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Dealing with transitions in climate , economic , and political conditions in Eurasia

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Introduction Dramatic changes occurred in pastoral systems of Mongolia , China and Russia for past decades . Integrated assessment of these changes on environment and quality of life is essential for sustainability of the region . Integrated assessment entails determining the interactions and impacts of various management strategies on the environment and human systems . Recently , evaluation of the pastoral systems has been conducted in the region . Overview of these research project findings , integration of knowledge and delivery of this knowledge to scientists , policy makers and land users is critical for regional sustainable development .

Pastoral systems , where humans depend on livestock , exist largely in arid or semi-arid ecosystems where climate is highly variable . Thus , in many ways pastoral systems are adapted to climatic variability . It is plausible to assume direct connection between climate variability , ecosystem dynamics and nomadic land use system in Mongolia . Interaction between ecosystems and nomadic land use systems co-shaped them in mutual adaptive ways for hundreds of years , thus making both the Mongolian rangeland ecosystem and nomadic pastoral system resilient and sustainable .

We also recognize the pervasive role of demographic , political and economic driving forces on pastoral exploitation . The general trend involves greater intensification of resource exploitation at the expense of traditional patterns of extensive range utilization . This set of drivers is orthogonal to the above described climate drivers . Thus we expect climate-land use-land cover relationships to be crucially modified by the socio-economic forces mentioned above . Nevertheless , the complex relationship between climate variability and pastoral exploitation patterns will still form the environmental framework for overall patterns of land use change .

Key findings We have analyzed climate data and land cover changes to evaluate factors affecting land use changes . Developing linkages between current trends in policy decisions and economic forces will be developed in the analysis of environment and ecosystem dynamics . During last 60 years the annual mean air temperature increased by 1.56°C in Mongolia (Mongolia National Action Program on Climate Change 2000) . Winter and spring-fall temperatures increased by 3.61°C and 1.4-1.5°C respectively . However , the summer temperature decreased by 0.3°C . Change in warming has spatial character : winter warming is more pronounced in the high mountains and mountain valley , and less in the Gov' desert and the steppe . There is a slightly increasing trend in the annual precipitation in the last 60 years (Natsagdorj , 2000) . During 1940-1998 , the annual precipitation increased by 6% , while summer precipitation increased by 11% (mostly in August) and spring precipitation decreased by 17% , mostly in May .

Remote sensing data analysis showed that large portion of the desert steppe and dry part of the steppe region in Mongolia and Inner Mongolia has delayed green-up trend during 1982-1992 and up to 1999 as well . Field trip-2001 conducted in Mongolia mainly climate change effects in Mongolia . The goal of the field survey-2002 in Inner Mongolia was to understand further climate and land use change effects on plant phenology dynamics .

Sustainability of pastureland may be more attainable through adaptation of the concept of landscape management so that improvements can be seen in the adaptability of pastoral nomadism , herd quality , and herder's living standards . Herders may then have the opportunity to utilize seasonal resources and enhance their ability to process and manufacture products from their pastoral systems .