central Asia as well as in Asian-Pacific region. It will provide invaluable information where the representatives of different countries will share their knowledge and experiences in environmental and social science at multi-scale levels.

DATE & VENUE

The workshop will be held at Conference hall (3rd floor, Soyliin tuv orgoo building) of Mongolian Academy of Sciences, head office, Ulaanbaatar, Mongolia on 23 August 2019. It is 6 minutes on foot from UB Grand hotel.



- The field trip excursion will be organized at Hustai National Park on 24 August 2019 which is 82 km from Ulaanbaatar

DETAILED PROGRAM

22 August 2019 (Thursday)		
8:30-23:00	Arrival	all delegates arrival At UB grand hotel, Ulaanbaatar, Mongolia
23 August 2019 (Friday)		
08:30-09:00	Registration	All participants
09:10-09:20	Opening Remarks	Acad. B. Avid, Secretary general of Mongolian Academy of Sciences Dr. Battogtokh Dorjgotov, director of Institute of Geography and Geoecology, MAS Future Earth Mongolian Committee
SESSION 1: INTRODUCTION and KEYNOTE SPEECH		
MODERATOR		
– Dr. Altanbagana Myagmarsuren, Institute of Geography and Geoecology, MAS		
09:20-10:30	Project introduction	Dr. B.Suvdantsetseg, sustainable development institute for western region of Mongolia. “Ecological Vulnerability Assessment for Adaptation Strategy Formulation at Different Spatial Scales in Western Mongolia and China”
	Keynote speaker	Prof. Okuro Toshiya, Graduate School of Agricultural and Life Sciences, University of Tokyo “Restoration and reconstruction of sustainable land management systems under highly variable environments”
	Invited speaker	Prof. Xueyong Zhao, Northwest Institute of Eco-environment and Resources, CAS “Toward sustainable desertification reversion and development in Horqin Sandy Land, Inner-Mongolia, China”
10:30-10:45	Group photo and Coffee break	
SESSION 2: SOCIO-ECOLOGICAL SYSTEMS SESSION		
<i>This session will share the pasture socio-ecological systems vulnerability assessment related research progress, and key findings for project partners.</i>		
CHAIR:		
– Prof. Xueyong Zhao, Northwest Institute of Eco-environment and Resources, CAS		
– McS Khurel Nominbolor, Institute of Strategic studies		
<i>Speakers</i>		
10:45-12:30	– Dr. Shaokun Wang, Northwest Institute of Eco-environment and Resources, CAS	

	<p>“Changes of soil microbial community along vegetation restoration in semi-arid sandy land of northern China”</p> <ul style="list-style-type: none"> – McS. Kherlenbayar. B, Sustainable development Institute for western region of Mongolia <p>“The impact of Pastoral Ecological vulnerability on local socio-economic development at Gobi-Altai provinces, Mongolia”</p> <ul style="list-style-type: none"> – Mr. Kitaura Yoshio, Green Network, Japan <p>“Greening experiences”</p> <ul style="list-style-type: none"> – Dr. Z.Burmaa, Khovd state University <p>“Study on rivers and lakes ecosystems in great lakes depression in western Mongolia”</p> <ul style="list-style-type: none"> – Dr. Chao Lu Mengqiqige1 and NiTu Wu, Institute of Grassland surveying and Planning, Inner Mongolia, China <p>“An assessing framework for regional grassland ecosystem health with consideration of natural succession”</p> <ul style="list-style-type: none"> – Dr. Tuvshintogtokh, McS. Manidari, McS. Otgonsukh, Institute of general and Experimental biology, MAS <p>“Pasture degradation assessment using botanical field survey and map comparison at biger and chandmani soums”</p>
12:30-13:30	Lunch
<p>SESSION 3: SOCIO-ECOLOGICAL GOVERNANCE</p> <p><i>This cluster will share the socio-ecological management and governance related research progress, key findings, and concrete activities for collaborative project partners.</i></p> <p>CHAIR:</p> <ul style="list-style-type: none"> – Prof. Okuro Toshiya, Graduate School of Agricultural and Life Sciences, University of Tokyo – Dr. Shaokun Wang, Northwest Institute of Eco-environment and Resources, CAS 	
Speakers	

13:30-15:10	<ul style="list-style-type: none"> – Dr. Suvdantsetseg Balt, Sustainable development Institute for western region of Mongolia “Participatory approach for conceptual development of local sustainable development plan: A case of Khuhmorit soum of Gobi-Altai provinces, Mongolia” – McS. Nominbolor.Kh, Institute of Strategic studies “Policy document assessments through SDG criteria in Khovd and Gobi-Altai provinces” – Dr. Takafumi Miyasaki, Nagoya university “Collaborative national park management and its effects on neighboring herders’ livelihoods in Mongolia” – McS. Daginnas Batsukh, Mongolian University of Life Sciences, Mongolia “Stakeholder engagement strategy for protected areas—a case study of Khustai national park in Mongolia” 		
15:10-15:30	Tea Break		
<p>SESSION 4: LOCAL PARTICIPANTS SESSION</p> <p><i>This session will share the pasture degradation, herding management, farming and policy related key findings, local activities and opportunities for collaboration among researchers, local participants and partners.</i></p> <p><i>Note: Networking development and experiences sharing at pasture adaptation managements will be discussed at this session.</i></p> <p>CHAIR:</p> <ul style="list-style-type: none"> – Dr. Balt Suvdantsetseg, Sustainable development Institute for western region of Mongolia – Dr. Takafumi Miyasaka, Nagoya university 			
Panelist			
15:30-16:45	<ul style="list-style-type: none"> – Government officer of food and agriculture department, Gobi-Altai province – Local officer and herder of Biger soum, Gobi-Altai province – Local officer of Khuhmorit soum, Gobi-Altai province – Local officer of Chandmani soum, Gobi-Altai province – Local officer of Chandmani soum, Khovd province – Local officer and herder of Zereg soum, Khovd province – Local officer of Darvi soum, Khovd province – Local officer of Durgun soum, Khovd province 		
16:45-17:00	Tea Break		
17:00-17:45	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Discussion</td> <td>Chairs to summarize 4 thematic sessions</td> </tr> </table>	Discussion	Chairs to summarize 4 thematic sessions
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17:45-18:00	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Closing Remarks</td> <td>Prof. Okuro Toshiya, Graduate School of Agricultural and Life Sciences, University of Tokyo</td> </tr> </table>	Closing Remarks	Prof. Okuro Toshiya, Graduate School of Agricultural and Life Sciences, University of Tokyo
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		<p>Prof. Xueyong Zhao, Northwest Institute of Eco-environment and Resources, CAS</p> <p>Dr. Balt Suvdantsetseg, Organizing Committee chair, Sustainable development institute for western region of Mongolia</p>
18:30	Welcome Dinner	
24 August 2019 (Saturday)		
08:30-12:30	Field Visit	
12:30-13:30	Lunch	
13:30-17:00	Field Visit	

WELCOME MESSAGE

Dear project collaborators, distinguished guests, and colleagues:

The Sustainable Development Institute for western region of Mongolia (SDiWoM) is conducting several international and domestic collaborative projects since its establishment. The “Ecological Vulnerability Assessment for Adaptation Strategy Formulation at Different Spatial Scales in Western Mongolia and China” project has been implemented from 2017 to 2019 supported by Asia-Pacific Network for Global Change Research (APN). Under this project we organized 2 workshops. The first one was an expert discussion meeting focusing on “Ecological Vulnerability Assessment” which was held in Tongliao city, Inner Mongolia, China from 5-9 July 2018. This year’s workshop titled “The 2nd workshop on social-ecological systems governance for sustainability (SEGoS2019)” is taking place in Ulaanbaatar, Mongolia from 23-24 August 2019.

The aim of the workshop is to discuss the key research findings, identify the involvement and cooperation of the regional organizations in the implementation of the research output, facilitate knowledge sharing and present united scientific understanding, solutions and recommendations. “SEGoS2019” workshop comprises of three main sessions namely, Socio-Ecological Systems Challenges, Socio-Ecological Systems Governance and Local and Regional Pasture management in adaptation development process. Moreover, the workshop has emphasized the project implementation process and our future collaboration by inviting collaborators.

“SEGoS2019” workshop is co-organized by the Head office of Mongolian Academy of Sciences, Future Earth-Mongolian Committee, Institute of Geography and Geocology, MAS and is attended by scientists and researchers from China, Japan, and Mongolia, as well as communities and representatives from local and regional government organizations, research institutes, and universities.

We would like to express our sincere gratitude to all the participants and the co-organizers of the workshop from the government offices, international and research organizations. I am looking forward to hearing your thoughts on all these issues. We are grateful for the support and cooperation received from our project members as to work together to deliver best outcomes to make research areas and our region more sustainable, safe and inclusive.

Thank you for your attention. I wish you a very successful workshop.

Balt Suvdantsetseg (PhD)

Director General, The Sustainable Development Institute for western region of Mongolia

OPENING REMARKS

Dear distinguished guests, colleagues, ladies and gentlemen:

Welcome you all to the “2nd Workshop on Social-Ecological systems Governance for Sustainability” here in Ulaanbaatar. We are very grateful to the host and to the workshop Organizing Committee for their tremendous support they have provided and our researchers and institutes for coming together and engaging in this project activity.

I am delighted to be here with all of you to focus on pasture ecosystem vulnerability, its impacts on socio-economy and governance systems, which are urgent topics in Mongolia. Mongolia is an agriculture-based country that we use 78 percent of the total land for grazing pasture. Pasture ecological vulnerability assessment is essential to reverse ecosystem changes, environmental degradation and combat climate change.

The nomadic pastoralism has been using the grazing land within pasture capacity through traditional nomadic management to preserve ecosystem resources. Unfortunately, rapid increase in livestock number and changes of climate condition affected the pasture degradation and shrinking of pasture for grazing field by reducing the further sustainability of nomadic animal husbandry. So, we must reach to a common understanding of the environmental challenges that we are facing now. And establish how overcoming these challenges could help sustain economic and social development in our region by learning from best experienced countries.

Environmental and social development actions have enabled opportunities for peer-learning, the sharing of best practice and supported coherent policies for clean and environmentally sustainable development. These include initiatives on green growth, environmental accounting and statistics, partnerships, and regional coordination mechanisms.

As seen from project implementation, the Mongolian Academy of Sciences is supporting well the project activities through active participation of scientists and young researchers from our institutes and also they had good communication with international young researchers. We hope this personal and institutional communication and friendship will continue in future.

I wish you a very successful days.

Academician Budeebazar AVID
Secretary General, Mongolian Academy of Sciences

OPENING REMARKS

Dear distinguished delegates, professors, researchers, ladies and gentlemen,

Today, I welcome all of you to The 2nd Workshop on Social-Ecological systems Governance for Sustainability which is organized by Sustainable Development Institute for Western Region of Mongolia under APN support. It is my pleasure to open this workshop. I would like to introduce the key findings, policy messages and successful examples of this project with you. This report was prepared as part of our effort to support most vulnerable provinces and sub-provinces in terms of ecology and pasture ecosystems, and its impacts on social and economic systems' sustainability in future.

The main advantage of this project is that we used a participatory approach that has enabled participation of several regional and local governments, communities, and multiple academic teams. The second point is working with collaborative model of participatory geovisualization in assessment of ecological vulnerability and socio-economic impacts analysis and development of policy formulation on adaptive resource efficiency and sustainability of the grazing pasture. Thirdly, the research report examines how current policies can contribute to reducing extreme events and ecological vulnerabilities. It demonstrates how more effective and linked policies could lead to an improvement in risk reduction and pasture management opportunities, thereby reducing vulnerabilities.

To reduce future risks, we are developing policy options to improve nomadic pasture management systems and to improve adaptive capacity of local communities through scientific common information and evidence-based and better targeted responses. We are also considering developing national planning strategies and their design that are linked to: (i) assessment of pasture ecological vulnerability; (ii) environmental protection initiatives; and (iii) specific policy recommendations at the case areas.

The project research analysis shows that pasture ecological systems are very vulnerable, with more than 60 percent of pasture land and 60 percent of local herders are under a situation requiring immediate action. The region has recorded a threat in natural environment change and socio-ecological changes. Therefore that the mix of traditional knowledge, scientific outputs, creativity, and information, if put in the context of human capabilities in environmental protection and climate change adaptation.

I am pleased to invite all of you to share with us your key findings and knowledge products to support the capacity building activities and implementation of the project.

Thank you for your attention. I look forward to our discussions during this workshop today.

Myagmarsuren ALTANBAGANA

Project advisor, Head of socio-economic geography division, Institute of Geography and Geoecology, MAS



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MONGOLIAN ACADEMY
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ECOLOGICAL VULNERABILITY ASSESSMENT FOR ADAPTATION STRATEGY FORMULATION AT DIFFERENT SPATIAL SCALES IN WESTERN MONGOLIA AND CHINA

Balt Suvdantsetseg^{1,2}, Yan Wanglin³, Toshiya Okuro⁴ and Xueyong Zhao⁵

¹ *Sustainable development Institute for western region of Mongolia*

² *International Cooperation Department, Mongolian Academy of Sciences, Mongolia*

³ *Graduate school of Media and Governance, Keio university, Japan*

⁴ *Toshiya Okuro, Graduate School of Agricultural and Life Sciences, University of Tokyo, Japan,*

⁵ *Xueyong Zhao, Northwest Institute of Eco-environment and Resource, Chinese Academy of
Sciences, China,*

suvdantsetseg@mas.ac.mn, suvd16@gmail.com

Keywords: geovisualizations, socio-political context, pasture vulnerability

The collaborative project has enabled a participation of several regional and local governments, communities, and multiple academic teams working with collaborative approach of participatory GIS in development of assessment modelling and policy formulation on adaptation and sustainability of the grazing pasture. The main objective of this research project is to develop effective adaptation strategies for pasture management using advanced geospatial techniques merged with scientific data and community knowledge at different spatial scales in Mongolia and China. This project used open participatory model for all levels of data collection, methodology development, assessment, and policy formulations through group meetings, training workshops, and experience sharing visits. The research project is implemented at three vulnerable provinces in two countries, covering various geo-climatic and ecological zones and different management policies.

Project strengths have been the application of geospatial tools to climate change within collaborative processes on assessment of pasture vulnerability, effectiveness assessment for socio-economics of pasturing society, evaluation of policy documents and policy formulation made through the active participation with multiple academic researchers and local communities.

During the first phase of the project we organized field surveys for data collection in 3 case areas and assessed ecological vulnerability at 2 provinces in Mongolia, and discussed the research results and exchanged between 2 countries local communities, policy makers and researchers. In the second phase we assessed the impacts of ecological vulnerability on socio-economy of the pasturing communities, and evaluated the policy documents more related with grazing pasture and animal husbandry management by sustainable development criteria in 2 provinces. The third phase is to disseminate research results and develop policy scenario and

recommendations.

The project activities have been educated young scientists and local communities of herders, practitioners and governors through climate change impact, its risks, pasture vulnerabilities, and the local development scenarios tied to regional and national issues, and application of spatial planning tools. The flexibility of the local pastoral adaptation strategy process has allowed the application of geovisualizations in place-based problem solving and decision-making process in specific socio-political context of municipal and regional governments.



RESTORATION AND RECONSTRUCTION OF SUSTAINABLE LAND MANAGEMENT SYSTEMS UNDER HIGHLY VARIABLE ENVIRONMENTS

Toshiya OKURO

The University of Tokyo

aokuro@mail.ecc.u-tokyo.ac.jp

Keyword: Sustainable Land Management, non-equilibrium environments

People's livelihoods in drylands rely highly on ecosystem services to provide their basic needs. Dryland ecosystems, however, are extremely vulnerable to over-exploitation and inappropriate land use. Poverty, political instability, deforestation, overgrazing and bad irrigation practices can all undermine land productivity. Recently it has been also emphasized that desertification is deeply associated with biodiversity loss and contributes to global climate change. As the causes, effects and possible policies are strongly interlinked among those issues, multiple benefits could be obtained with increased effectiveness through joint implementation of the three Rio Conventions and further strengthening of synergies based on environmental management approaches. One of the key findings of the Millennium ecosystem assessment scenarios was the importance of a proactive management approach to coping with desertification. Applying desertification early warning systems based on land vulnerability assessments may be one of the most effective preventive actions at both fine and broad scales. However, at degraded sites where land conditions have already shifted to alternate states, it will still be necessary to apply rehabilitative measures and promote restoration processes as a reactive approach.

Land degradation causes reduction or loss of the biological or economic productivity and complexity, resulting from land uses or from processes arising from human activities and habitation patterns. As land degradation is also defined as "the processes of landscape changes caused by miss-match between natural land conditions and land use by human", it is necessary to reconstruct new land use systems based on new human-environment relations which can realize sustainable use of ecosystem services. Sustainable Land Management (SLM) has become a mainstream concept to combat desertification, and defined as a set of technologies, policies and activities to achieve sustainable land productivity, livelihood and environmental conservation through appropriate soil and water management. SLM have been developed based on the idea of reconstructing sustainable human-environment relations.

In recent studies, we have been trying to provide guidelines for the ecosystem restoration and the sustainable resource use in the rangelands of Asia and Africa. To achieve this purpose, we integrated ecological knowledge regarding ecological restoration and develop restoration measures that could facilitate restoration of ecosystem services.

This paper introduces case studies on the sustainable land management (SLM)

approaches, focusing on human-environment relations, or social-ecological systems. Firstly, I introduce modelling of nomadic pastoralism under non-equilibrium environments and elucidation of land degradation processes in Mongolian rangeland. Specifically I focus on “key resource” (sensu Illius and O’Connor 1999), regarded as the place/resource which shows limited distribution but supports survival of animals during disaster period, and show the importance of the appropriate management of key resources. Secondly, I show a concept and methodology of grassland management systems in consideration of biodiversity-ecosystem functioning relationships. More specifically I emphasize the importance of detecting threshold changes of ecosystem functioning. Finally I conclude that prescriptions for combating desertification should be considered based on understanding of heterogeneity of coupled social-ecological systems. I would also like to propose future perspectives, possible research topics which should be further developed, and implication to SDGs.



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TOWARD SUSTAINABLE DESERTIFICATION REVERSION AND DEVELOPMENT IN HORQIN SANDY LAND, INNER-MONGOLIA, CHINA

Xueyong Zhao, Jie Lian, Rui Zhang, Juanli Chen, Hailun Yu, Runxia Zhang

*Northwest Institute of Eco-environment and Resources, Chinese Academy of Sciences
zhaoxy@lzb.ac.cn, 320 Donggang West Road, Lanzhou, China*

Keyword: Horqin Sandy Land, desertification reversion, sustainable, adaptability, water availability

China has made great efforts in combating desertification and promoting development, but desertification is still a big threat to the natural and social systems. Desertification reversion and development have been faced with severe challenges, such as reduction of water availability due to drought and overuse of water, as well as the contradictive relation between combating desertification and development. It is, therefore, of great implication to carry out research, demonstration and adaptive management to promote adaptive land use practices for sustainable desertification reversion and development.

Horqin Sandy Land is located in the eastern part of Inner Mongolia and once was one of the most severely desertified areas in the northern part of China. Through continued combat desertification for more than 30 years, desertification has been reversed since the late 1980s, but the reversion trend has been severely challenged by decreasing water availability, which is characterized by drying up of lakes and rivers and consistent reduction of underground water table. As a result, large area of planted trees died of and natural vegetation degraded, meanwhile desertified land reversion rate is decreased and the sustainable development compromised. Therefore, the researchers and the locals have systematically developed adaptive land use systems, living systems and dissemination systems to promote natural capacity of ecosystem succession and degraded ecosystem restoration, and sustainable development in this tripled area of desertification reversion, development and Poverty relief.



THE IMPACT OF PASTORAL ECOLOGICAL VULNERABILITY ON LOCAL SOCIO-ECONOMIC DEVELOPMENT AT GOBI-ALTAI PROVINCES, MONGOLIA

B.Kherlenbayar^{1,2}, B.Suvdantsetseg^{2,3}, M.Altanbagana^{1,2}, T.Chuluun⁴ and Kh.Nominbolor⁵

¹ *Socio-Economic Geography Division, Institute of Geography and Geoecology, MAS,*

² *Sustainable development Institute for western region of Mongolia*

⁴ *Sustainable Development Institute, NUM*

⁵ *Institute for Strategic Studies*

Bkherlenbayar@gmail.com

Key word: pastoral ecological vulnerability; grazing livestock; miscarried livestock.

The nomadic pastoral system is an important sector in Mongolian social economy, which covers over 50% of gross domestic product of 14 provinces, 30% of work force and 26% of total households at national level. The nomadic pastoralism has been using the grazing land within pasture capacity through traditional nomadic management to preserve ecosystem resources. Unfortunately, rapid increase in livestock numbers and changes of climate condition affected the pasture degradation and extending insufficient pasture for grazing field by adversely reducing the further sustainability of nomadic grazing. This study identified the relevance of pastoral ecological vulnerability on miscarriage of grazing livestock and its grazing managements in Gobi-Altai province, western Mongolia. The pastoral ecological vulnerability was assessed by exposing the degree of key factors for drought, pasture use and vegetation cover and analyzed the relevance of factors on the livestock miscarriage. The research analyses used the remote sensing techniques and geostatistical analysis with observation data of temperature and precipitation from weather stations, satellite data of eMODIS and SPOT, and statistical data of livestock number, pasture area, prepared hay and number of miscarried livestock from 1999 to 2017.

The findings of the study shows that pasture ecological vulnerability results in the increased number of miscarried livestock especially in small animals (goat and sheep) with high correlation value of 0.5-0.8. The most affecting factors were vegetation cover and drought. The soums of Bugat, Tonkhil and Khaliun in desert steppe ecosystem in Gobi-Altai province were evaluated as having the highest (0.7-0.8) correlation during the last 20 years. Delger, Taishir and Tugrug soums in mountain steppe ecosystem of Gobi-Altai province had less correlation. Pasture management and maintenance of livestock showed that low vulnerable soums had well prepared hay and forage for their livestock and high vulnerable soums did not. As a conclusion, if herders apply good pasture and grazing management practices such as reducing the pressure on grazing field, increasing movement of livestock, reducing the number of livestock, increasing prepared hay and forage and water source for their livestock can keep the nomadic grazing system in future.



AN EFFICIENT APPROACH OF ECOLOGICAL RESTORATION IN DEGRADED LAND RESTORATION USING MICROBIAL ORGANIC COMPOUND

Shaokun Wang¹ and Xueyong Zhao¹

¹ *Urat Desert-grassland Research Station and Naiman Desertification Research Station, Northwest Institute of Eco-Environment and Resources, Chinese Academy of Sciences*

Key words: degraded land, restoration technique, microbial organic compound, arid and semi-arid area

We are facing tremendous land degradation across the whole world, especially in the vulnerable arid and semi-arid areas. There are about 42 million km² of land under human-induced desertification. Numerous methods have been applied to combat desertification and many of them received a satisfactory restoration. However, some of the methods are time consuming, some are expensive and some may cause environmental problems.

We developed a fast way to restore degraded sandy land by using microbial organic compound (MOC). Organic waste from straw and livestock dung were smashed into small pieces and mixed as raw organic compound. Effective cellulose decomposers were inoculated to accelerate the organic compound decomposition. The MOC could be used for degraded land restoration when the fermentation were done in two months.

The optimized MOC was significantly efficient in rehabilitating bare sand dunes, accelerating biological soil crust formation, and cropland amendment. The MOC had a potential advantage for increasing water holding capacity, wind erosion resistibility and soil fertility. It is also a potential option to replace the use of chemical fertilizer in cropland. This technique provides an effective and ecological method that aims to accelerate successful restoration from degraded sandy land in the arid and semiarid areas.



ГОВЬ-АЛТАЙ АЙМГИЙН БИГЭР, ХОВД АЙМГИЙН ЧАНДМАНЬ СУМДЫН БЭЛЧЭЭРИЙН СУДАЛГАА

И.Түвшинтогтох, Д.Маньдарь, С.Отгонсүх, Б.Сувданцэцэг

*ШУА-ийн Ерөнхий болон сорилын биологийн хүрээлэн, Ургамалжлын экологи, ургамлын
нөөцийн лаборатори*

Баруун бүсийн тогтвортой хөгжлийн хүрээлэн

i.tuvshintogtokh@gmail.com

Түлхүүр үг: Бэлчээрийн доройтол, газрын хэмжилт, харьцуулан шинжлэх

Хээрийн судалгааг Говь-Алтай аймгийн Бигэр, Ховд аймгийн Чандмань сумдын нутагт 2018 оны 07 сарын 16-ны өдрөөс 08 дугаар сарын 05-ны өдрийн хооронд хийж гүйцэтгэв. Урьдчилан төлөвлөсөн 103 цэгт 20х20м² талбайд геоботаникийн дэлгэрэнгүй бичиглэл үйлдэж, биомассын дээж авав. Үүнд: Говь-Алтай аймгийн Бигэр суманд 51 цэгт, Ховд аймгийн Чандмань суманд 52 цэгт. Судалгааны дүнд тус сумдын бэлчээрийн 1:200000 хэмжээст зургийг шинээр зохиов.

Бигэр сум нь нийт 385157.3 га бэлчээрийн талбайтай бөгөөд үүнээс өндөр уулын бэлчээр 2161.0 га, уулын хээрийн бэлчээр 39225.7 га, уулын цөлжүү хээрийн бэлчээр 85336.2 га, цөлийн хээрийн бэлчээр 98755.9 га, цөлийн бэлчээр 132058.8 га, голын татам, нуурын хөвөөний нугын бэлчээр 26545.0 га талбайг тус тус эзэлж байна. Бидний судалгаагаар Бигэр сумын бэлчээрийн 1.0% нь соргог, 76.5% нь сул доройтсон, 17.6% нь дунд доройтсон, 3.3% нь их доройтсон, 1.5% нь хэт их доройтсон төлөвтэй байна. Үүнийг 1981 онд хийгдсэн Монгол орны бэлчээр тэжээлийн зургийн мэдээтэй харьцуулж үзэхэд соргог бэлчээрийн талбай 30.5%-аар багасаж, сул доройтсон бэлчээр 8%-аар, дунд доройтсон бэлчээр 17.6%-аар, их доройтсон бэлчээр 3.4%-аар, хэт их доройтсон бэлчээр 1.5%-аар тус тус нэмэгдсэн байна.

Чандмань сум нь нийт 520953.4 га бэлчээрийн талбайтай бөгөөд үүнээс өндөр уулын бэлчээр 4759.1 га, уулын хээрийн бэлчээр 65307.2 га, уулын цөлжүү хээрийн бэлчээр 73694.0 га, цөлийн хээрийн бэлчээр 290399.2 га, цөлийн бэлчээр 61756.6 га, голын татам, нуурын хөвөөний нугын бэлчээр 25037.4 га талбайг тус тус эзэлж байна. Бидний судалгаагаар Чандмань сумын бэлчээрийн 3.1% соргог, 66.3 % сул доройтсон, 13.4% дунд доройтсон, 17.1% их доройтсон байна. Үүнийг Монгол орны бэлчээр, тэжээлийн 1:1.0 саятын хэмжээст зурагтай (1981) харьцуулж үзэхэд соргог бэлчээрийн талбай 34%-аар багасаж, сул доройтсон бэлчээрийн талбай 19%-аар, их доройтсон бэлчээрийн талбай 17,1%-аар тус тус нэмэгдсэн байна.



PASTURE DEGRADATION ASSESSMENT USING BOTANICAL FIELD SURVEY AND MAP COMPARISON AT BIGER SOUM OF GOBI-ALTAI PROVINCE AND CHANDMANI SOUM OF KHOVD PROVINCE

I.Tuvshintogtokh¹, D.Manidari¹, S.Otgonsukh¹ and B.Suvdantsetseg²

¹ *Vegetation ecology and resources laboratory, Institute of General and experimental
biology, Mongolian Academy of Sciences*

² *Sustainable development Institute for western region of Mongolia
i.tuvshintogtokh@gmail.com*

Key words: Pasture degradation, field survey, map comparison

This study is part of the pastoral ecological vulnerability assessment research. Findings of initial study of pastoral ecological vulnerability assessment showed the need for deeper study by using field survey and map comparison in the most vulnerable sub provinces as a case study on pastoral and grassland degradation. The main objective of this study is to identify the main reasons and conditions of the grassland changes including changes in vegetation types, degradation of grassland, biomass and volumes comparing with field survey in 2018 and mapping data in 1981.

The field survey was done in 20 days from 16 July to 5 August 2018 in 2 sub provinces, Biger from Gobi-Altai province and Chandmani from Khovd province, which were selected as the most vulnerable in terms of pasture degradation based on initial ecological vulnerability assessment. The field survey used a Geobotanical reviewing method including aboveground biomass measurement (1m*1m area) and vegetation releves (25m*25m area) in total of 103 sites, 51 points in Biger sub province and 52 points in Chandmani sub province.

As seen from the research, a total area for pastureland in Biger sub province, Gobi-Altai is 385157.3 hec, where high mountain pasture 2161.0 hec, mountain steppe pasture 39225.7 hec, mountain desert steppe pasture 85336.2 hec, desert steppe pasture 98755.9 hec, desert pasture 132058.8 hec, and river valley or lake valley pasture 26545.0 hec. During the field survey we registered 109 species of vascular plants belonging to 69 genera and 23 families in Biger sub province. In terms of assessment, only 1.0% of the total pasture land has been non degraded, 76.5% low degraded, 17.6% medium degraded, 3.3% heavily degraded, and 1.5% over degraded. When this survey result was compared with the pasture monitoring map in 1981, non degraded area was decreased by 30.5%, low degraded area by 8%, medium degraded area 17.6%, high degraded area 3.4%, most degraded area 1.5% increased. This means mountain steppe ecosystem shifted to desert steppe and desert steppe ecosystem transferred to desert steppe pasture which is not good condition. The main impact on the degradation is increasing

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number of livestock that was 154674 sheep heads in 1981 and 239232 sheep heads in 2018. In the southeastern part of the sub province, *Artemisia adamsii*, *Ajania achilleoides*, *Ephedra sinica* and *Artemisia adamsii* were highly increased and *Nitraria sibirica*, *Achnaterum splendens*, *Leymus secalinus* and *Potentilla bifurca*, *Achnaterum splendens* vegetations are increased at Biger valley and near lake which are indicating pasture degradation caused by increasing number of livestock.

A total area for pastureland in Chandmani sub province, Khovd is 520953.4 hec, where high mountain pasture 4759.1 hec, mountain steppe pasture 65307.2 hec, mountain desert steppe pasture 73694.0 hec, desert steppe pasture 290399.2 hec, desert pasture 61756.6 hec, and river valley or lake valley pasture 25037.4 hec. During the field survey we registered 134 species of vascular plants belong to 84 genera and 29 families in Chandmani sub province. In terms of assessment only 3.1% of the total pasture land has been non degraded, 66.3% low degraded, 13.4% medium degraded, and 17.1% heavy degraded. When we compare the survey result with pasture monitoring map in 1981, non-degraded area decreased by 34%, and low degraded area by 19%, and high degraded area increased by 17.1%. The main impacts on the degradation is climate change of temperature and dryness, and increasing number of livestock that was 214865 sheep unit in 1981 and 295312 sheep unit in 2018.



AN ASSESSING FRAMEWORK FOR REGIONAL GRASSLAND ECOSYSTEM HEALTH WITH CONSIDERATION OF NATURAL SUCCESSION

Chao Lu Mengqiqigel and NiTu Wu1

¹ *Institute of Grassland surveying and Planning
Inner Mongolia, China*

Ecosystem health assessment is the basis for formulating ecological protection policy. However, there are few assessing methods from the angle of natural succession for the northern china's regional native grassland with excessive human activities, which resulted in the fact that it is difficult to reflect the impact of some artificial landscape on the ecological structure and to assess a seemingly healthy "sick ecosystem" more accurately and objectively. Thus, the main purpose of this study is to build a health assessing system for the north China's regional grassland under excessive human activities from the perspective of natural succession. Moreover, we used the minimum accumulative resistance (MCR) model to extract potential ecological information of the study area as a supplementary reference for the assessment results. Based on the landscape ecological theory and disturbance ecological theory, we built a grassland health assessing system and classified the indicators into positive and negative categories.

Moreover, we used the minimum accumulative resistance (MCR) model to extract potential ecological information of the study area as a supplementary reference for the assessment results. Based on the landscape ecological theory and disturbance ecological theory, we built a grassland health assessing system and classified the indicators into positive and negative categories. Through the assessment for Bayinxil pasture, a typical semi-arid steppe with excessive human activities located in northern China, the results showed that: (1) The ecological function of eastern hilly area is better than that of other regions and the western area is lowest in the whole. (2) The grassland degradation is obvious on both sides of the river. (3) As a transformed landscape from the native grassland, the assessing result of farmland is average or poor. On the basis of the assessing results, the identified potential ecological information indicated that: (1) The density of ecological network is closely related to the intensity of human activities in the grassland area, and the farmland and road have great negative influence on the connection of grassland ecological network. (2) The river is the most important ecological network in the whole grassland and it is of vital significance in prevention of the retrogressive succession and linking ecological communities. We further proposed an ecological control zone for Bayinxil to prevent the grassland degradation based on the above results. This study will provide an important theoretical and practical significance for sustainable development of regional grassland.



ОРОЛЦООНЫ АРГАД ТУЛГУУРЛАН ОРОН НУТГИЙН ТОГТВОРТОЙ ХӨГЖЛИЙН ТӨЛӨВЛӨГӨӨ БОЛОВСРУУЛАХ НЬ: ГОВЬ-АЛТАЙ АЙМГИЙН ХӨХМОРЬТ СУМ

Б. Сувданцэцэг¹, Б.Хэрлэнбаяр², М.Алтанбагана², Х.Номинболор³, З.Бурмаа⁴

¹ Баруун бүсийн тогтвортой хөгжлийн хүрээлэн

² ШУА-ийн Газарзүй Геоэкологийн хүрээлэн

³ Стратегийн судалгааны хүрээлэн

⁴ Ховд их сургууль

Email: suvdantsetseg@mas.ac.mn;

XXI зууны дэлхий нийтийн хөгжлийн чиг хандлага нь хүрээлэн буй орчин, нийгэм, эдийн засгийн асуудлуудыг нийлмэл байдлаар цогцоор авч үзэн, нөөцийг үр ашигтай ашиглан эдийн засгийн тогтвортой өсгөж, нийгмийн тэгш хүртээмжтэй байдлыг хангахад чиглэж байна. Монгол Улсын Их Хурлын 2016 оны 2 дугаар сарын 05-ны өдрийн 19 дүгээр тогтоолоор “Монгол Улсын тогтвортой хөгжлийн үзэл баримтлал-2030” урт хугацааны бодлогын баримт бичгийг 2016-2030 онд хэрэгжүүлэхээр баталсан. Ийнхүү Монгол Улс үндэсний хэмжээнд тогтвортой хөгжлийн бодлогоо боловсруулсан нь дэлхий нийтийн хөгжлийн чиг хандлагатай уялдан улс орныхоо эдийн засаг, нийгмийн онцлогийг тусгаж, тулгарч байгаа сорилтуудыг даван туулах, тогтвортой хөгжлийн зорилтуудыг цаг алдалгүй төлөвлөлттэйгээр хэрэгжүүлэх, цаашид аймаг, нийслэл, сум, дүүргийн түвшинд уг бодлоготой уялдсан хэтийн зорилтуудыг тодорхойлох, төлөвлөгөөгөөг боловсруулах үндэслэл бий болсон.

Нөгөө талаас Говь-Алтай аймгийн Хөхморьт суманд 20 жилийн өмнө тулгарч байсан хүн амын гадагш чиглэсэн шилжилт хөдөлгөөн, ажилгүйдэл, ядуурал зэрэг нийгэм, эдийн засгийн суурь асуудлууд тулгамдаж байгаагийн зэрэгцээ тус бүс нутагт дэлхийн дулаарал, уур амьсгалын өөрчлөлтөөс үүдэлтэй байгаль цаг уур, орчны хүчтэй нөлөөлөл ихээр бий болж цаашид улам нэмэгдэх хандлагатай байна. Мөн мэдээллийн технологийн үсрэнгүй хөгжил, хөрөнгө оруулалтын чөлөөт урсгал, гадаад харилцааны өргөн боломж, давуу талууд шинээр бий болж байгаа нь бидэнд хөгжлийн гарцаа шинээр тодорхойлж, иргэдийнхээ амьжиргаа, амьдрах орчныг сайжруулан, орон нутагтаа амьдрах тааламжтай нөхцөлийг бүрдүүлэх боломжуудыг ашиглах шаардлага тулгарч байна.

Энэхүү бодлогын баримт бичгийг Баруун бүсийн тогтвортой хөгжлийн хүрээлэн төрийн бус байгууллагын судлаачдын баг, Ховд их сургууль, Шинжлэх ухааны академийн судлаачид, аймаг, сумын төрийн захиргааны байгууллага, сумын иргэд, аж ахуйн нэгж, төрийн бус байгууллагууд, мэргэжилтэнгүүд зэрэг олон байгууллагын

идэвхтэй оролцоог ханган шинжлэх ухааны аргагүй, судалгаанд тулгуурлан боловсруулсан. Үүнд тогтвортой хөгжлийн үзэл баримтлалыг иш үндэс болгон өнөөгийн нөхцөл байдал, ирээдүйд үүсэх нөхцөл, одоогийн бодлогын баримт бичгийн алдаа оноог бодитоор дүгнэн, хөгжлийн гарцуудыг харж, хөрөнгө мөнгө, цаг хугацаагаа алдахгүй байхад онцгой анхаарсан болно.

Нийгэм хөгжил: Говь-Алтай аймгийн хувьд хүний хөгжлийн индексээр бусад аймаг, улсын дунджаас нилээд доогуурт орж байгаа нь боловсрол эзэмших, эрүүл мэндийн үйлчилгээ авах, хөдөлмөр эрхлэх зэрэг хүний хөгжлийн боломжуудаар харьцангуй бага байгааг илтгэж байна. Хөхморьт сум нийгмийн хөгжлийн тухайд хүний хөгжил буюу иргэдийн сонголт, сайн сайхан байдал багатай, иргэдийн боловсрол доогуур, нийгмийн эрүүл мэндийн үйлчилгээний хүртээмж хангалтгүй, амьдралын зөв дадал хэвшилд суралцсан байдал тааруу байгаа зэрэг нь анхаарал хандуулах салбарууд болж байна. Хөхморьт сум хүн амын бичиг үсэг тайлагдалтын түвшнээр улсын дунджаас харьцангуй доогуур хэдий ч сүүлийн жилүүдэд насанд хүрэгчдийн бичиг үсгийн тайлагдалтын түвшинд бага зэрэг ахиц гарч байна.

Хөхморьт сум нь нэг их эмчид ногдох хүний тоогоороо улсын дунджаас 3.2 дахин, аймгийн дунджаас 3 дахин их ачаалалтай хэдий ч эмнэлгийн ажилтанд ноогдох хүн амын тоогоор улсын дунджийн хэмжээнд байна. Сумын эрүүл мэндийн байгууллагын урьдчилан сэргийлэх үзлэг оношлогоо 17 хувьтай, амбулаторийн үзлэгт хамрагдагсад болон эмнэлэгт хэвтэн эмчлүүлэгсдийн тоо маш бага байгаа хэдий ч өвчлөл өндөр байгаа нь үйлчилгээний чанар, хүртээмж хангалтгүй байгааг илтгэж байна.

Сумын хэмжээнд амьсгалын замын, хоол боловсруулах тогтолцооны, зүрх судасны тогтолцооны, бэлгийн замын халдварт өвчлөлүүд зонхилон тохиолдож байгаа бөгөөд нас баралтын тэргүүлэх шалтгаан нь осол, гэмтэл, хорт хавдрын өвчлөл болж байна. Иймд сумын ундны усны чанарт анхаарч худгийн усны бүрэн шинжилгээг давталттайгаар хийж усны химийн найрлагын үндсэн дээр тохиромжтой шүүлтүүрүүдийг худгуудад байршуулах, унданд ашиглах боломжгүй худгуудыг тодорхойлж зориулалтыг зааж өгөх, иргэдэд ундны усыг аюулгүй байдлаар хэрэглэх, цэвэрлэх энгийн арга технологийг заан сургаж, сурталчлах, зөв дадал хэвшлийг бий болгох зэрэг арга хэмжээнүүдийг яаралтай авч хэрэгжүүлэх нь зүйтэй.

Эдийн засгийн хөгжил: Аймгийн нийт хүн амын 4 орчим хувь Хөхморьт суманд амьдардаг. Сумын хүн амын 49 хувь нь эдийн засгийн идэвхтэй хүн ам байгаа нь улс (40), баруун бүс (46), аймгийн (48) дунджаас өндөр үзүүлэлт юм. Түүнчлэн сумын нийт ажиллах хүчний 88 хувь ажил эрхлэж байгаагаас үзвэл ажил эрхлэлтийн түвшин



зохистой хэмжээнд байна. Хэдий тийм боловч ядуурлын түвшин 40 илүү хувь байгаа нь хөдөлмөр эрхэлсэн ч амьжиргаа доогуур буюу олж байгаа эдийн засгийн үр ашиг бага, нөгөө талаас мал аж ахуйгаас бүрэн хараат эдийн засгийн бүтэцтэй, байгаль, цаг уурын эрс тэрс нөлөөгөөр малчид малаа хорогдуулж, амьжиргаанаасаа салах бодитой эрсдэл өндөр байдагтай холбоотой.

Дэд бүтцийн сул хөгжил, томоохон хот суурингаас алслагдмал байршил нь сумын эдийн засгийн хөгжилд сөргөөр нөлөөлөх үндсэн хүчин зүйл болдог. Малчин өрхийн үйлдвэрлэсэн хөдөө аж ахуйн бүтээгдэхүүнийг зах зээлд нийлүүлэхэд шаардагдах зардал өндөр байх тусам бүтээгдэхүүн үйлдвэрлэл тогтмолжиж, үйлдвэрлэлийн хэмжээнд явагдах бололцоогүй байдаг. Иймд байршлын сул талыг зардлаа хуваалцах хэлбэр буюу хорших, хамтрах замаар бууруулах, нэгдсэн зохион байгуулалтаар зах зээлд нэвтрэх оролдлогуудыг идэвхтэй ашиглах шаардлагатай болж байна.

Байгаль орчин: Хөхморьт сум нь говь, цөлийн бүсэд оршдог бөгөөд нийт нутаг дэвсгэрийн 40 орчим хувийг элс, элсэн манхан эзэлдэг учраас бэлчээрийн хүрэлцээ бага, Монгол орны уур амьсгалын өөрчлөлт хамгийн ихээр илэрч буй их нууруудын хотгорт байрласан нөлөөлөлд өртөмгий нутаг юм. Сумын хэмжээнд жилийн нийлбэр хур тунадас дунджаар 90 мм, агаарын температур 1.7-2⁰C –ээр дулаарч байгаа нь цаашид хуурайшилт нэмэгдэж бэлчээрийн ургацад муугаар нөлөөлөх эрсдэл өндөр байна.

Нөгөө талаас тус сум нь гадаргын усны нөөц хомс, бэлчээр дэхь худгууд нь хамгаалалт, арчилгаа муу, хуурайшилт, элсний нүүдэл ихтэйгээс дарагдаж ширгэн цөөрсөөр байна. Бэлчээрийн худгийн хүртээмж бага, элсэн манхан ихтэйгээс ашигладаггүй бэлчээр их ба худгийг тойрсон цэгэн цөлжилт өндөр байна. Сүүлийн 40-50 жилийн хугацаанд 100-аад өвөлжөө, 30 гаруй хороо, 23 саравчтай хашаа, 80-аад уст цэг, 20 орчим булаг шанд элсэнд дарагдсан байна. Сүүлийн 25 жилийн хугацаанд шинээр элсээр бүрхэгдсэн талбай 7835.9 га буюу нийт газар нутгийн 1.2%-г эзлэн Завхан гол, Сангийн далай, Сайн уст багуудын нутагт тархсан ба цөлжилтийн эрчим нь улсын дунджаас 2 дахин хурдацтай явагдаж байгаа нь тогтоогджээ.

Хөхморьт суманд амьтны аймгийн төрөл зүйл харьцангуй бага, 6 багийн 15 овогт хамаарах 42 зүйл хөхтөн амьтан тэмдэглэгдсэн байна. Дэлхийд устах аюулд орсон Монгол бөхөн энэ бүс нутагт тодорхой нутгийг эзлэн тархаж байгаа бөгөөд монгол улсын хэмжээнд хамгаалах статус нь бусад зүйлээсээ илүү байна. 2016 онд гарсан гоц халдварт мялзан өвчний улмаас бөхөнгийн сүрэг 30-55 хувиар хорогдсон нь тус суманд төдийгүй бүс нутагт тулгамдсан асуудал болж байна. Үүнээс үүдсэн бусад амьтад, малд

халдварлах эрдлийг бууруулах ажлыг зохион байгуулж бэлчээрийг хамгаалах нь чухал юм.

Тулгамдаж буй асуудлууд

- Уур амьсгалын өөрчлөлтийн нөлөөлөл хамгийн хүчтэй илэрч буй бүс нутагт оршдог нь мал аж ахуй, газар тариалангийн ирээдүйн үйлдвэрлэлд сөрөг нөлөө үзүүлэх эрсдэл өндөртэй.
- Мэргэжилтэй ажиллах хүч, залуучуудын гадагш чиглэсэн хөдөлгөөн ихсэж байгаа нь орон нутгийн зах зээлийг өргөжүүлэхэд сөргөөр нөлөөлдөг.
- Газарзүйн байршлын хувьд томоохон хот сууринаас алслагдмал, дэд бүтэц сул хөгжсөн байдал нь үйлдвэрлэл хөгжүүлэхэд өртөг өндөртэй байдаг.
- Удирдлага зохион байгуулалт тогтвортой бус байдгаас төсөл хөтөлбөрт тавих хяналт сул, ажлын залгамж уялдаа холбоо, сумын хөгжлийг удирдан залж, чиглүүлэх байдалд нөлөөтэй.
- Иргэдийн тогтвортой бизнесийн чиглэлээр идэвхи санаачлага сул, үйлдвэрлэл, технологи дамжуулалт, шингээлтийн чиглэлээр мэргэшсэн боловсон хүчин дутмаг байгаа нь үйлдвэрлэл хөгжүүлэлтийн чиглэлийн төсөл хөтөлбөр хэрэгжүүлэх хөрөнгө оруулагчдын итгэлийг төрүүлэхгүй байх.
- Ерөнхий боловсролын сургууль нь 9 жилийн боловсролтой учир хүүхдийн боловсролын чанараас шалтгаалсан сургуулийн насны шилжилт хөдөлгөөн их.
- Ундны усны эрүүл ахуйн чанарт тавих хяналт сул, худаг усны хамгаалалт муугаас халдварт өвчлөл, нийгмийн эрүүл мэндийн асуудал хоцрогдсон байна.
- Бэлчээрийн усан хангамж хомсдолтой бүсэд малын тоо толгой хэт өсч сүргийн бүтэц алдагдсанаас бэлчээрийн талхлалт ихэсч ирж болзошгүй эхднээр өндөр эрсдэх магадлалтай.

Хөгжлийн эх сурвалж, боломжууд

- Улс төрийн хувьд тогтвортой ажиллах боломжтой.
- Элсний нүүлт, байршлын онцлогоороо гадаад, дотоодын хөрөнгө оруулагч байгууллагуудын анхаарлын төвд орсон.
- Суль, цульхараар гурилан бүтээгдэхүүн үйлдвэрлэж ирсэн туршлагатай, зах зээлд танигдаж эхэлсэн.
- Иргэдийн санхүүгийн мэдлэгийг дээшлүүлж, сумын мөнгөн хуримтлалыг эргэлтэнд оруулах боломжтой.



- Бэлчээрийн сэргэн ургах чадамж сайн байгаа нь мал сүргийн зохистой бүтцийг бий болгосноор малчид амьжиргаагаа сайжруулах боломжтой.
- Малын эрүүл байдлыг хадгалж, мах, махан бүтээгдэхүүн зах зээлд нийлүүлэх боломжтой.
- Тэмээ, хонины ноос боловсруулах анхан шатны үйлдвэр байгуулах боломжтой.
- Хил залгаа сумдтай хамтран элсний аялал жуулчлал хөгжүүлэхэд иргэдээ татан оролцуулах боломжтой.

Хөгжлийн алсын хараа “Орон нутагт байгалийн нөхцөл, нөөцөд тулгуурласан мал аж ахуйн үйлдвэрлэл, бизнес, эдийн засгийн хөгжлийн суурийг тавьж, хүний хөгжлийг дэмжсэн сум болно”.

Хөхморьт сумын тогтвортой хөгжлийн төлөвлөгөө

Сумын тогтвортой хөгжлийн төлөвлөгөө нь 3 тэргүүлэх чиглэл, 3 ерөнхий зорилго, 12 зорилт, 65 хэрэгжүүлэх үйл ажиллагаанаас бүрдэж байна.

Тэргүүлэх чиглэл 1. Сумын эдийн засгийн голлох салбаруудын бүтээмжийг нэмэгдүүлж, тогтвортой ажлын байрыг нэмэгдүүлнэ.

***Зорилго:** Байгалийн нөөцийн үр ашигтай, хэмнэлттэй технологийг дэмжин, хөдөө аж ахуйг түшиглэсэн жижиг үйлдвэрлэлийн бүтээмжийг нэмэгдүүлж, орлогыг тэгш хүртээмжтэй өсгөх замаар эдийн засгийн тогтвортой өсөлтийг бий болгоно.*

- Зорилт 1: Малын ашиг шимт байдлыг сайжруулах, түүхий эд, бүтээгдэхүүнийг стандартын дагуу бэлтгэх, тээвэрлэх, зах зээлд худалдан борлуулах тогтолцоог цогцоор бий болгон, малчдын бодит орлогыг нэмэгдүүлнэ.
- Зорилт 2: Байгалийн нөөцийг хэмнэлттэй, үр ашигтай ашиглах зарчимд тулгуурлан иргэдийн орлогын эх үүсвэрийг нэмэгдүүлнэ.
- Зорилт 3: Байгаль орчинд ээлтэй, хог хаягдал багатай, суманд эдийн засгийн үр ашигтай жижиг дунд үйлдвэрийг хөгжүүлнэ.
- Зорилт 4: Сумын төсвийн төлөвлөлт, ил тод байдал, хяналтын тогтолцоог сайжруулан, төсвийн зарцуулалтын үр ашгийг нэмэгдүүлнэ.
- Зорилт 5. Иргэдийн оролцоонд суурилсан аялал жуулчлалыг хөгжүүлнэ.

Тэргүүлэх чиглэл 2. Нийгмийн хөгжил ногоон амьдралын хэв маяг, төлөвшлийг бий болгох.

Зорилго: Иргэдийн мэдлэг чадварыг дээшлүүлж, сонголт, боломжийн хүрээг тэлж, ажил хөдөлмөр эрхлэх боломжийг бүрдүүлж, эрүүл саруул, тав духтай ажиллаж амьдрах орчныг бүрдүүлнэ.

- Зорилт 1: Ундны усны хангамж, чанар, хяналт мониторингийг сайжруулж, эрүүл мэндийн урьдчилан сэргийлэх оношилгоо үйлчилгээний хүртээмж, иргэдийн мэдлэг боловсролыг дээшлүүлэн хүн амын өсөлтийг нэмэгдүүлнэ.
- Зорилт 2: Сурагчдын сурах, иргэдийн мэдлэг чадавхиа дээшлүүлэх идэвхи санаачлагыг өрнүүлэн, суралцах таатай орчин нөхцлийг бүрдүүлж, сургалтын шинэ хөтөлбөр, гүнзгийрүүлсэн сургалт, арга барил нэвтрүүлж боловсролын үйлчилгээний чанар хүртээмжийг нэмэгдүүлнэ.
- Зорилт 3. Хөдөлмөрийн зах зээл дэх иргэдийн тэгш оролцоог хангаж, хөдөлмөрийн үнэлэмжийг бүтээмжид суурилан оновчтой нэмэгдүүлэх, хамтарч бизнес эрхлэх арга туршлага, мэдлэг, ур чадварыг олгон хөдөлмөр эрхлэлтийг нэмэгдүүлнэ.
- Зорилт 4. Байгальд зохицсон ахуй, соёлын үнэт зүйлийг хадгалан хөгжүүлж, зөв хандлага, сэтгэлгээ бүхий ногоон амьдралын хэв маягтай иргэнийг хөгжүүлж хамтарч хорших боломжийг бүрдүүлнэ.

Тэргүүлэх чиглэл 3. Байгалийн нөөцийн тогтвортой байдлыг хадгалж, эрсдлийг даван туулах чадварыг нэмэгдүүлнэ.

Зорилго: Бэлчээрийн усан хангамжийг сайжруулж, ногоон бүсийг нэмэгдүүлэх замаар газрын доройтол, цөлжилтийг бууруулан биологийн олон янз байдал, байгалийн унаган төрхийг хамгаалж, улсын болон орон нутгийн тусгай хамгаалалттай газар нутгийг нэмэгдүүлнэ.

- Зорилт 1: Ногоон бүсийг нэмэгдүүлж уур амьсгалын өөрчлөлтөд дасан зохицсон, байгальд ээлтэй технологийг нэвтрүүлнэ.
- Зорилт 2: Бэлчээрийн усан хангамжийг нэмэгдүүлж газрын доройтол, цөлжилтийг бууруулна.
- Зорилт 3: Биологийн олон янз байдал, байгалийн унаган төрхийг хамгаалж, орон нутгийн болон улсын тусгай хамгаалалттай газар нутгийг нэмэгдүүлнэ.



PARTICIPATORY APPROACH FOR CONCEPTUAL DEVELOPMENT OF LOCAL SUSTAINABLE DEVELOPMENT PLAN: A CASE OF KHUHMORIT SOUM, GOBI- ALTAI PROVINCES, MONGOLIA

B. Suvdantsetseg¹, B.Kherlenbayar², M.Altanbagana², Kh.Nominbolor³ and Z.Burmaa⁴

¹ Sustainable development institute for western region of Mongolia.,

² Institute of Geography and Geoecology,

³ Institute for Strategic Studies.,

⁴ Khovd University, khovd province, Mongolia

Email: suvdantsetseg@mas.ac.mn;

According to the 19th resolution of 2016, Mongolian parliament adopted the "Sustainable Development Vision-2030", a long-term policy document coherent to United Nation's sustainable development goals (SDG)-2030. The main objective of this study was to develop a sustainable development plan of Khuhmorit soum, Gobi-Altai province for 2017-2025 and approve it at the citizens' public meeting (hural).

This policy document was developed using participatory approach in harmony with geospatial techniques enabled by a multi-stakeholder group including several regional and local governments, multiple academic and think tank teams working on fields of current situation assessment, policy review analysis, and sustainability scenario development.

Located in the distance of 1220 km away from Ulaanbaatar and 215 km from the city center of Gobi-Altai province, within the most warmed region of the Great Lakes Depression, Khuhmorit soum is the most vulnerable soum in terms of pasture land. Due to climate change, the mean air temperature was increased by 1.7-2.0 Celcius degrees in Khuhmorit soum between 1961 and 2011. Future prognoses in the region are: warmer winter with more precipitation and drier and hotter summer, expanding desert and desert-steppe zone, shrinking vegetation cover, declining species, decreasing surface water due to evaporation, and therefore maintaining pastoral animal husbandry is expected to be difficult in the region. The soum has a territory of 631452 hectare and its 38 percent is Mongol els biggest sand dunes that cross 90 km long lying in a semi-desert ecological zone.

On the other hand, the ground water resource is limited, and wells in the grazing pasture are poorly protected and dried up and drowning due to sand dunes and dryness. During the last 40-50 years, over 100 winter shelters, 30 khoros, 23 yard fences, 80 water points and 20 springs are dried up. Over the past 25 years, the area covered by the new sand covering 7835.9 ha, or 1.2% of the total area, where the desertification intensity is twice higher than the national average.

Khuhmorit soum has 5 bags, 2390 citizens and 684 households, of which 60 percent are herder families. Socio-economically, citizens of Khuhmorit soum have lower human



development opportunities with poor quality of education for citizens, low employment opportunities for youth, lack of access to public health services, and lack of self-learning as well as poor access to mining, agricultural and tourism sectors. Public health and education are the most disadvantaged sectors at soum level. The vast majority of unemployed people are young and well educated. However, employment opportunities are limited to the number of civil service jobs, and therefore is the main reason why young people are deprived of their profession and are exposed to stress economically and mentally.

About 49 percent of the soum population is economically active, higher performance compared with the national (40%), western regional (46%) and the aimag (48%) average. In addition, 88 percent of total workforce is employed, which shows higher level of employment. Nevertheless, the poverty rate is equally higher at 40 percent, which can be related to lower economic benefits and lower wages as well as economy dependence on animal husbandry which affected extreme risks of climatic and environmental conditions.

Soum's pasture capacity can contain about 90 thousand livestock for grazing, and currently carrying capacity of the pastureland has exceeded by 2.2 times with over 210 thousand grazing animals. This is one of the main reason of soil erosion, desertification and pasture degradation at soum level.

Local communities have always benefited from ecosystem services. Wild seabuckthorn, *Elymus giganteus* (Цагаан суль), *Agriophyllum arenarium* (цулхир) are an unique ecosystem services of cereals products, and as a natural renewable resource which are needed to be protected and sustainably utilized for the benefits of the socio-economic development of the soum.

Challenges for development

- Being located in the region where there are most noticeable impacts of climate change poses a higher risk for future animal husbandry and natural resource use.
- Increased number of migration on workforce and youth outsourcing negatively affects the expansion of local markets.
- Geographically remote from major cities and poor infrastructure, it is therefore costly to develop industries.
- Lack of skilled workforce for large-scale production is likely to affect investor confidence.
- Because the secondary school provides 9 years of education and people are not satisfied with the quality of education, there is an increasing trend for the transition of students to schools in other aimags and soums due to poor quality of education and the movement of families following it.
- Governing system is no sustainable, therefore it is no continuing work and poor monitoring for activities, projects, budget investments, as well as managing and directing the development of soum, and coordination.

- The lack of control for drinking water and lack of protection from wells is a major issue for infectious diseases and public health.
- A water supply is limited and increasing number of livestock in the pastureland which may lead a risks on overgrazing and livestock loss with future extreme events.

Sources of development and opportunities

- The sand dune movement and location specificity is under the focus of foreign and domestic investors.
- The cereals products of *Elymus giganteus*, *Agriophyllum arenarium* are an unique ecosystem services and natural renewable resource that recognized in the markets and domestic investors are paying close attention to the efficient economic.
- Improve the financial education of citizens and increase the soum's cash savings and economic diversification.
- Create appropriate herd structure and improve livelihood of herders.
- Preserve animal health and supply meat products to the market.
- Handmade camel and sheep wool products have become available on international market, so it is possible to build a next stage processing plant.
- It is big potential to develop sand tourism in cooperation with participation of local citizens and neighboring borders.

Sustainable development plan

Soum's sustainable development plan has vision, 3 strategic goals, 12 operational objectives, and 65 actionable activities. Plan implementers will be state organization, aimag organizations, relevant state administrations of the soum, international projects and programmes, and private sectors.

Vision: To become a soum with diversified economy through efficient use of natural resources and small and medium enterprises based on new technology and supported human development of the citizens.

Strategic goals:

1. To improve economic diversification and productivity of the soum and increase sustainable jobs

- 1.1. to decrease livestock number in accordance with pasture carrying capacity by focusing on animal health, commodity and productivity, and increase herder's actual income by creating a comprehensive system of preparation and market delivery of animal raw materials and products



- 1.2. to use natural resources effectively and efficiently utilizing environmentally-sound technologies based on citizens participation and increase income source for citizens by developing SMEs
- 1.3. to improve planning, transparency and monitoring system of soum budget and increase efficiency of budget expenditure
- 1.4. to strengthen the basis for a sustainable future economy by creating favorable conditions for the banking, financial and business environment
- 1.5. to develop the ecotourism based on local resources and communities participation
- 2. *To improve citizens' knowledge and skills, widen the scope of choice and opportunities, create a comfortable working and living environment, and create a green lifestyle***
 - 2.1. to improve quality and accessibility of health care services and public health education, and create an effective system for water supply for citizens
 - 2.2. to create favorable environments for learning and capacity building of students and citizens, to improve the quality and accessibility of all levels of education through the introduction of new curriculum, advanced training and methodology
 - 2.3. to provide equal participation of people in the labor market, and optimize the value of labor based on productivity and increase the employment by providing skills, knowledge and experience to work together
 - 2.4. to increase the life expectancy of the citizens by improving the quality and supply of drinking water, creating a favorable environment and increasing population growth and birth
- 3. *To preserve sustainability of natural resources, increase capacity to overcome risks, mitigate desertification and land degradation by adjusting pasture carrying capacity, and conserve biodiversity and nature***
 - 3.1. to improve adaptation capacity to climate change, and mitigate land degradation and desertification by maintaining animal husbandry adjusted to the pasture carrying capacity and increasing green area
 - 3.2. to increase a water sources in the pastureland and create environmental information database by improving control and monitoring system on desertification
 - 3.3. to expand the local protected area in the utilization and protection of natural ecosystems and biodiversity through innovation and green technology



POLICY DOCUMENT ASSESSMENTS THROUGH SUSTAINABLE DEVELOPMENT CRITERIA IN KHOVD AND GOBI-ALTAI PROVINCES

Kh.Nominbolor¹ and B.Suvdantsetseg^{2,3}

¹ *Institute for Strategic Studies*

² *Sustainable development Institute for western region of Mongolia*

³ *International Cooperation Department, Mongolian Academy of Sciences*

Key word: qualitative document analysis; policy coherence; sustainable development goals

Nomadic pastoral system in Mongolia, where humans depend on livestock, plays an important role in herders' livelihoods, income and food. The traditional resilience of nomadic pastoral system is being affected by climate and socio-economic changes during the past several decades, which makes careful adaptation planning imperative. The purpose of this policy analysis is to better understand the extent to which identified policies integrate adaptation action in the livestock sector and coherence among policies within and between policy areas. Guided by the Policy Coherence for Sustainable Development Framework by OECD (2016), this analysis examines provincial development, climate, agriculture, land and environmental policies of Gobi-Altai and Khovd provinces for strength and coherence to inform better adaptation policy against ecological vulnerability in two provinces. A qualitative content analysis approach was applied to analyse the policy documents through sustainable development criteria. Regarding SDGs, the analysis focused on SDG 1 No Poverty, SDG 2 No Hunger, SDG 13 Climate Action, and SDG 15 Life on Land with the understanding that nomadic pastoral system is a critical source of food, income, and savings for herders and highly vulnerable to socio-economic and climate change impacts, as evidenced by livestock losses due to drought, winter extreme, and gradual trends in temperature and precipitation.

Provinces are working to integrate grazing pasture and livestock management strategies into climate and other policy areas, although at times with limited detail and coherence. With more recently developed policies aligned with the SDGs and national sustainable development strategies, Khovd province has strong policy coherence around adaptation strategies across policy areas. In Gobi-Altai province, there is policy coherence for livestock adaptation in development policy, but the province needs to update its development strategies in accordance with the SDGs and national sustainable development vision and strategies.



COLLABORATIVE NATIONAL PARK MANAGEMENT AND ITS EFFECTS ON NEIGHBORING HERDERS' LIVELIHOODS IN MONGOLIA

Takafumi Miyasaka¹

¹ *Nagoya University,*
miyataka@nagoya-u.jp

Mongolia has recently experienced land degradation due to overgrazing. Since livestock raising is economically and culturally important for Mongolian herders, it is not realistic to reduce the number of livestock by a simple top-down approach. Collaborative natural resource management carried out in protected areas in Mongolia could shed light on a practical solution to this issue. The present study examined the collaborative management system of Hustai National Park in Mongolia and its effects on the livelihoods of neighboring herders, particularly the number of their livestock. First, we interviewed key members of the park's management body to understand its management system involving local communities. Second, we interviewed 94 herders neighboring the park to assess management effects on their livelihoods.

Hustai National Park established a buffer zone around the park, Buffer Zone Committees in three *soum* (villages) whose territories overlapped the zone, and Buffer Zone Council to coordinate the activities of the three committees, in order to collaborate with the local people on land management. The aims of the buffer zone management were to increase public participation, secure their livelihoods, and encourage the proper use of natural resources. To these ends, the park provided neighboring herders soft loans and training for increasing their livestock productivity and diversifying their livelihoods, which could lead to the reduction of livestock numbers in the buffer zone.

We found a certain number of herders who actually diversified and improved their livelihoods and a statistically significant trend for trained herders to intend to reduce their livestock numbers in the future. However, those management activities had targeted only about 20% of interviewees, and herders receiving loans tended to unexpectedly increase their livestock numbers. We concluded that the management system of Hustai National Park was well established in collaboration with the local communities, but that effects of the collaborative management system on neighboring herders' livelihoods were still limited and often unexpectedly negative.



STAKEHOLDER ENGAGEMENT STRATEGY FOR PROTECTED AREAS – A CASE STUDY OF KHUSTAI NATIONAL PARK IN MONGOLIA

Daginnas Batsukh¹ and Karl Benediktsson²

¹ *Mongolian University of Life Sciences, Mongolia P.O.BOX 904, Darkhan 45047,
Darkhan-Uul, daginnasb@gmail.com, daginnas@sab.edu.mn*

² *University of Iceland kben@hi.is*

Mongolia currently has 99 protected areas and in each of these areas, co-operation is required between stakeholders such as locals, administrators of the protected areas, and decision-makers at all levels. There are problems such as illegal hunting, off-roading and livestock grazing in the protected areas leading to land use arguments between communities, local authorities and administration of protected areas. The aim of this research was to address these problems by investigating stakeholders' collaboration and developing an engagement strategy in the Khustai National Park.

The objectives of the research were to identify stakeholders, analyse stakeholders considering their interests and interdependencies, determine needs for improving stakeholder engagement, and designing engagement strategy for the national park.

The research utilized both quantitative (survey) and qualitative (interviews) methods. Eleven key stakeholders were identified in four categories including civil society, non-governmental organization, governmental organization and the private sector, using the stakeholder analysis. Herders and locals who are using land as pasture have low influence on decision-making while local government has a high influence based on its mandate to give land to residents, but has little interest in conservation and sustainable land usage in the park buffer zone (designated area surrounding the park). The main conservation issue of the park was identified as rangeland degradation in the buffer zone due to the increasing number of migrating herders who settled in the buffer zone with livestock. Also, most conflicts between locals and the park administration are related to herding livestock in the core zone where wild animals graze. The study also showed that when designing the stakeholder engagement plan for the park, locals' interest, the difference between generations, and building ownership attitude for migrating herders are important. Based on the information gathered from the findings, an engagement plan for the national park was created.



ИХ НУУРУУДЫН ХОТГОРЫН ТӨВ ХЭСГИЙН НУУР, ГОЛУУДЫН ЭКОСИСТЕМИЙН СУДАЛГАА

Z.Burmaa¹, Ch.Ayushsuren², B.Mendsaikhan³, Ch.Bilegtmandakh¹, Suvdantsetseg⁴,

N.Jargalsuren¹, G.Ganbileg²

¹ Ховд их сургууль

² ШУА-ийн Ерөнхий ба сорилын биологийн хүрээлэн

³ ШУА-ийн Газарзүй Геоэкологийн хүрээлэн

⁴ Баруун бүсийн тогтвортой хөгжлийн хүрээлэн

Монгол Алтай ба Хангайн нурууны хоорондох нам дор хөндийд зүүнээсээ баруун зүгт сунаж тогтсон Их нууруудын хотгор нь Монгол орны физик газарзүйн мужлалын хувьд Говийн их мужийн, Алтайн ар говийн бие даасан мужийг үүсгэдэг (Мурзаев 1952, Герасимов, Лавренко 1952, Цэгмид 1968). Их нууруудын хотгорын сав газар нь Төв Азийн гадагш урсацгүй, дотоодын ай сав бүхий өвөрмөц нутаг юм. Хүрээлэн буй уулын бүсэд унасан хур тунадас нь мөнх цас, мөсөн гол, хөрсөнд хуримтлагдахын зэрэгцээ голын ус, ургамлаар дамжин, ууршин алдагдаж, улмаар гадагш урсгалгүй битүү хотгорт тогтсон Хяргас, Увс, Дөргөн нууруудыг тэтгэдэг. ИНХ-ын усны нөөц ихээхэн хязгаарлагдмал, өндөр уулаас эх аван урсах гол горхи нь түүний адагт орших нуурын оршин тогтнох үндэс болдог.

ИНХ-ийн төв хэсэг болох Хар-Ус нуурын дэд хотгорын нуур голууд нь мөнх цас, мөсөн голын эхтэй Ховд, Буянт, Цэнхэрийн голоор усжин, зүүн хойд талаараа Хяргас нуурын хотгор, зүүн өмнөд талаараа Дөргөн нуурт хүрээд төгсдөг онцлогтой. Хар-Ус нуураас Чонохарайх гол эх аван урсаж Хар нуурт цутган, Хар нуур илүүдэл усаа ууршуулахын зэрэгцээ Хомын хоолойгоор Дөргөн нуурт цутгаж, нөгөө хэсэг нь Тээлийн голоор дамжин Хяргас нуурт цутгана. Эндээс үзэхэд ИНХ-ын нуур, голууд нь усзүйн нэгдмэл нэг системийг бүрдүүлж байна.

ИНХ-ын төв хэсгийн Хар-Ус нуурын дэд хотгорын нуур голуудын усны чанарын судалгааны үндсэн дээр бохирдолтонд нөлөөлж буй гидробиологийн болон хүний хүчин зүйлийн нөлөөлөл, түүнийг бууруулах арга замыг судалж байна.

Хар-Ус нуур, түүнээс эх аван урсах гол, нууруудын усны бохирдолтонд бүс нутгийн уур амьсгалын өөрчлөлт, цутгал голуудын урсацын хэмжээ нөлөөлж байна. Хамгийн гол нь Хар-Ус нуур нь Монголын Баруун бүсийн Их нууруудын хотгорын цэнгэг болон эрдэст нууруудыг холбож, усжуулдаг байгалийн усан сан юм. Энэ нуурын онцлог нь олон арлуудтай, арлуудад малчин иргэд амьдардаг, нуурын өөрийн морфологийн үзүүлэлтүүд нь усны ургамал ихсэх нөхцөл болж байна. Хар-Ус нуураас

эх авах урсах Чонохарайх гол дээр Дөргөний усан цахилгаан станц ажилладаг ба энэ нуур нь УЦС-ын усан сангийн усны нөөцийг зохицуулдаг онцлогтой.

Хар-Ус нуур түүний усны чанарт нөлөөлж буй байгалийн болон хүний хүчин зүйлийн нөлөөллийг бууруулах, судалгаанд үндэслэсэн хамгаалалт, ашиглалтын зөв менежментийг боловсруулж, зөвлөмж гаргаж, үйл ажиллагаа явуулдаг холбогдох төрийн байгууллагуудтай хамтран ажиллаж хэрэгжүүлэхэд бидний судалгааны ажлын практик ач холбогдол оршиж байна. Бид сүүлийн 5 жил хийсэн судалгааны ажлын үндсэн дээр Хар-Ус нуурын гүний, усны бохирдолтын элементүүд, ёроолын шаварт агуулагдах оксидуудын тархалтын болон энэ нуурын районы усны ургамлын зүйлийн бүрдэлийн сэдэвчилсэн зургуудыг гаргасан.



STUDY ON RIVERS AND LAKES ECOSYSTEMS IN GREAT LAKES DEPRESSION IN WESTERN MONGOLIA

Z.Burmaa¹, Ch.Ayushsuren², B.Mendsaikhan³, Ch.Bilegtmandakh¹, Suvdantsetseg⁴,

N.Jargalsuren¹, G.Ganbileg²

¹ *Khovd University*

² *Institute of General and Experimental Biology, MAS*

³ *Institute of Geography and Geoecology, MAS*

⁴ *Sustainable Development institute for western region of Mongolia*

The Great Lakes Depression (GLD), which extends from east to west by the Mongol Altai and Khangai Mountains, forms the independent Gobi desert and Altai back gobi regions (Muriyaev 1952, Gerasimov, Lavrovko 1952, Tsegmid 1968). The Great Lakes Depression Basin is a unique watershed within Central Asian basin. Precipitation in the surrounding mountainous region is accumulated from snow, glaciers and rivers from the Khyargas, Uvs and Durgun lakes, which are located in undisturbed depressions, and it evaporates through soil and vegetation. The water resource of the GLD is very limited, and the rivers flow from high mountains to the foundation of the lakes.

Extending from Khyargas Lake depression to the northeast and Durgun Lake to the southeast, sub-valley of Khar-Us Lake, the central part of the GLD, is fed by Khovd, Buyant and Tsenkher rivers, which are originated from glaciers and glacial rivers. Chonokharaikh river originates from Khar-Us Lake and flows into Khar Lake, and Khar Lake evaporates its excess water, pouring part of its water into Durgun Lake through the Khom valley while the other part passes through the Teel River to Khyargas Lake. This makes a unique hydrological system of rivers and lakes in the GLD.

The main objective of this research was to assess the impacts of hydrobiological and human factors on water pollution and quality in the Khar-Us Lake sub-basin of GLD. A Water pollution of Khar-Us Lake and its rivers and lakes is caused by regional climate change and run off of flow rivers. The most importantly, Khar-Us Lake is a natural water reservoir that connects and feeds freshwater and salt lakes in the Great Lakes Region of Western Mongolia. The lake is characterized by many islands inhabited by the herders, and the morphological parameters of the lake are increasing its water plants. Durgun hydroelectric power station works on Chonokharaikh river which runs from Khar-Us lake. This lake provide the hydro-reserves of hydropower plants in the region.

The practical importance of our research is to reduce the natural and man-made impacts on Khar-Us Lake and develop research based policy recommendations and appropriate

protection and use management. Based on the research outputs within the last 5 years, the thematic maps were developed including the pollution elements of groundwater, the distribution of oxides contained in the mud, and aquatic species in the Khar-Us lake.

LIST OF PARTICIPANTS AND REGISTRATION

№	Name	Institute and organization	E-mail	23 August	24 August
1.	Avid Budeebazar	Mongolian Academy of Sciences	avid@mas.ac.mn	+	-
2.	Suvdantsetseg B.	Sustainable development Institute for western region of Mongolia	Suvd16@gmail.com	+	+
3.	Altanbagana.M	Institute of Geography and geoecology	Altanbagana44@gmail.com	+	-
4.	Manidari.D	Institute of General and experimental biology, MAS	dmanidari@gmail.com	+	+
5.	Otgonsukh.Sh	Institute of General and experimental biology, MAS	s.otgoo1234@gmail.com	+	+
6.	Kherlenbayar B.	Sustainable development Institute for western region of Mongolia	bkherlenbayar@gmail.com	+	+
7.	Daginnas Batsukh	Mongolian University of Life Sciences	daginnasb@gmail.com	+	+
8.	Toshio Okuro	University of Tokyo	aokuro@mail.ecc.u- tokyo.ac.jp	+	-
9.	Takafumi Miyasaka	Nagoya University	miyataka@nagoya-u.jp	+	+
10.	Xueyong Zhao	Northwest Institute of Eco- environment and Resource, CAS	zhaoxy@lzb.ac.cn	+	-
11.	Shaokun Wang	Northwest Institute of Eco- environment and Resource, CAS	wangsk@lzb.ac.cn	+	+
12.	Kitaura Yoshio	Green Network NGO, Japan	kitaura@gol.com	+	+
13.	Wu Nitu	Inner Mongolian Grassland institute, China	Unteecass@outlook.com	+	+
14.	Delgertsetseg badrangui	Sustainable development Institute for western region of Mongolia	B_delgertsetseg@yahoo.com	+	+
15.	Nominbolor Khurel	Institute for strategic study	nkhurel@gmail.com	+	+
16.	Zambuu Burmaa	Khovd state university	Z_burmaa@yahoo.com	+	+
17.	Navchtsetseg Nergui	International cooperation and collaboration department, MAS	navchtsetseg@mas.ac.mn	+	-

18.	Munkhtsetseg Tsedenee	International cooperation and collaboration department, MAS	mugi@mas.ac.mn	+	-
19.	Enkh-Amgalan Damiran	Information and Innovation department, MAS	enkhamgalan@mas.ac.mn	+	-
20.	Purevdorj	Government officer, Gobi-Altai province	99489604	+	+
21.	Munkhtsetseg Jambal	Local officer, Biger soum, Gobi- Altai province	99483038	+	+
22.	Baigalimaa Myagmarsuren	Local officer, Khuhmorit soum, Gobi-Altai province	99489695	+	+
23.	Nansalma Sengedorj	Herder, Biger soum, Gobi-Altai province	99485551	+	+
24.	Lkhagvasuren Jambal	Environmental officer, Chandmani soum, Gobi-Altai province	80848772	+	+
25.	Duudee Lkhagva	Herder, Durgun soum, Khovd province	98855544	+	+
26.	Ochir Byambasuren	Herder, Durgun soum, Khovd province	98668611	+	+
27.	Galigaa Baigalmaa	Herder, Zereg soum, Khovd province	98433086	+	+
28.	Enkhbayar Nyamdorj	NGO, Sharga soum, Gobi-Altai province	95225188	+	+
29.	Urantogtokj Suhbaatar	Herder, Delger soum, Gobi-Altai province	95225188	+	+
30.	Azjargal Purevhuu	Financial department, MAS	azjargal@mas.ac.mn	+	-
31.	Munkhzul Luuochir	Financial department, MAS	munkhzul@mas.ac.mn	+	-
32.	Nandin-Erdene Munkhbaatar	SDIWOM	88007234	+	+