

# **NEESPI research priorities for dry lands**

- 2. Environmental processes that directly feed back to the global Earth system and

- 1. Environmental processes of major societal importance

## Specific human dimension in Northern Eurasia

We had “managed” societies in Northern Eurasia and now *social shocks superimposed with environmental changes reduce the resilience of the societies of the region*

- Political system changed
- Land use rules changed
- Economics changed
- Infrastructure of social services unsupported

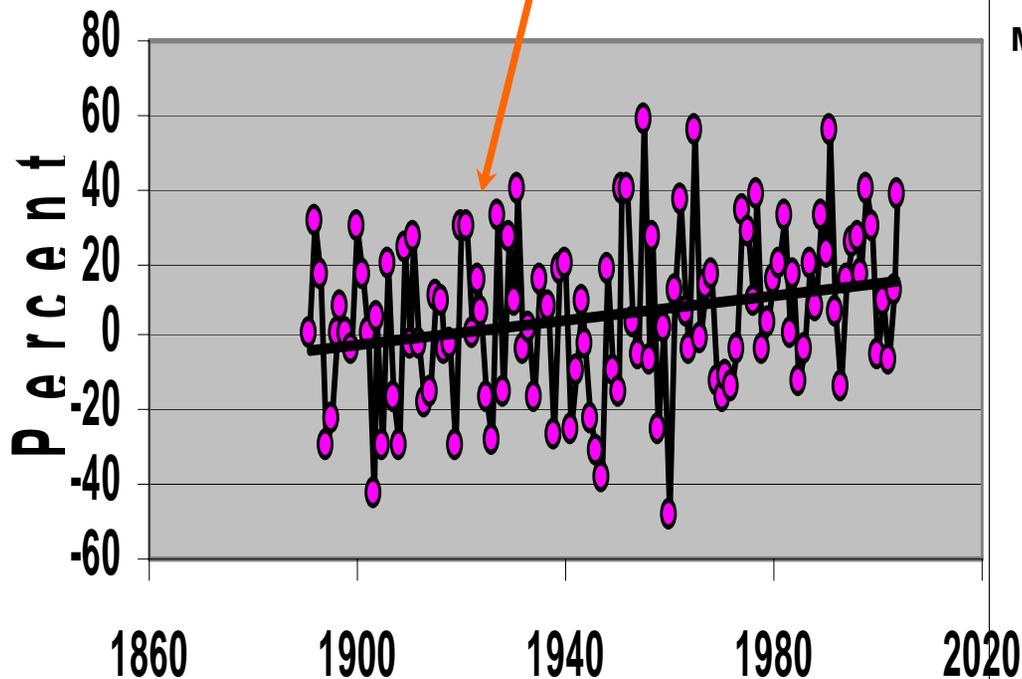
**Plus**

- “Hot spot” of climatic change
- Numerous feedbacks acting in uncertain ways

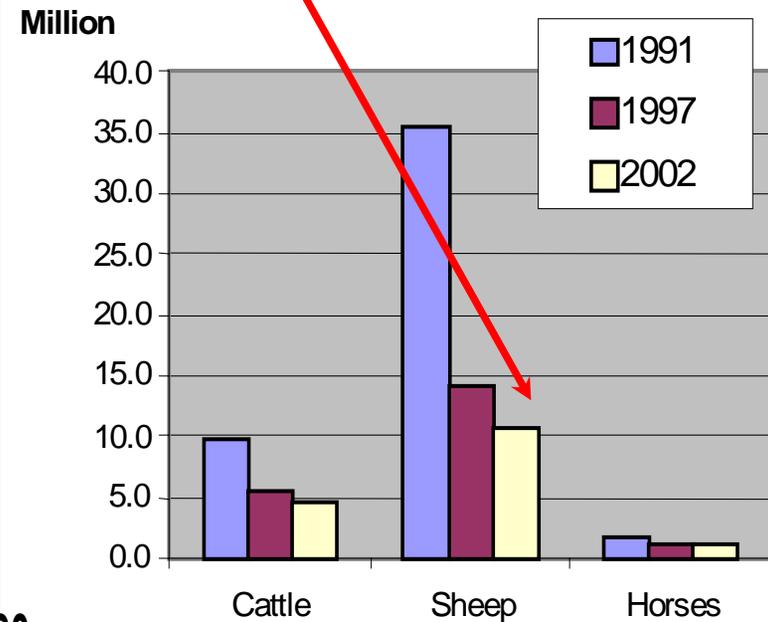
## Example: Kazakhstan.

Satellite data (Robinson et al. 2005) show steppe **greening**; socio-economic data show **decline**; and meteorological data show **regional drying**.

Regional drought index (Mescherskaya & Brazhevich, 1997, updated to 2004)



### Change in livestock inventory



# Example: Mongolia

- Livestock increases but its management was, is, and probably will be unstable
- Industrial production in the past 15 years
- Pressure on environment become near unbearable (may not be a result of “global warming”)
- Sociological surveys show a sizeable fraction of population wants to immigrate
- **What to do?**

# **Ongoing processes put society wellbeing and human health in harm way**



**Example: Increasing frequency of dust storms  
and increasing rate of soil erosion.**

Risks are increasing.  
Population is growing up.  
Water resources are scarce.

What to do?

How Science can help?

## **The overarching NEESPI science question:**

- **How do Northern Eurasia's terrestrial ecosystems dynamics **interact** with and alter the biosphere, atmosphere, cryosphere, and hydrosphere of the Earth?**

This question can be reformulated in a pragmatic way as:

- **How do we develop our **predictive** capability of terrestrial ecosystems dynamics over Northern Eurasia for the 21<sup>st</sup> century to support global projections as well as informed decision making and numerous practical applications in the region?**

## **NEESPI Deliverables:**

to have in ~10 years

- **A suite of process –oriented models for each major terrestrial process in all its interactions**
- **A suite of global and regional models that seamlessly incorporate all regionally specific feedbacks associated with terrestrial and social processes**
- **An integrated observational knowledge data base for environmental studies**
- **A system in place that can serve the emergency needs of the society**

# Role of the NEESPI FRC for dry Land Processes Studies

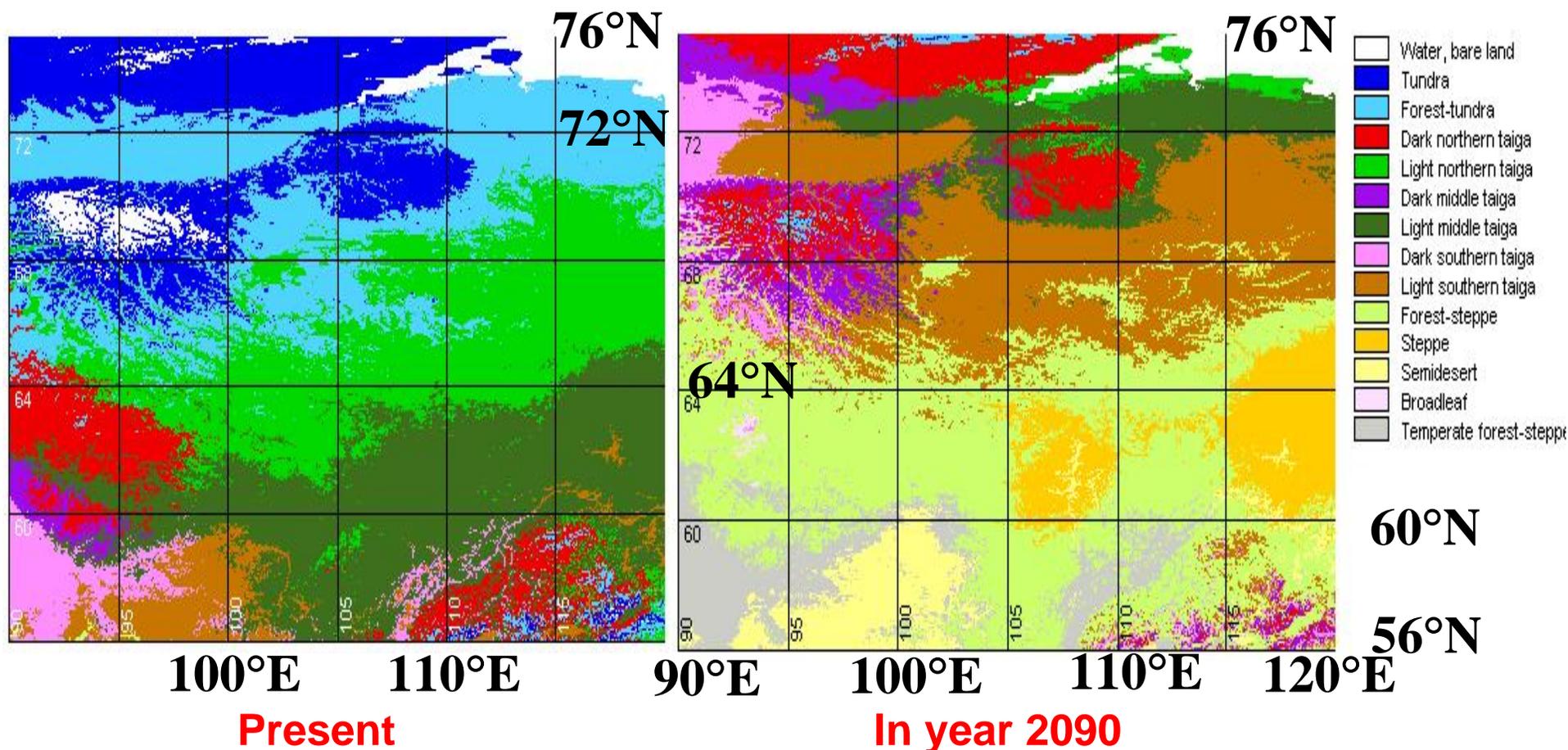
- Integrate the regional knowledge on environment and society
- Be a focal point, developer, and holder of a suite of models that incorporate all regionally specific feedbacks associated with terrestrial and social processes in dry regions of Northern Eurasia
- **Develop, promote, and implement models of sustainable development for each dry region of Northern Eurasia**

# **What about global feedbacks?**

***IPCC WG1 AR4 considers couplings between changes in climate system and biogeochemistry in a set of AOGCMs and there is a question:***

***What if we 'll need to re-do all assessments when the interactive biosphere will be included in Global Climate Models?***

**Ecosystems' changes projected for the future using HAD3 GCM. Projected land cover changes in Siberia are so dramatic that might require a re-run of the GCM with an interactive surface**



**Major ecosystems distribution in central and eastern Siberia (Tchebakova et al. 2003)**

# Major Role of the NEESPI FRC for dry Land Processes Studies

- **Develop and implement dynamic models of sustainable development for each dry region of Northern Eurasia linked to a suite of global and regional climate, hydrological, and environmental models and promote their results to decision makers**