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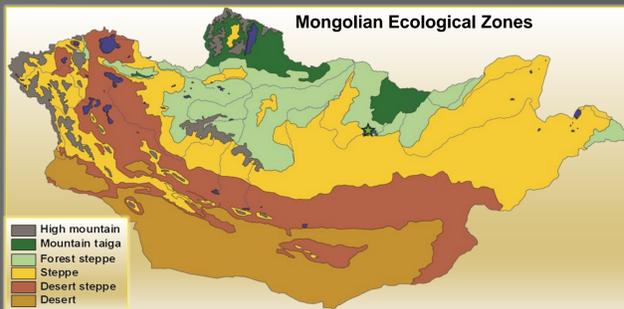
Introduction

We studied vegetation productivity trends in Mongolia, using long-term remotely sensed vegetation index AVHRR NDVI (1982-2008). First, we related remotely sensed vegetation index NDVI long-term (1982-2008) average value intervals to main 6 ecological zones. Then we studied changes in areas within these NDVI intervals. Vegetation trends analysis in Mongolia, using long-term remotely sensed vegetation index NDVI (1982-2008) showed that main ecological zone boundaries didn't shift.

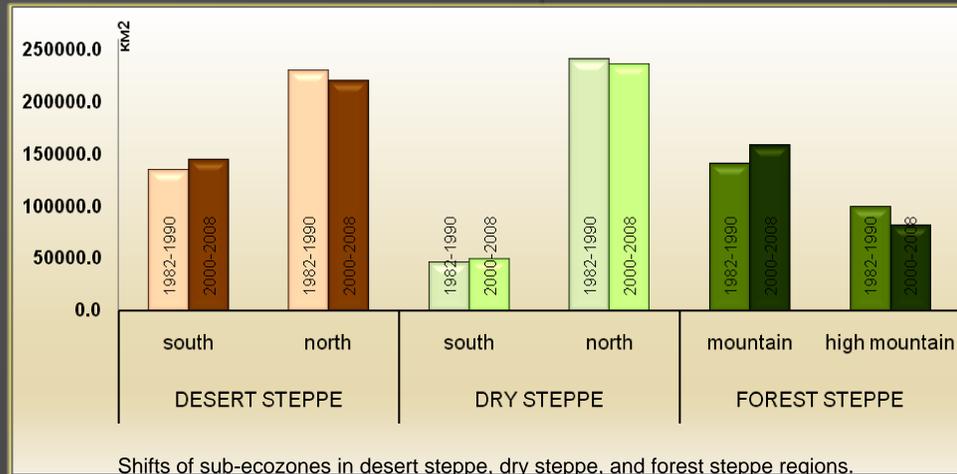
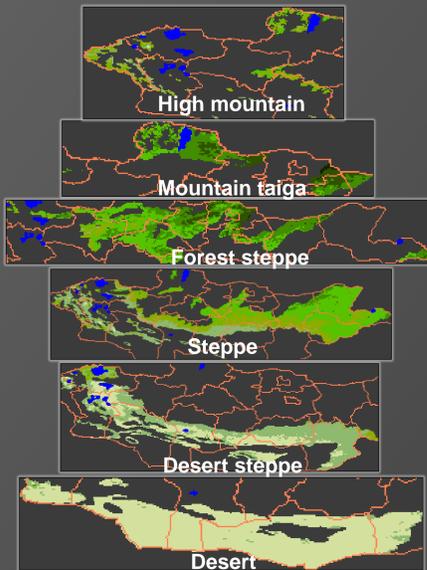
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Key words: NDVI, ecological zone shift, climate change and land use change Impact

Results



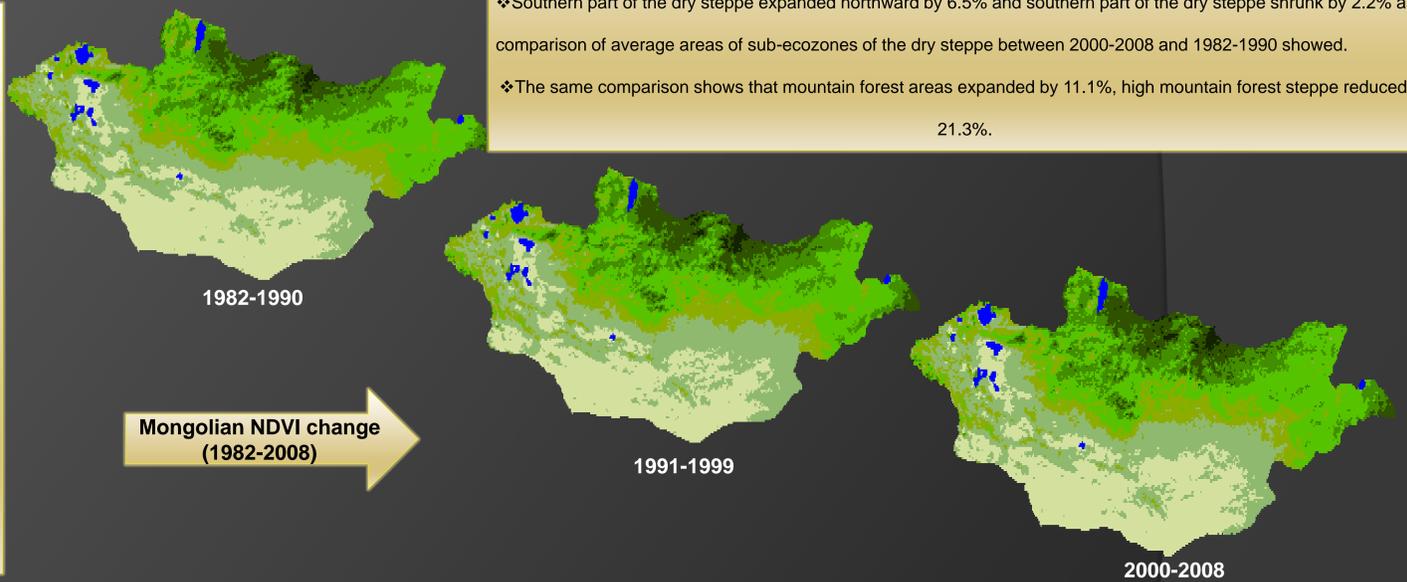
No	NDVI values	Ecological zones
1	0.001-0.15	Desert
2	0.1501-0.3	Desert steppe
3	0.301-0.45	Steppe
4	0.4501-0.6	Forest steppe
5	0.601-0.75	High mountains
6	0.7501-1	Mountain taiga



- ❖ Desert area didn't change during last 27 years.
- ❖ Averaged (2000-2008) area of southern part of the desert steppe expanded northward by 7.2% relative to average area between 1982-1990, however, northern part of the desert steppe shrunk by 4.7% (Fig.).
- ❖ Southern part of the dry steppe expanded northward by 6.5% and southern part of the dry steppe shrunk by 2.2% as comparison of average areas of sub-ecozones of the dry steppe between 2000-2008 and 1982-1990 showed.
- ❖ The same comparison shows that mountain forest areas expanded by 11.1%, high mountain forest steppe reduced by 21.3%.

Summary

Vegetation trends analysis in Mongolia, using long-term remotely sensed vegetation index NDVI (1982-2008) showed that main ecological zone boundaries didn't shift. However, there were changes within main ecological zones, particularly, southern parts with relatively lower productivity (southern sub-ecological zones) have expanded in areas by 6.5-11.1% northward, and the northern parts with relatively higher productivity (northern sub-ecological zones) have shrunk in areas. Expansion of southern parts within ecological zones means that plant productivity tend to decrease due to climate and land use changes.



Assessments of social-ecological systems in the Mongolia and Tuin river basin (Bayankhongor aimag)

"Dryland Development Paradigm Application for the Most Vulnerable to Climate and Land Use Change of Pastoral Systems in the Southern Khangai Mountains of Mongolia" DDPPas project

Long-term integrated Drought-zud, Pasture use and Ecological vulnerability dynamics in Ecological zones in Mongolia and Tuin river basin (1986-2008)

Social Survey related to "Dryland Development Paradigm" (DDP)



This study initially focused in the Tuin River basin. During its first year, the project provided scientific knowledge on climate change, its impact on rangeland ecosystems, sustainable land-use, resilience reduction with land fragmentation in arid and semi-arid lands, and research findings in a suitable format for policymakers and resource users.

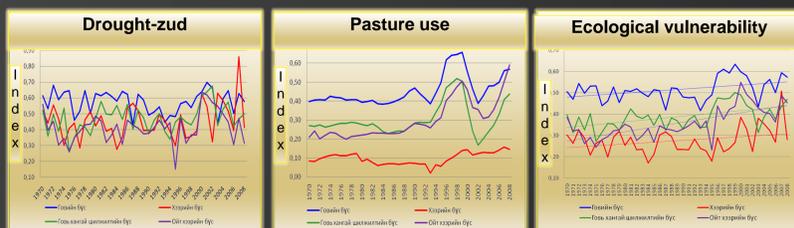


Figure (a). Mongolia



The social survey among the stakeholders in the Tuin river basin yielded interesting results for understanding of coupled social-ecological systems in the Tuin river basin from the dryland development paradigm's point of view. The following statements are the main outputs of this study in the Tuin river basin:

- ❖ Dynamics of social-ecological systems is defined primarily by climatic disaster events such as drought, zud, flood and dust storms;
- ❖ Global warming is a critical determinant of social-ecological systems;
- ❖ Surface water shortage is already crossed the threshold level and its leading to collapse of social-ecological systems;
- ❖ Global (44%) and country (31%) level regulations are more important than local government (16%) or community level regulations (9%);
- ❖ Level of policy, which combines up-to-date modern science and traditional knowledge, is fair.

We studied examples of successful herder (a leader of *hot ail*), who is doing well with his traditional knowledge and management skills (Win-Win model), the Ortomt river community (traditional community model), herder with fenced pasture (rich herder model), and "tragedy of commons" for pastoral social-ecological systems. Many traditional pastoral communities are still at bifurcation stage between sustainable livelihoods "Win-Win" (both "Win" ecologically and "Win" socially) and "Tragedy of Commons" collapse scenarios.

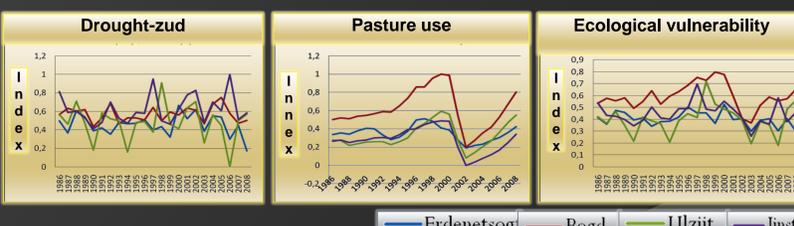


Figure (b). Tuin river basin

Figure (a). 7 aimags were integrated in the Gov' region, 3 aimags – in the transition zone between the Gov' and Khangai mountains, 2 aimags – in the steppe region, and 6 aimags – in the forest steppe region. The drought-zud index in the Gov' zone was the highest relative to other ecological zones until 2000, however, the drought-zud index in other ecological zones increased during last decade. For instance, the drought-zud index in the steppe zone even increased during last decade. The pasture use intensity is the lowest in the steppe region, but it was the highest in the Gov' region since 1990 and became more dynamic too.

Figure (b). Integrated drought-zud, pasture use and ecological vulnerability indexes were calculated for Erdenetsogt (forest steppe), Olziit (dry steppe), Jinst (desert steppe) and Bogd (desert steppe) sums, using climate and livestock data (1986-2008). Relations between average values of ecological vulnerability during 1986-2008 for Erdenetsogt, Olziit, Jinst and Bogd sums were 1:1.1:1.1:1.5, which indicate that desert steppe region of the Tuin river basin is more vulnerable to climate and land use changes.

Calculated by T.Chuluun & M.Altanbagana

Global warming impacts on surface water decrease. Nowadays only 3 rivers (Shargaljuut, Ortomt and Ovgon Jargalant) out of 99 rivers are still flowing into the Tuin river. A prime example of it is that the Tuin river is not reaching the Orog lake and the Orog lake is dried out already for several years.