

Regional Approach for Linking Ecosystem Services and Livelihood Strategies Under Climate Change of Pastoral Communities in the Mongolian Steppe Ecosystem



**Dennis Ojima
Kathy Galvin
Chuluun Togtohyn
Mark Stafford-Smith
Kelly Hopping**

**FUNDING
SPONSORS:
CDKN**



**AGU
4 December 2012
San Francisco, CA
GC 23D - 03**



KEY QUESTIONS

What factors contribute to the change in the vulnerability and resilience of aridland systems of Mongolia?

How are climate and land use intensification affecting pastoral institutions? Rangeland socio-ecological structure and function?

How are changes in social-economic structures affecting sustainable use of aridland ecosystems?



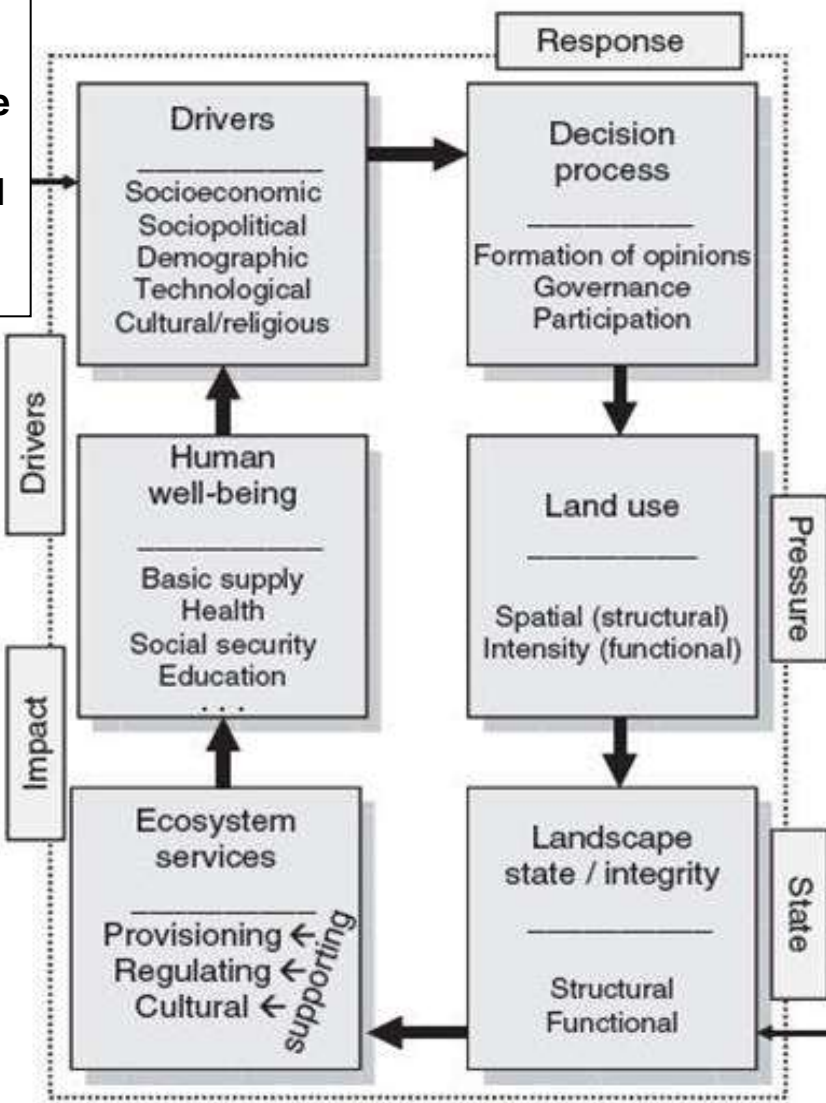
Ecosystem services and poverty reduction

- Development in dryland regions are closely linked to the condition of ecosystem services
- People living in drylands tend to have the lowest levels of human well-being (ie, lowest per capita GDP, highest infant mortality rates yet provide a significant proportion of the world's livestock
- Drylands have only 8% of the world's renewable water supply



Contextual constraints

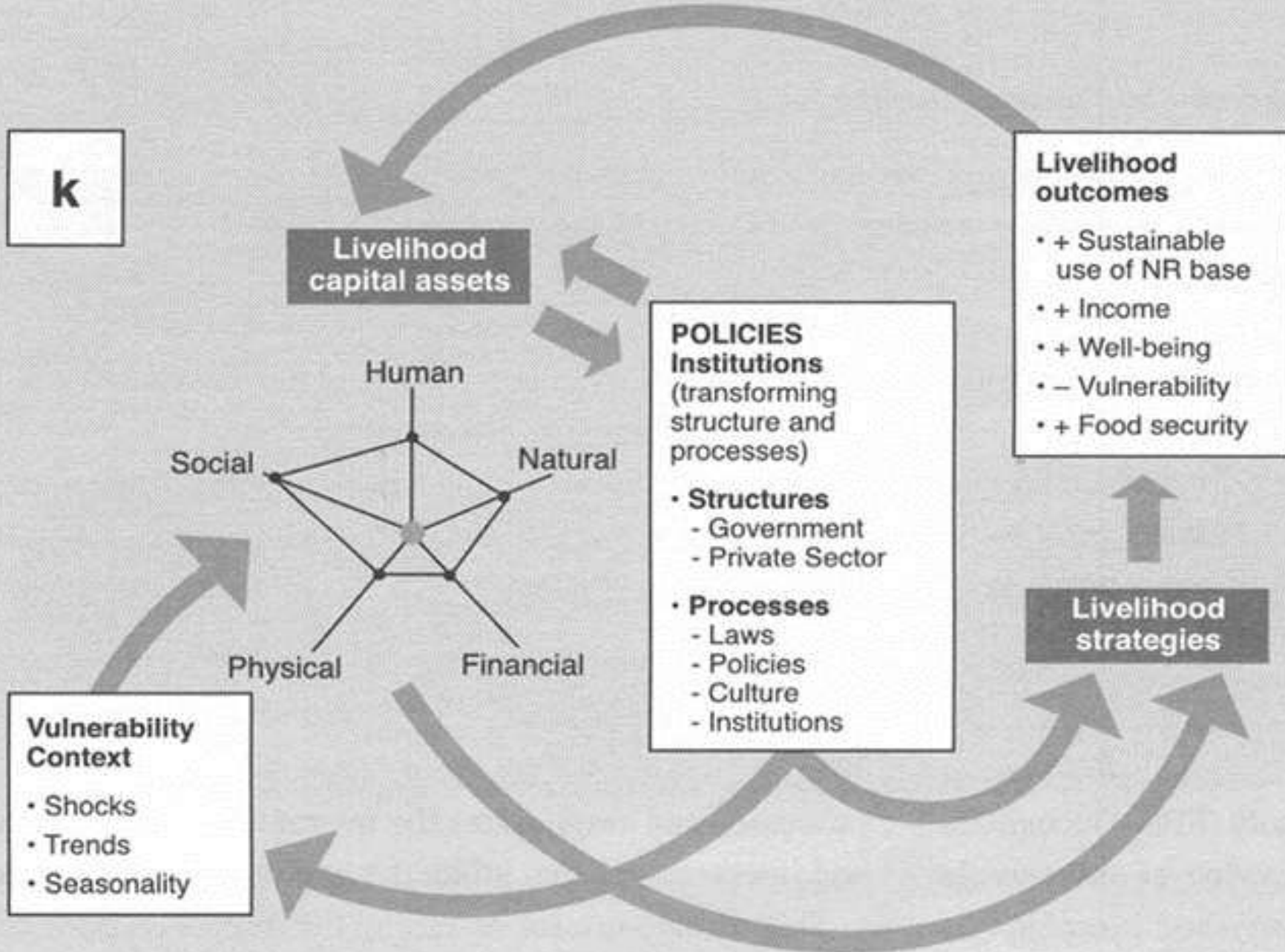
Social Change
Political
Technological
Culture
Climate



Process of understanding change, connections to decision making and livelihood strategies, within land use and landscape schemes, connected to ecosystem services, as these all affect human well-being



k



Regional Issues

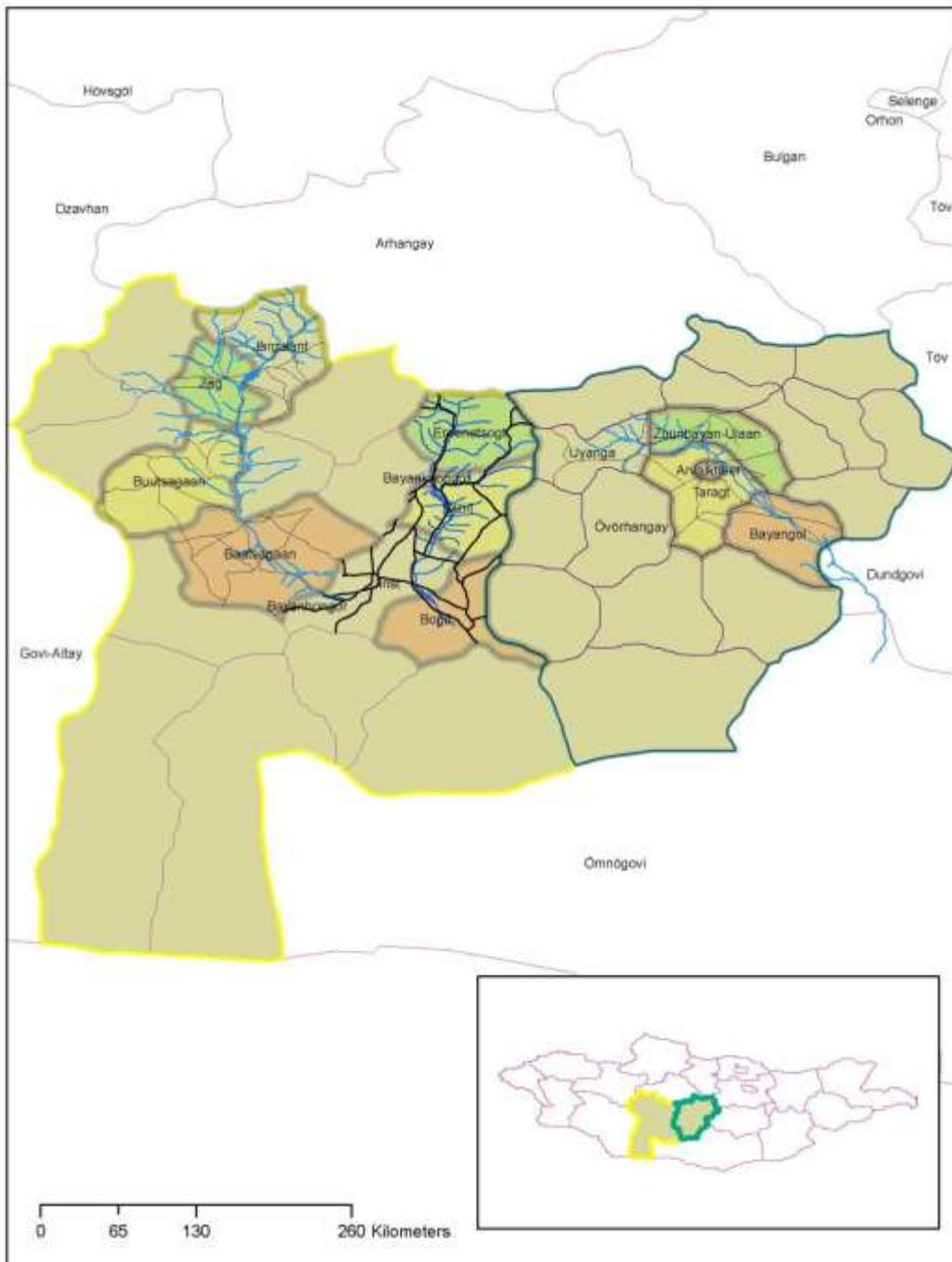
- Revitalized mining extraction challenges to ecosystem services and livelihoods along riverbasins
 - Water resources (Natural Capital)
 - Economic gains (Financial Capital)
- Policy interventions (social capital) can provide rangeland management strategies to allow for better ecosystem stewardship and livelihood choices



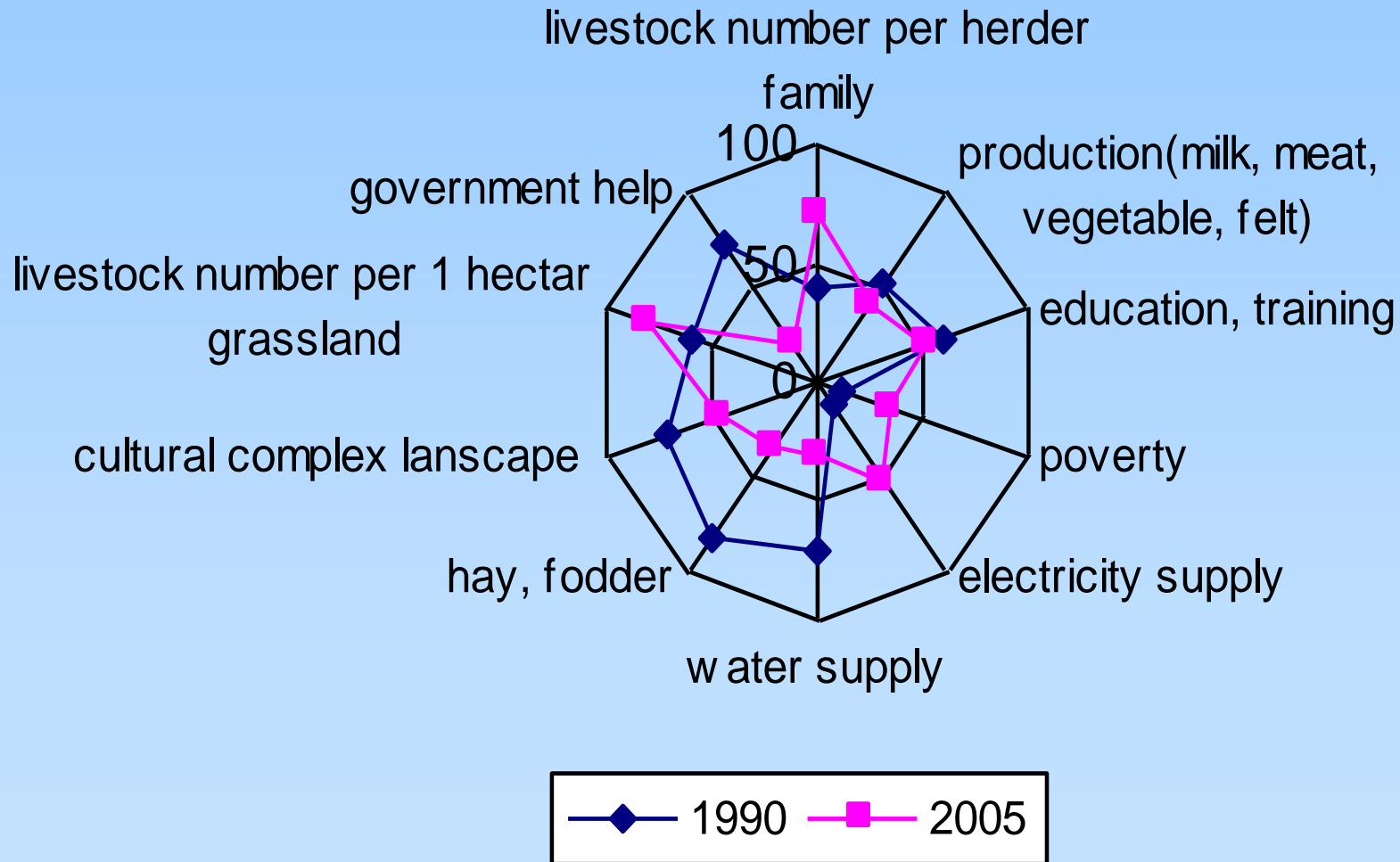
Study Area

Three river basins are located primarily in 2 Provinces (aimags), Bayanhongor and Arkhangai Aimag.

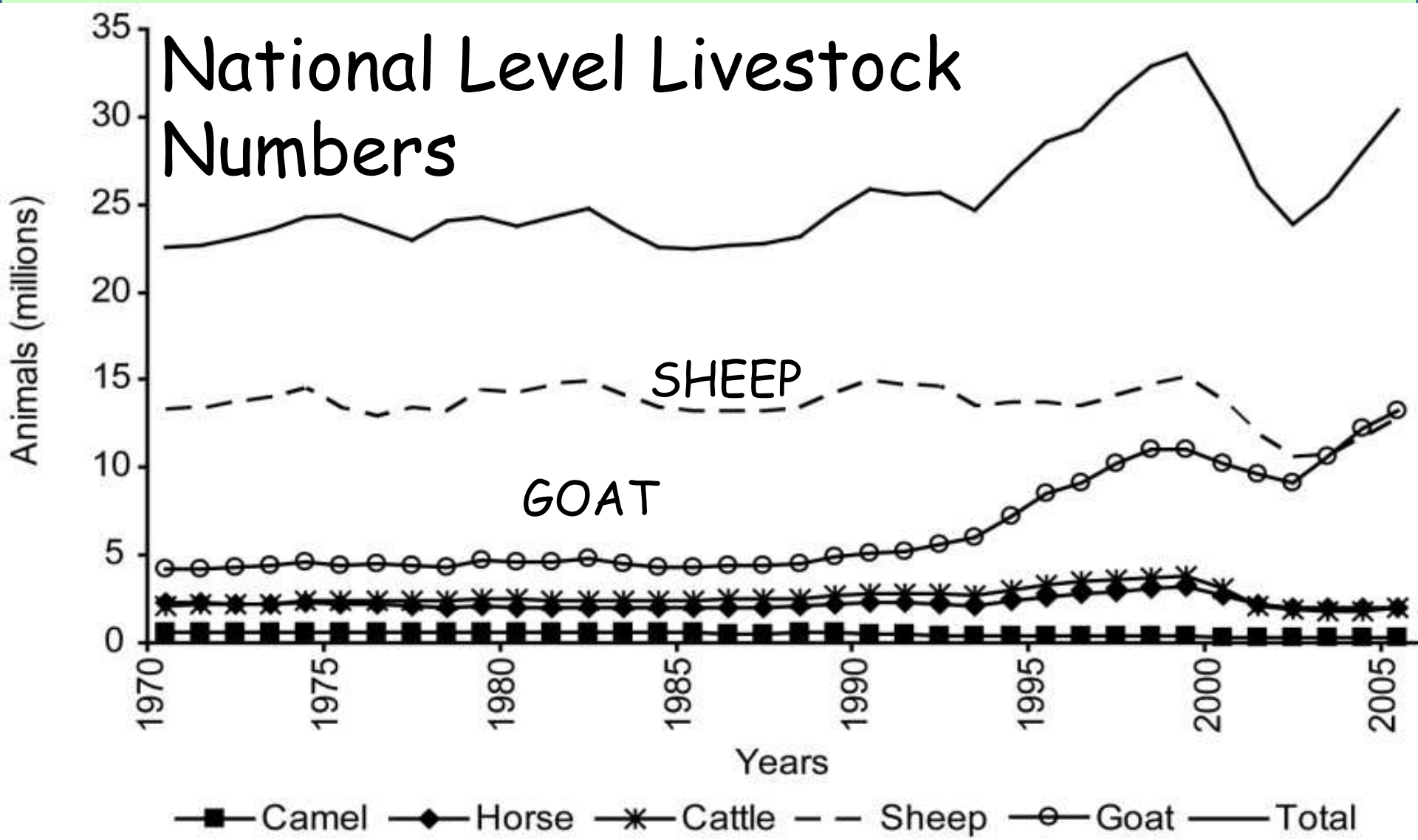
Each of these river basins include a gradient of steppe ecosystems utilized by pastoral groups, and include the forest steppe, steppe, and desert steppe ecosystems



Change of socio-economic conditions of the herder household: 1990 vs 2005

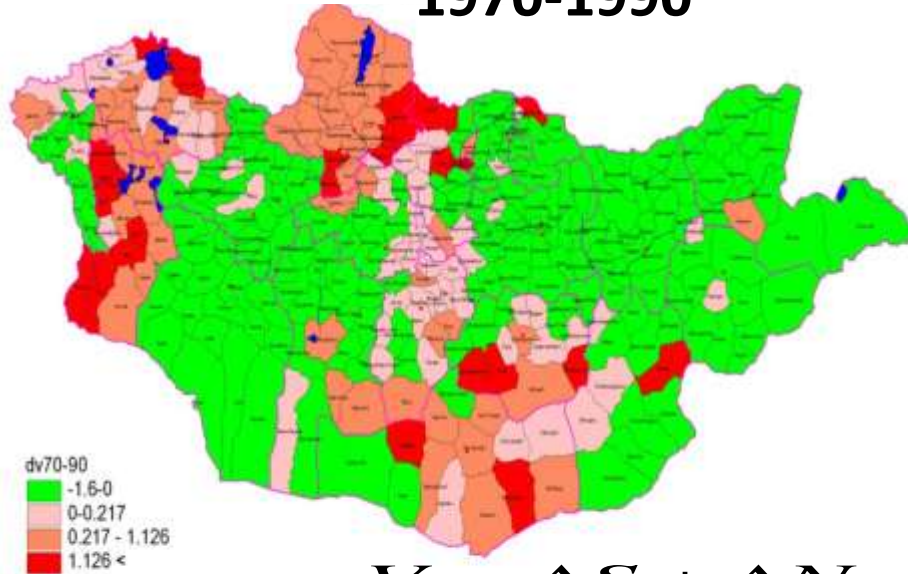


National Level Livestock Numbers

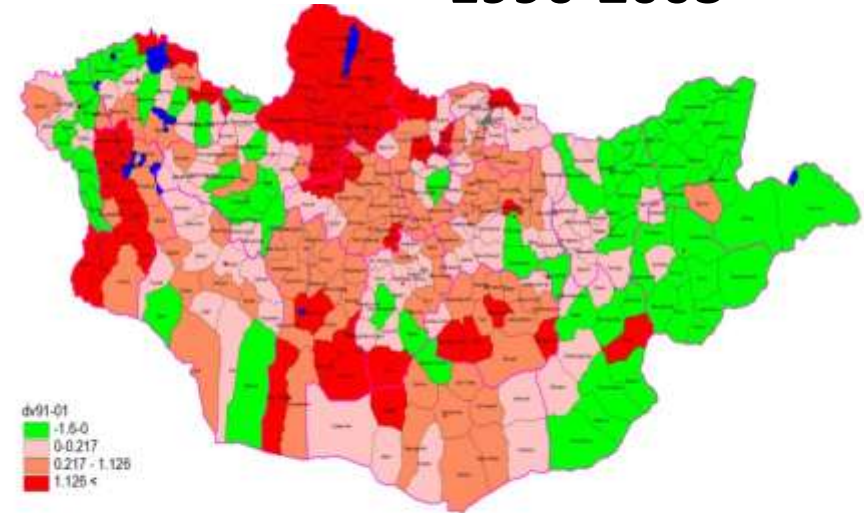


Rangeland vulnerability: *Zud* + land use intensity before and after 1990

1970-1990



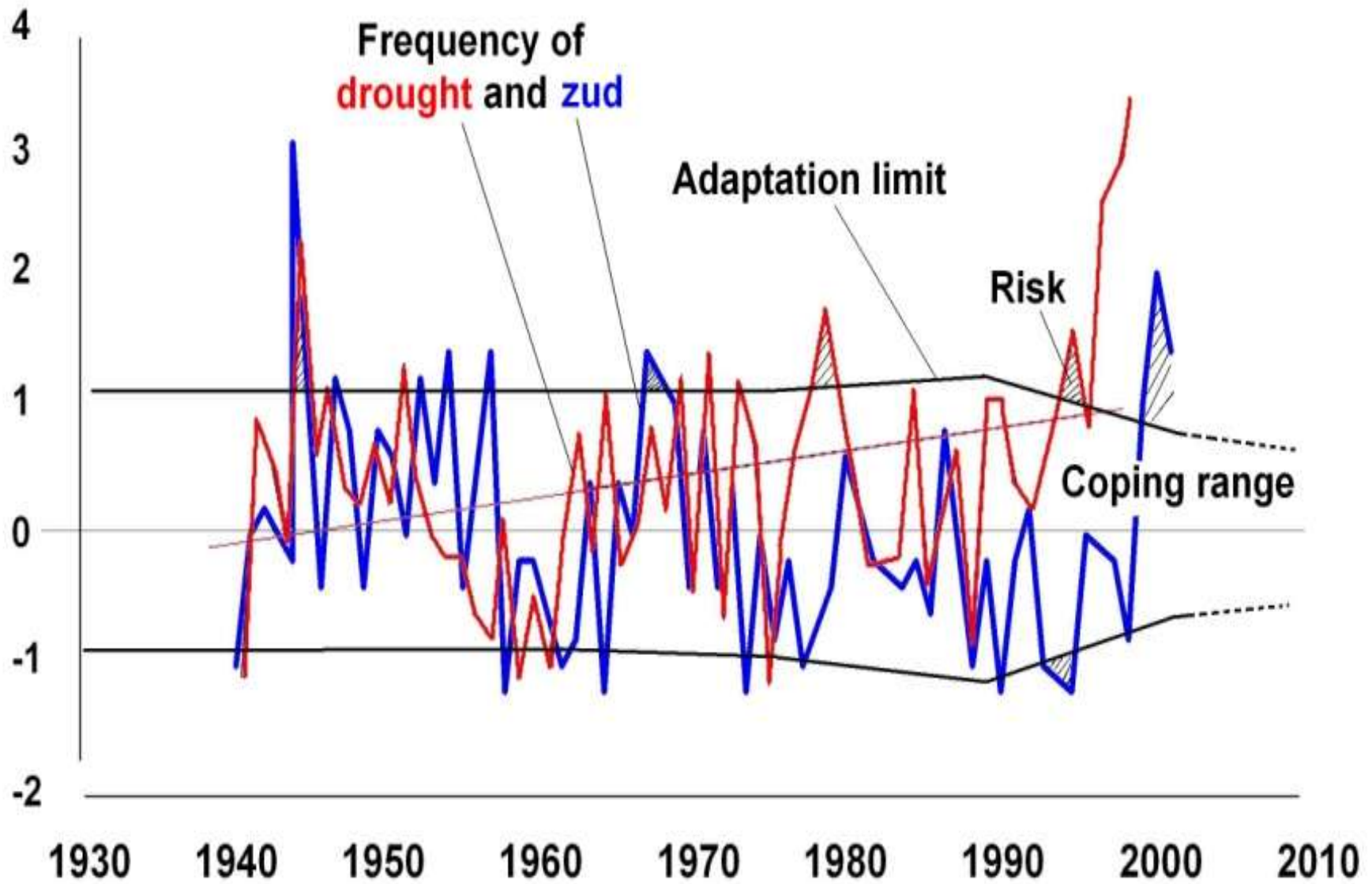
1990-2003



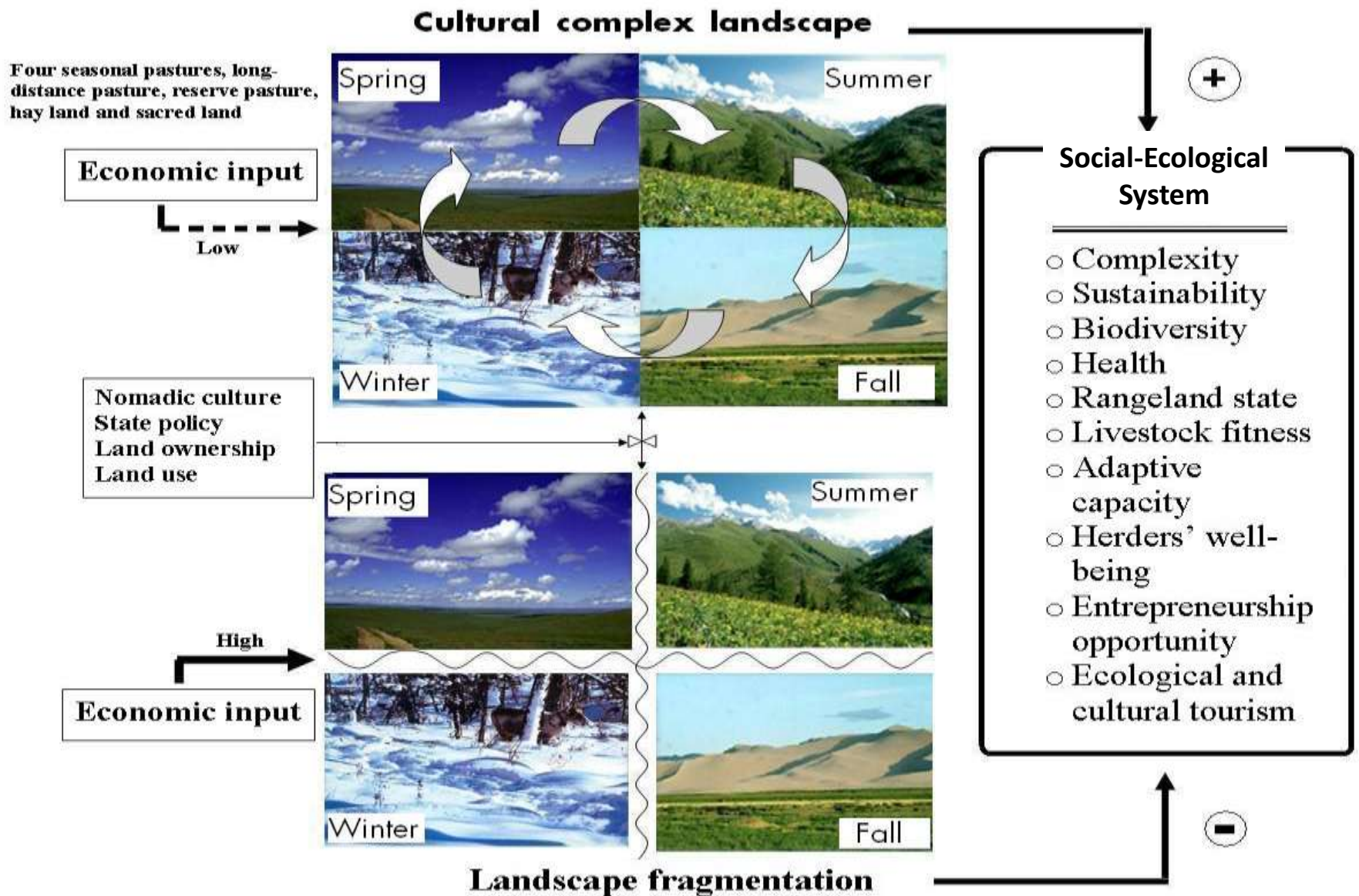
$$V = \Delta S + \Delta N$$

dS - *Zud* index, (L.Natsagdorj, G.Sarantuya, 2004)
 dN - Land use (livestock density-carrying capacity)





Trend in **Drought** and **Zud** index for 1940-2002



Initial Findings

(1 of 3)

- Impressed by rapidity with which environmental gradient changes from more to less productive ecological zones and the extent to which this is mirrored by the level of hardship people seem to be experiencing in maintaining their livelihoods under climate change
- Importance of water resources as central to forage; affected not only by precipitation directly but also by warming conditions
- Key interaction between water, climate, pasture, and movement for pastoralists
- Vertical and horizontal linkages at various levels are related to the household's degree of experience, leadership, economic condition, and historic and cultural ties to the area



Across communities, there was a gradient from relative independence to connection

- E.g., no one telling people where to move vs. movements being highly structured
- Yet they all realized that they are facing climate changes unlike any they have had before
- This has led them to experiment in an attempt to adapt/cope
- Understanding what leads them to experiment in this way is an important question for this project

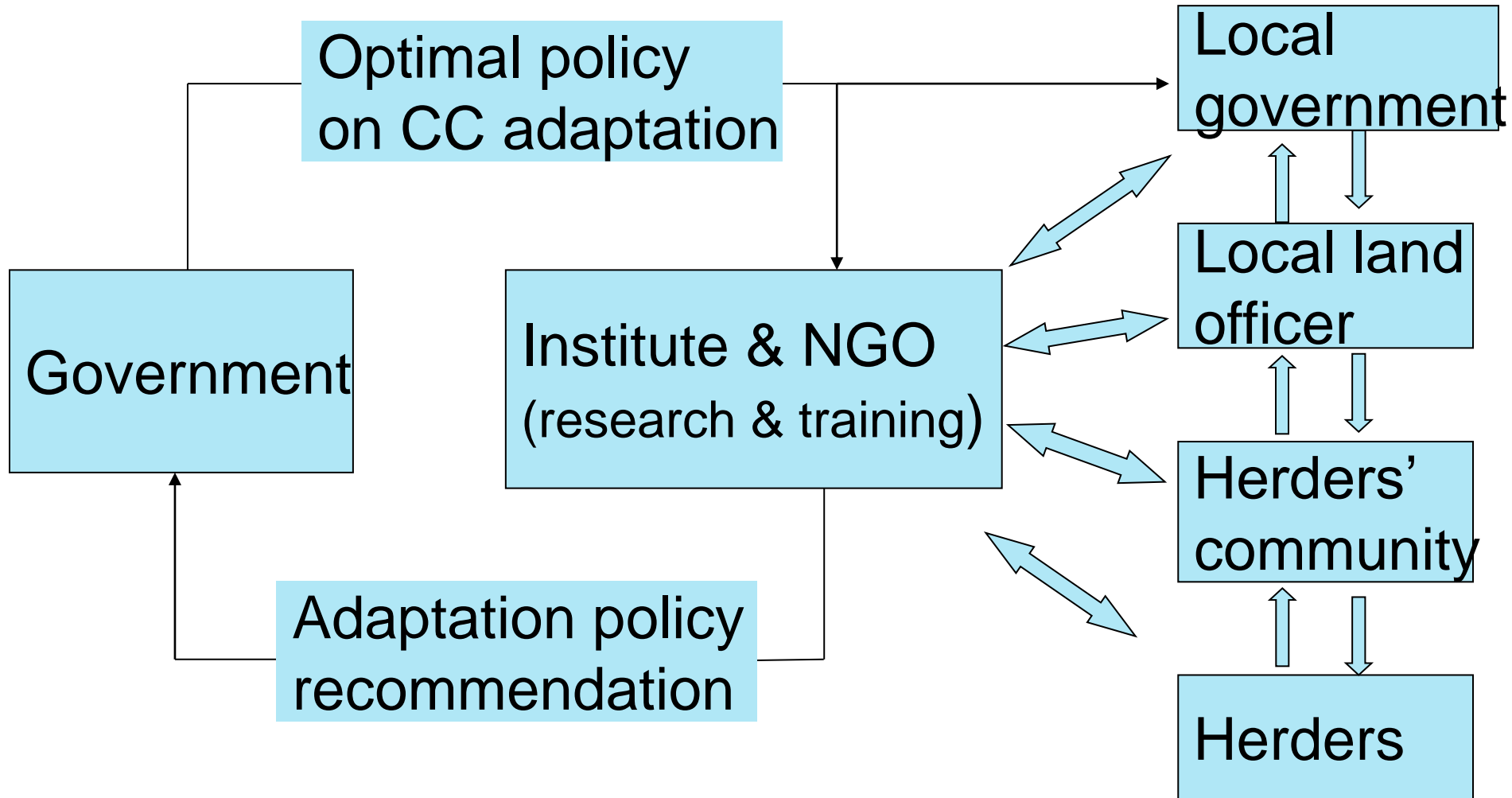


Importance of leadership in community dynamics

- In some communities, good leadership has been key to helping them adapt to social and environmental changes
- Leadership can also be a focal point for concentrating resources that aren't shared more broadly
- How can we use the positive aspects of leadership (technically and socially) and share these at multiple scales within the region in order to foster better leadership in this region?
- Most of what we heard about was a top-down style of leadership



Process to develop and implement adapted options of pastoral systems in Mongolia to climate change



SUMMARY

- Dryland systems are sensitive to climate and land use trends
- Socio-Economic changes are strongly affecting land productivity in the region
- Sustainability and recovery of ecosystems of the region depends on improved management institutions, environmental monitoring and forecasting technologies, and enhanced information exchange



THANK YOU

