Dauria Going Dry:

Adaptation to climate change in transboundary headwaters of the Amur River Basin

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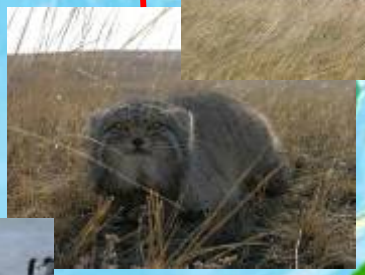
Dauria as ecoregion

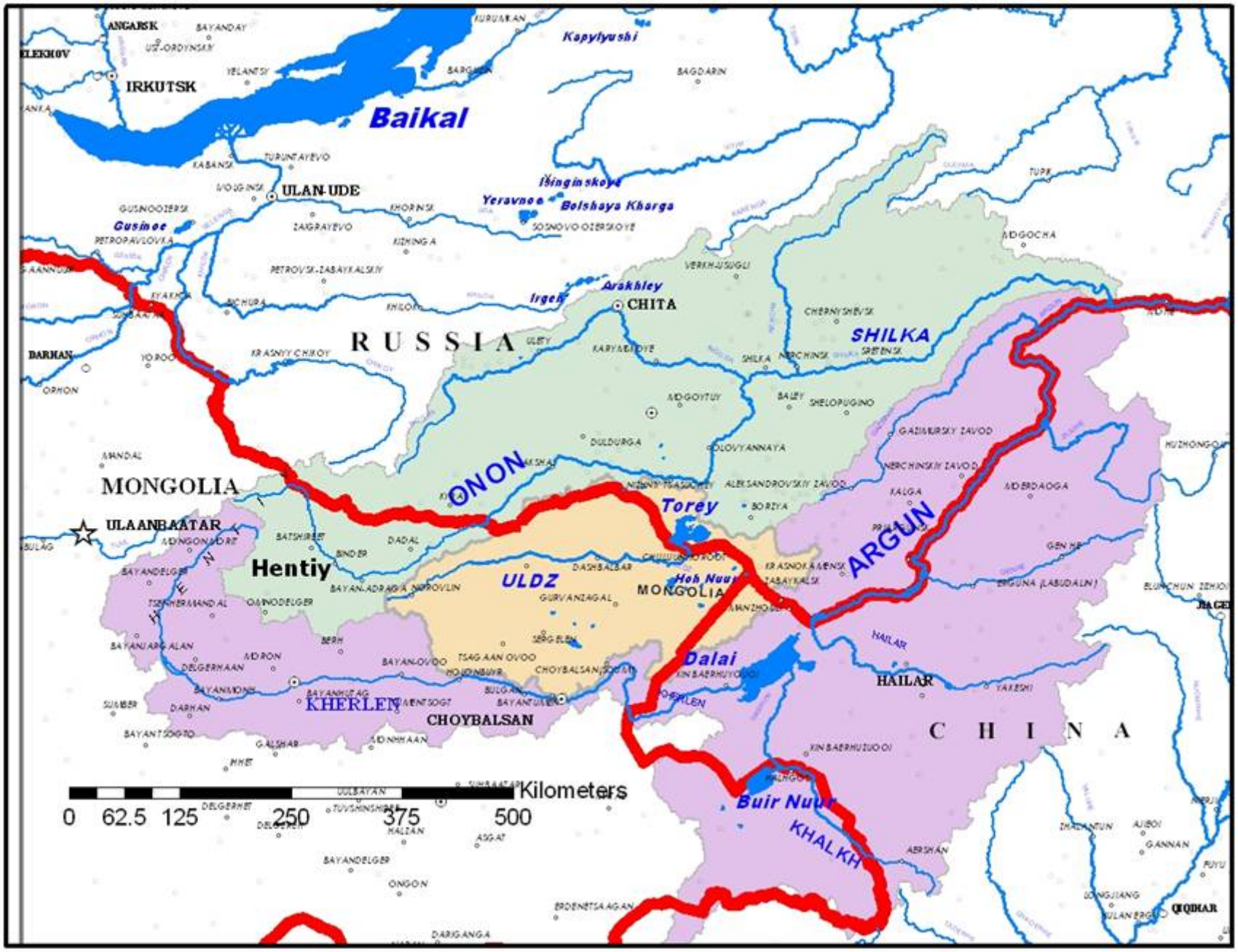
Global 200 Network



In 2000 World Wildlife Fund included Dauria steppes into the list of Global 200 – list of ecoregions of the planet, which have special importance for conservation life on the Earth.

Main routers of birds' migration via Dauria

TRANSBOUNDARY BASINS IN DAURIA



Dauria Going Dry:
adaptation to climate change in transboundary headwaters of the Amur River Basin

To develop and promote science-based adaptation measures to complex cycling climate of Dauria region

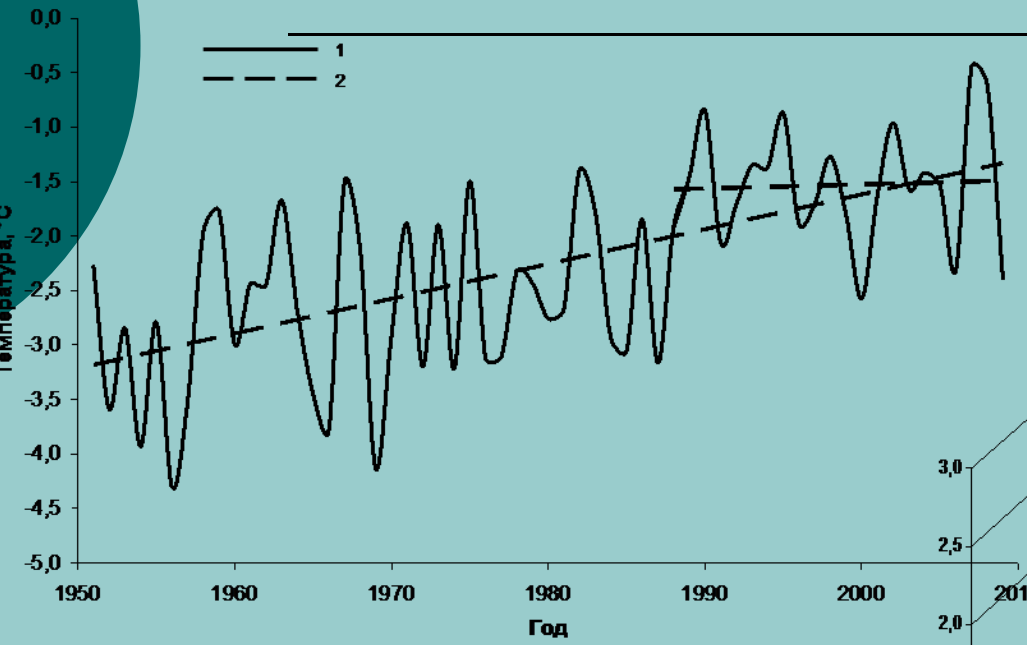
The aim is to harmonize transboundary river protection and management in Dauria by:

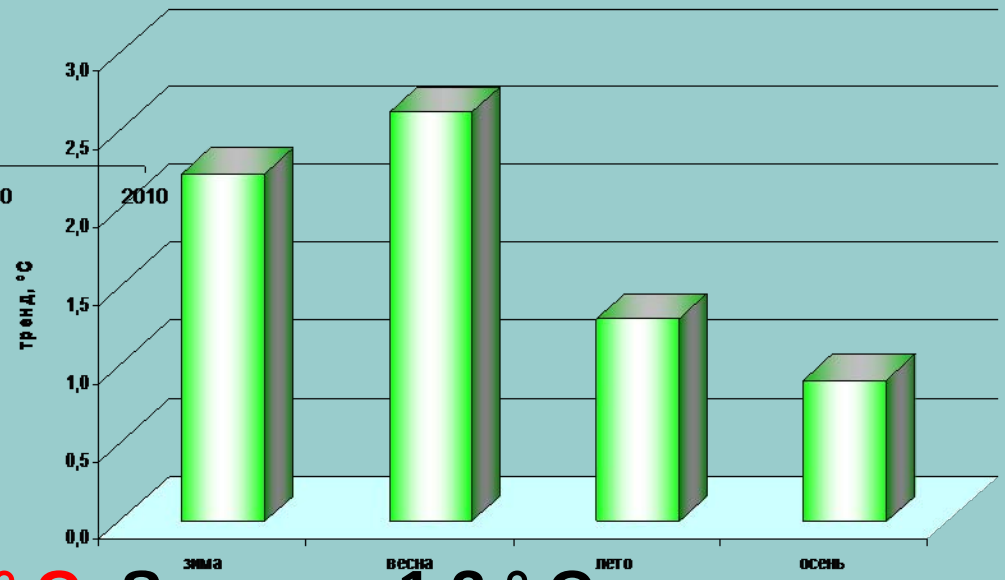
- Strategic assessment of river management options in the light of climate adaptation;
- Establishing wetland monitoring system in both Argun and Uldz basins;
- Enhancement of protected areas network as one of key adaptation measures;
- Awareness raising program on climate adaptation in transboundary Dauria

Project Partners:

- Dauria International Chinese-Mongolian-Russian Protected Area
- World Wildlife Fund - Russia
- International Crane Foundation
- East Asian-Australasian flyway Partnership
- International Red-crowned Crane Network
- Rivers without Boundaries Coalition
- Institute of Natural Resources and Cryology of Russian Academy of Sciences
- and a number of Mongolian and Chinese NGOs and researchers

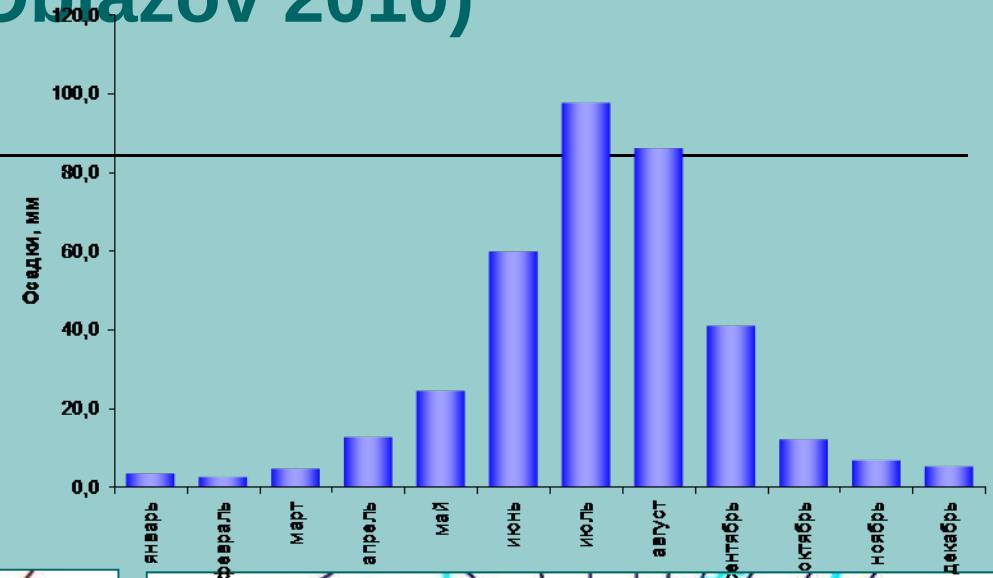
CLIMATE CHANGE ANALYSIS:
1950-2009 fluctuation of annual temperature in Russian Dauria (after Obiazov 2010)

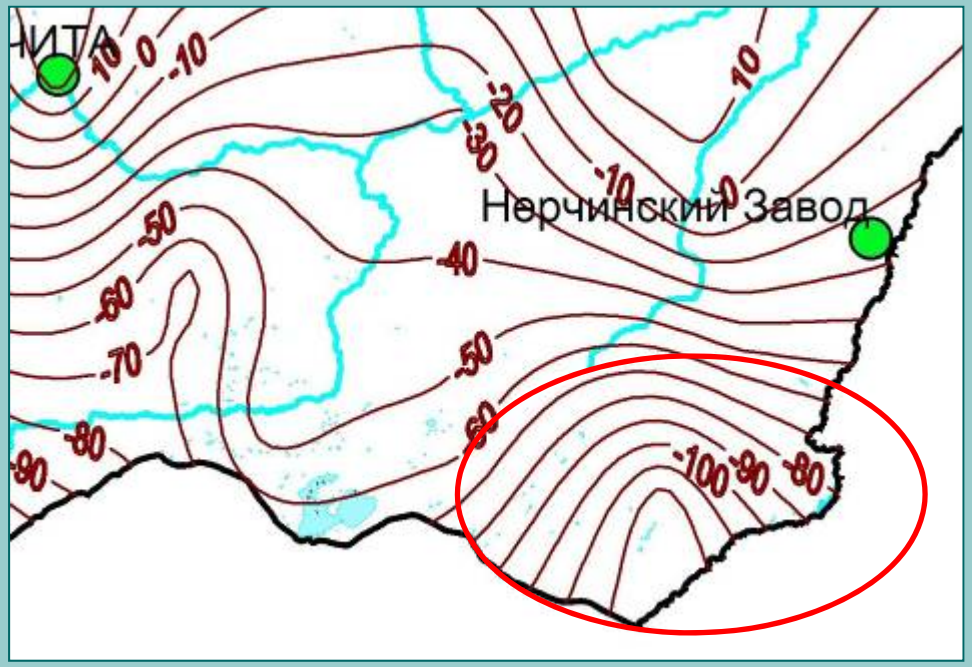


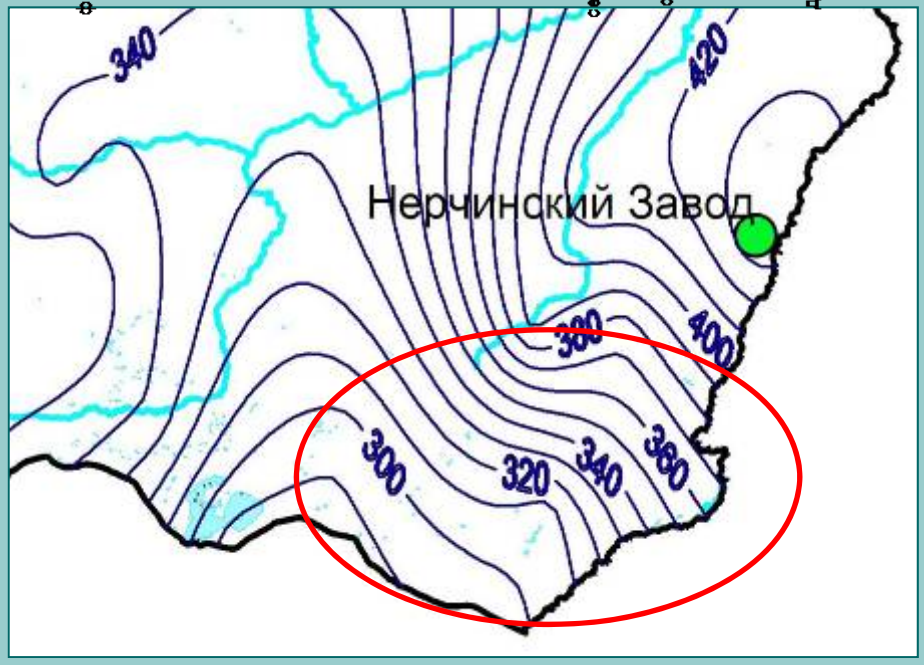


Total increase 1.9 ° C: Summer-1.3 ° C, Autumn- 1.1° C, Winter 2.4° C, Spring -2.8 ° C

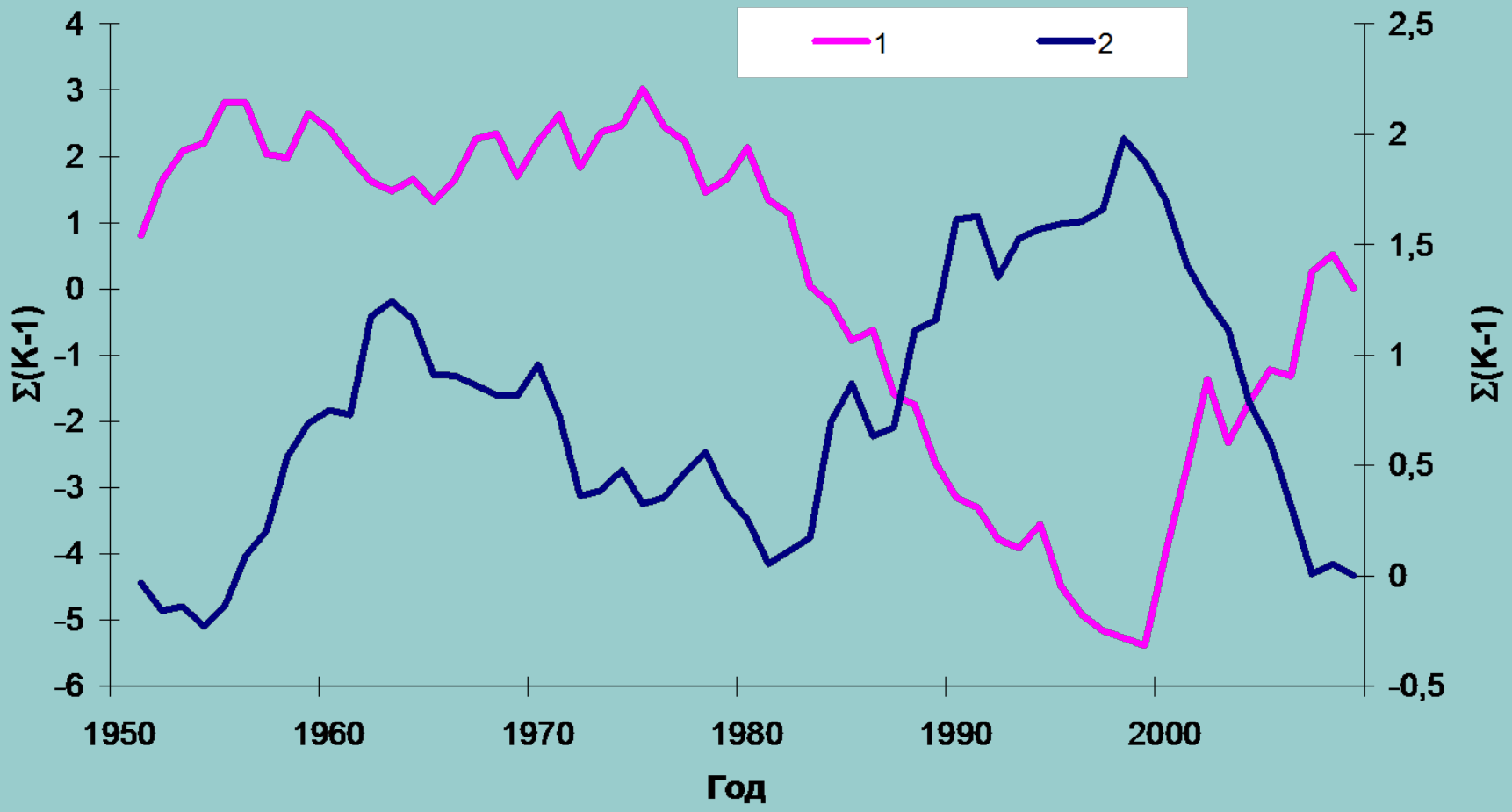
Change in annual precipitation in 1950-2009 (after Obiazov 2010)



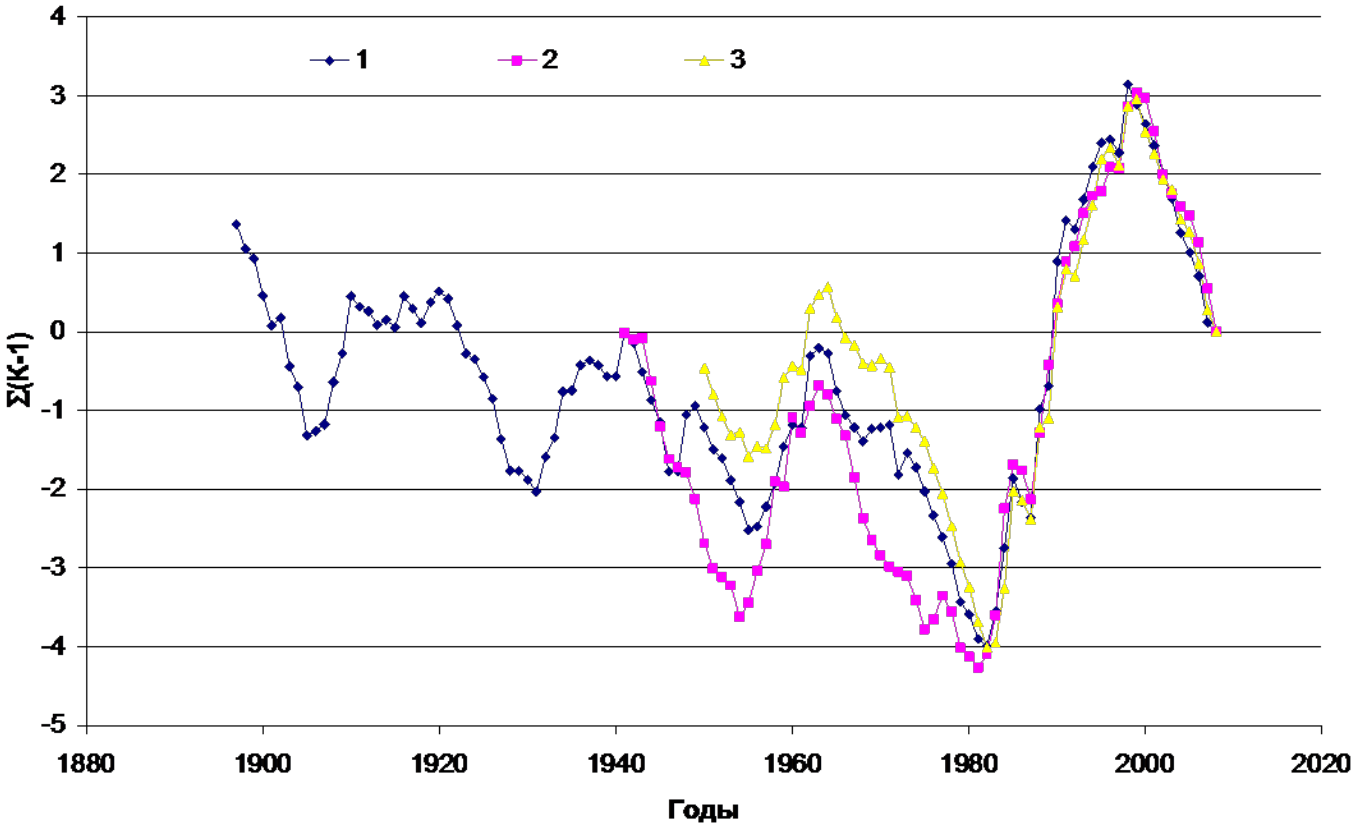




Cyclical change in temperature (pink-1) and precipitation (blue-2) since 1982 reinforces drought (after Obiazov 2010)

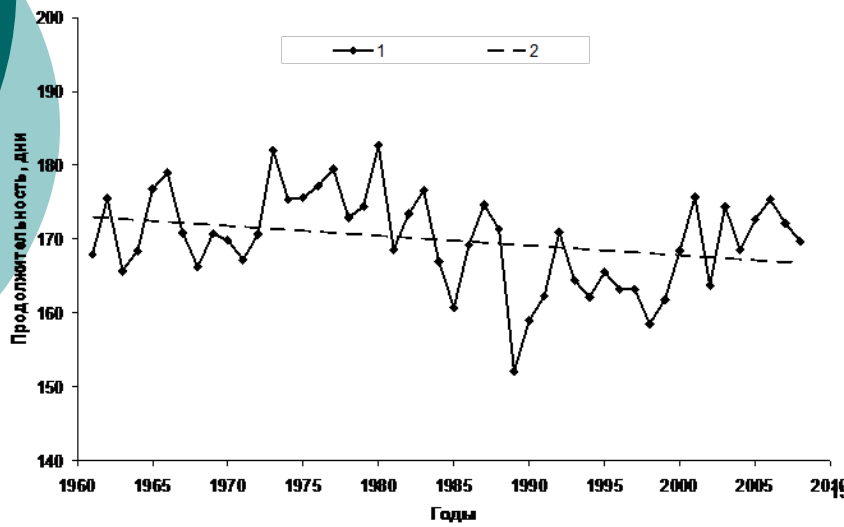


Change in annual discharge (integral curve) of Onon, Shilka and Argun rivers.

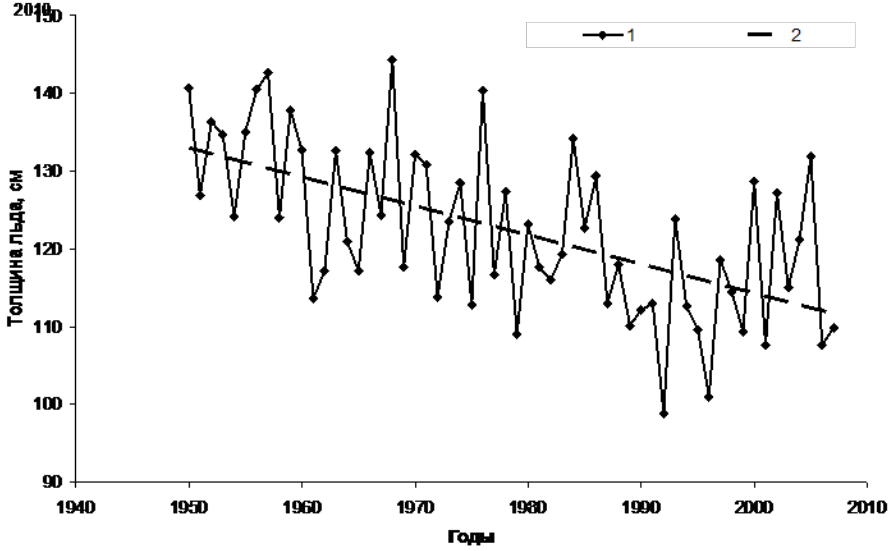


Decrease is also observed in flow rate from 1950 to 2009

Rapid change in water temperatures manifested in ice phenomena (after Obiazov 2010)

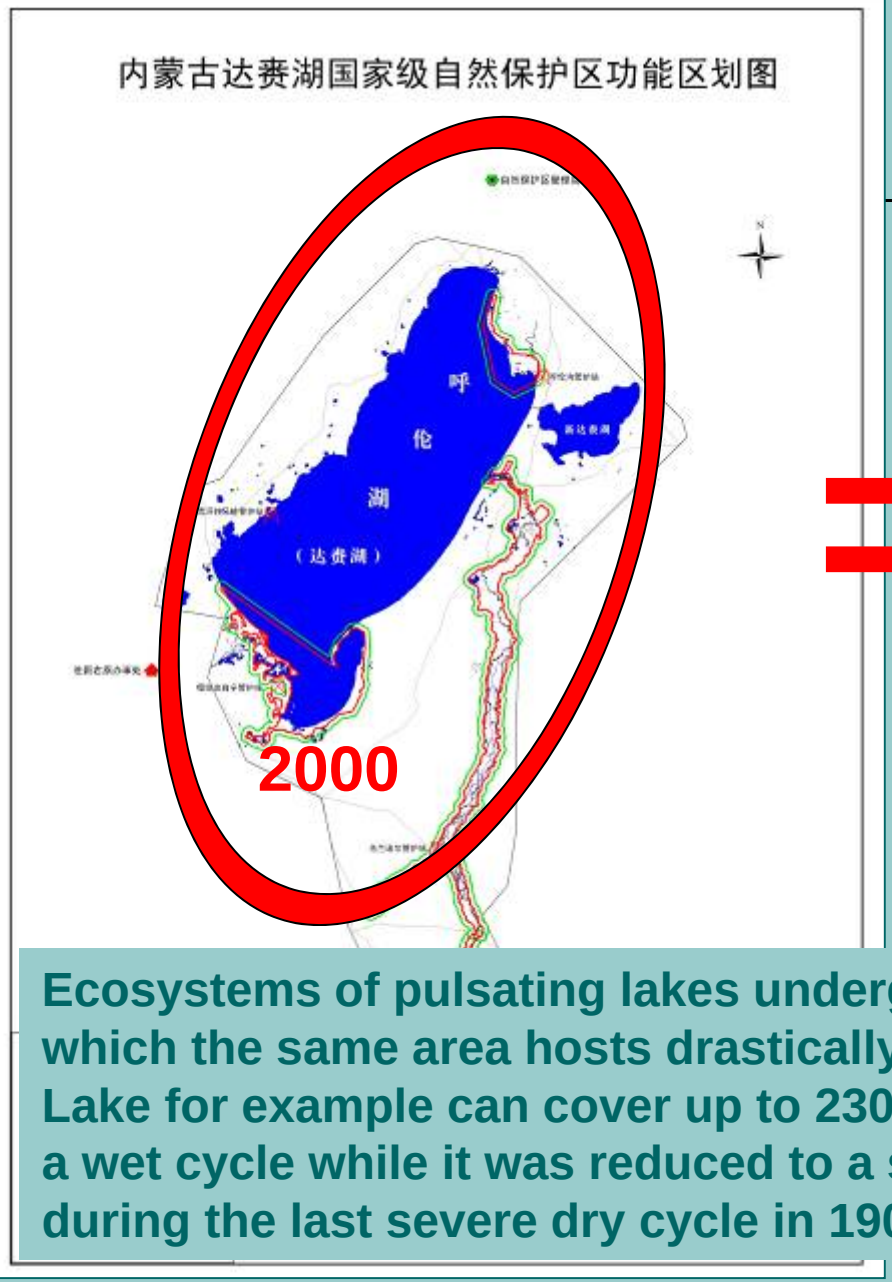


Ice-period shortened by 6 days since 1950



Average thickness of ice cover decreased by 22 centimeters

Dalai Lake has the same cyclical pattern



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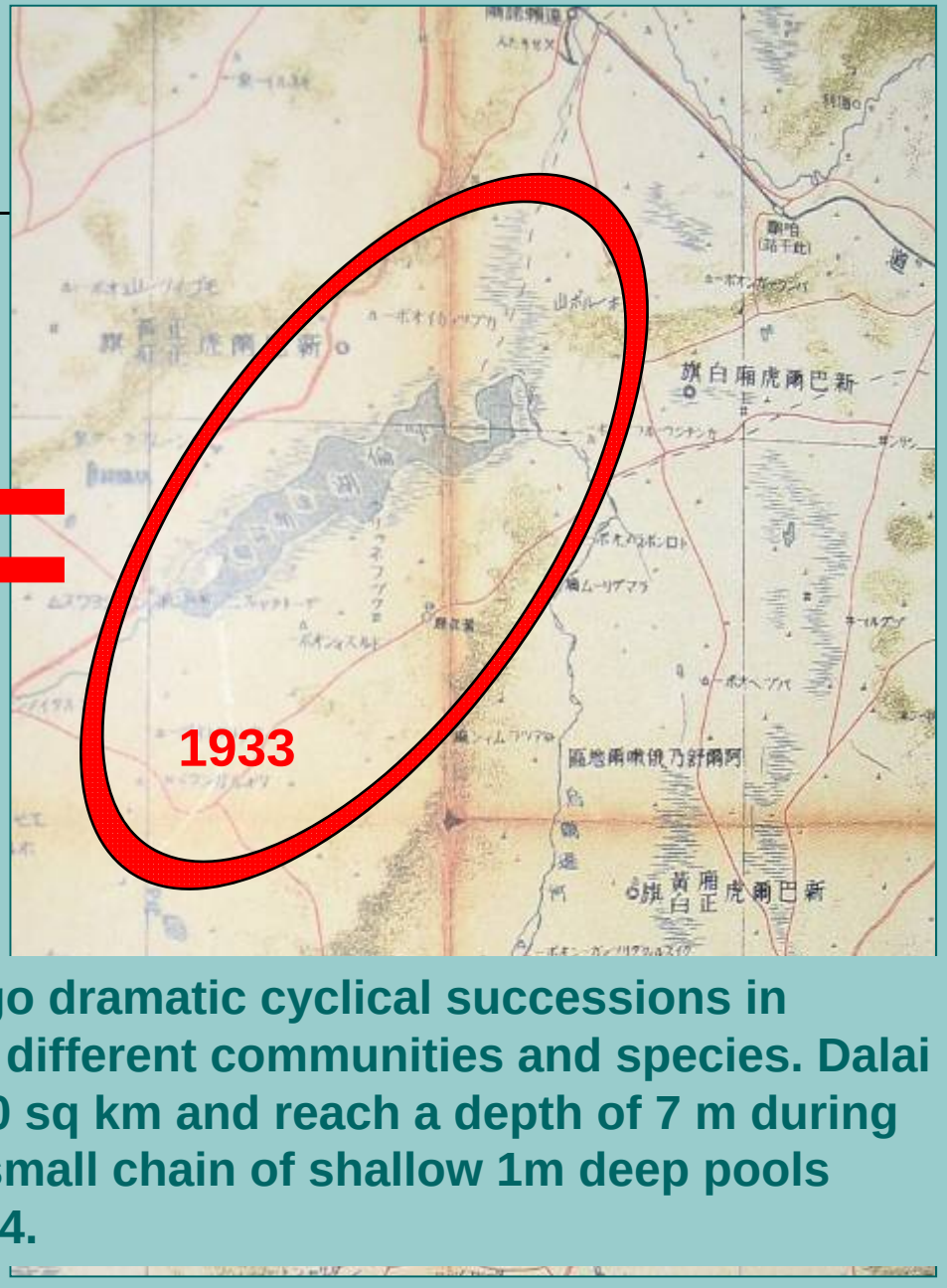
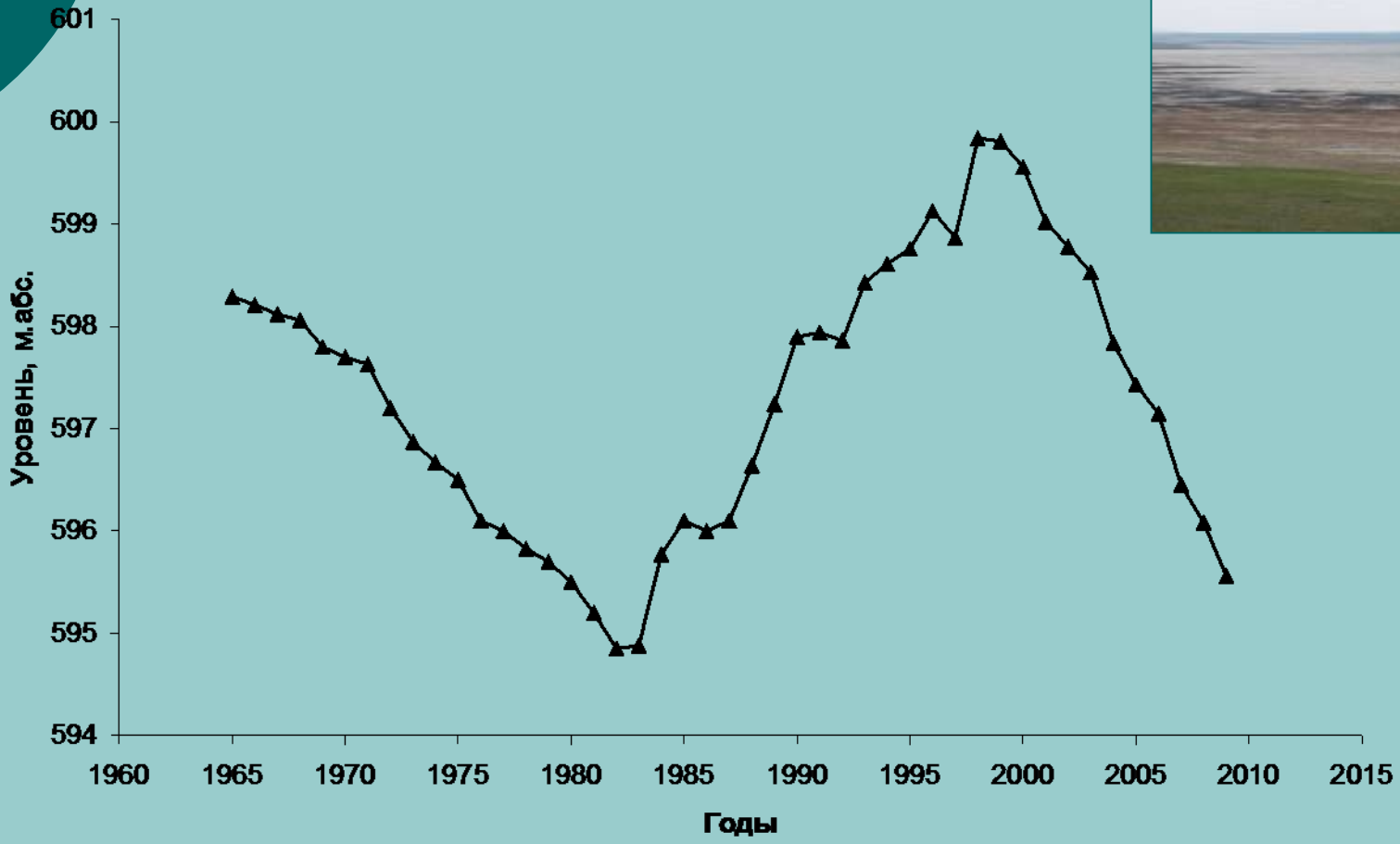
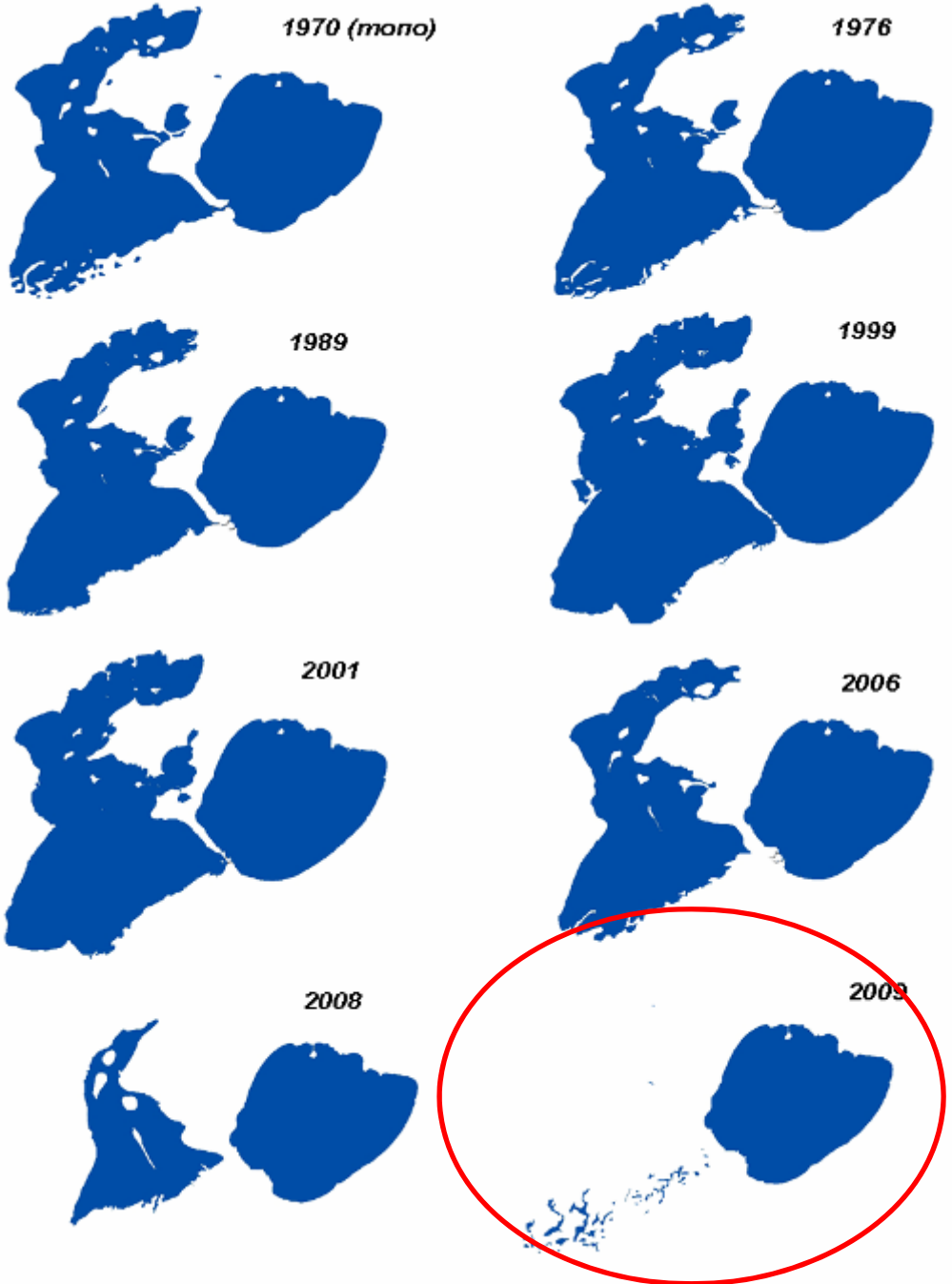


Ecosystems of pulsating lakes undergo dramatic cyclical successions in which the same area hosts drastically different communities and species. Dalai Lake for example can cover up to 2300 sq km and reach a depth of 7 m during a wet cycle while it was reduced to a small chain of shallow 1m deep pools during the last severe dry cycle in 1904.

Level of Torey lakes fluctuates in line with the cycle in precipitation and river discharge



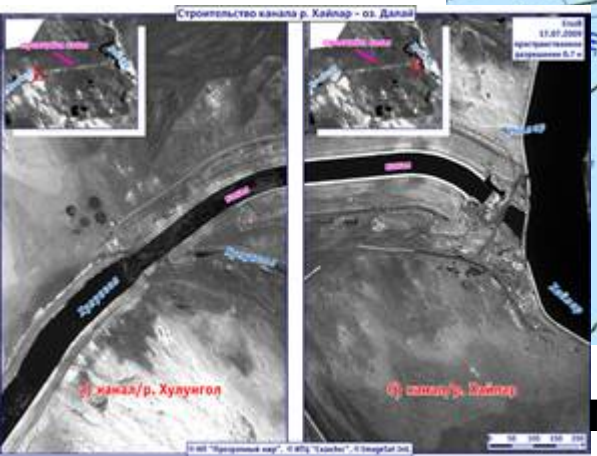
Torey Lakes dynamics



Uncoordinated development of water infrastructure – signs of lack of adaptation

New pipeline of China gold Co

Hailar-Dalai Canal Head



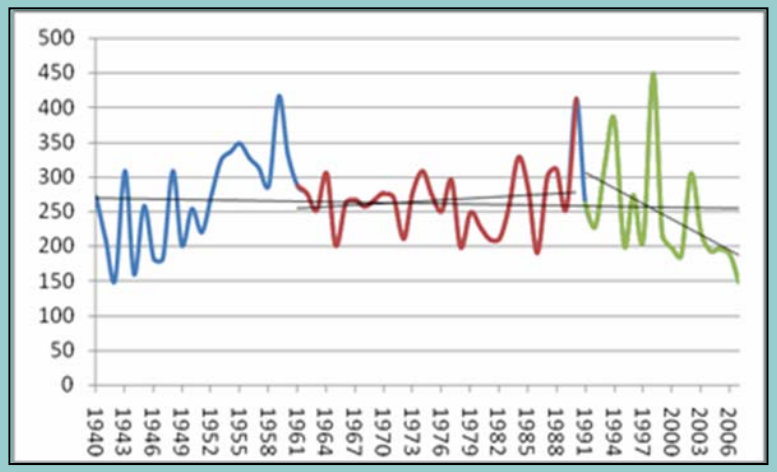
New canal from space

Reservoir on Yimin River

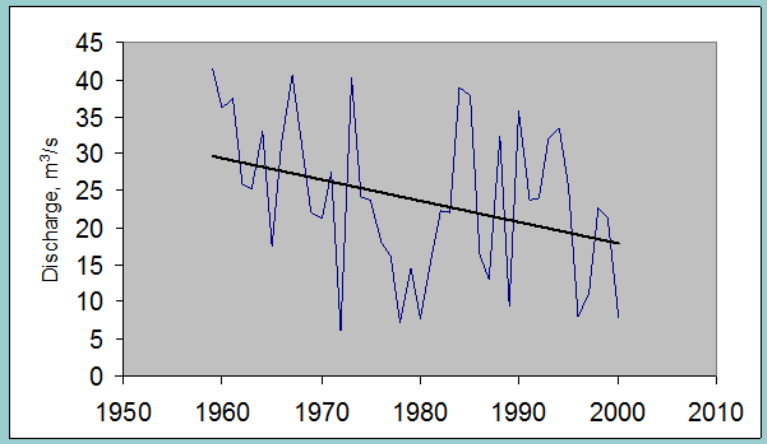
Mongolia: Future river runoff to changes by ECHAM A2 and HadCM A2 in % (after WWF Mongolia 2010)

	2020	2050	2080
Kherlen			
Echam	**-21.5**	**-22.8**	**-24.6**
HadCM	**-22.7**	**-15.7**	**-19.9**
Khalhgol			
Echam	**-23.3**	**-22.5**	**-21.4**
HadCM	**-25.4**	**-23.1**	**-23.5**
Onon			
Echam	**-17.5**	**-20.9**	**-21.7**
HadCM	**-10.7**	**-14.5**	**-13.7**

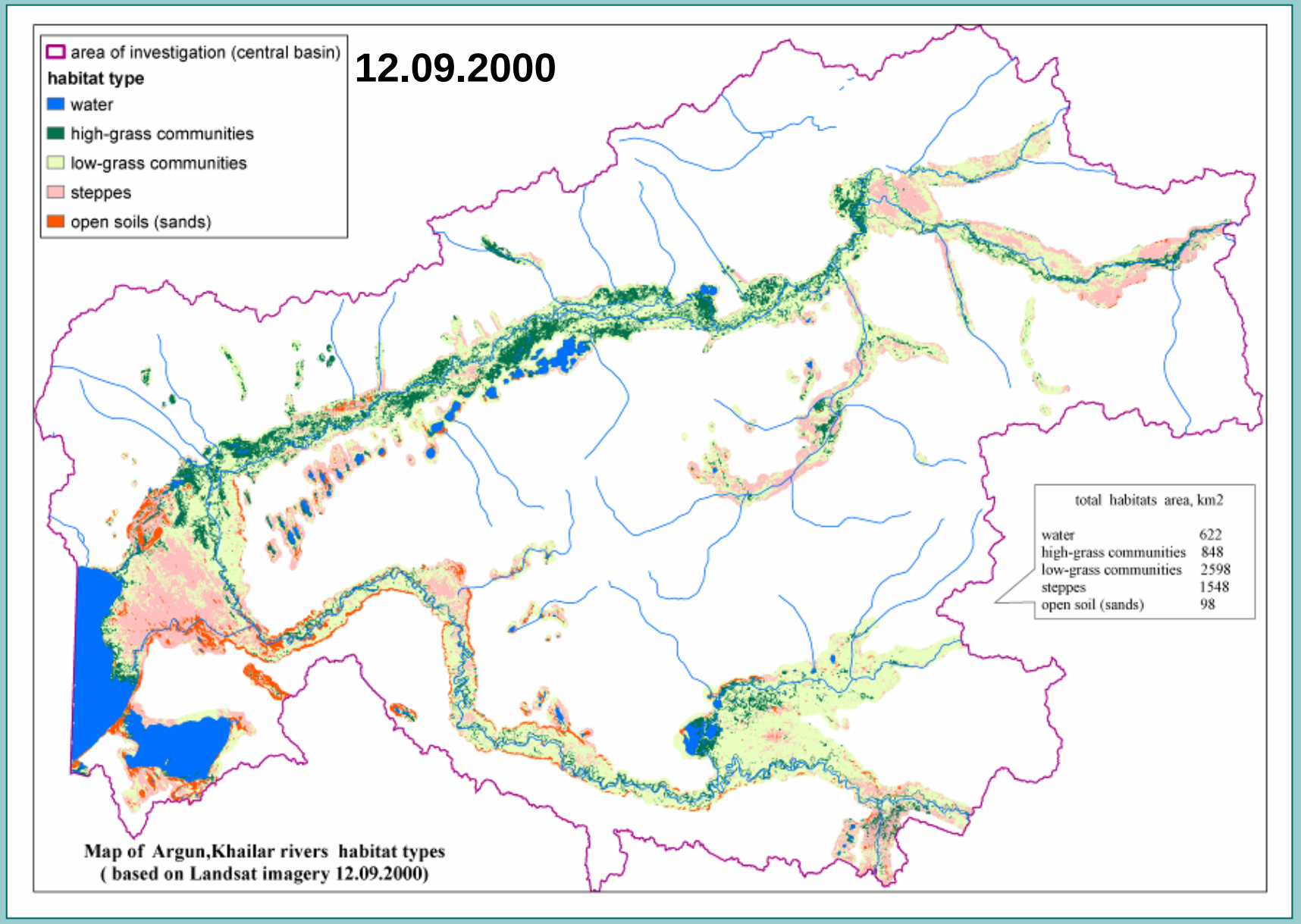
Annual precipitation trend in eastern Mongolia



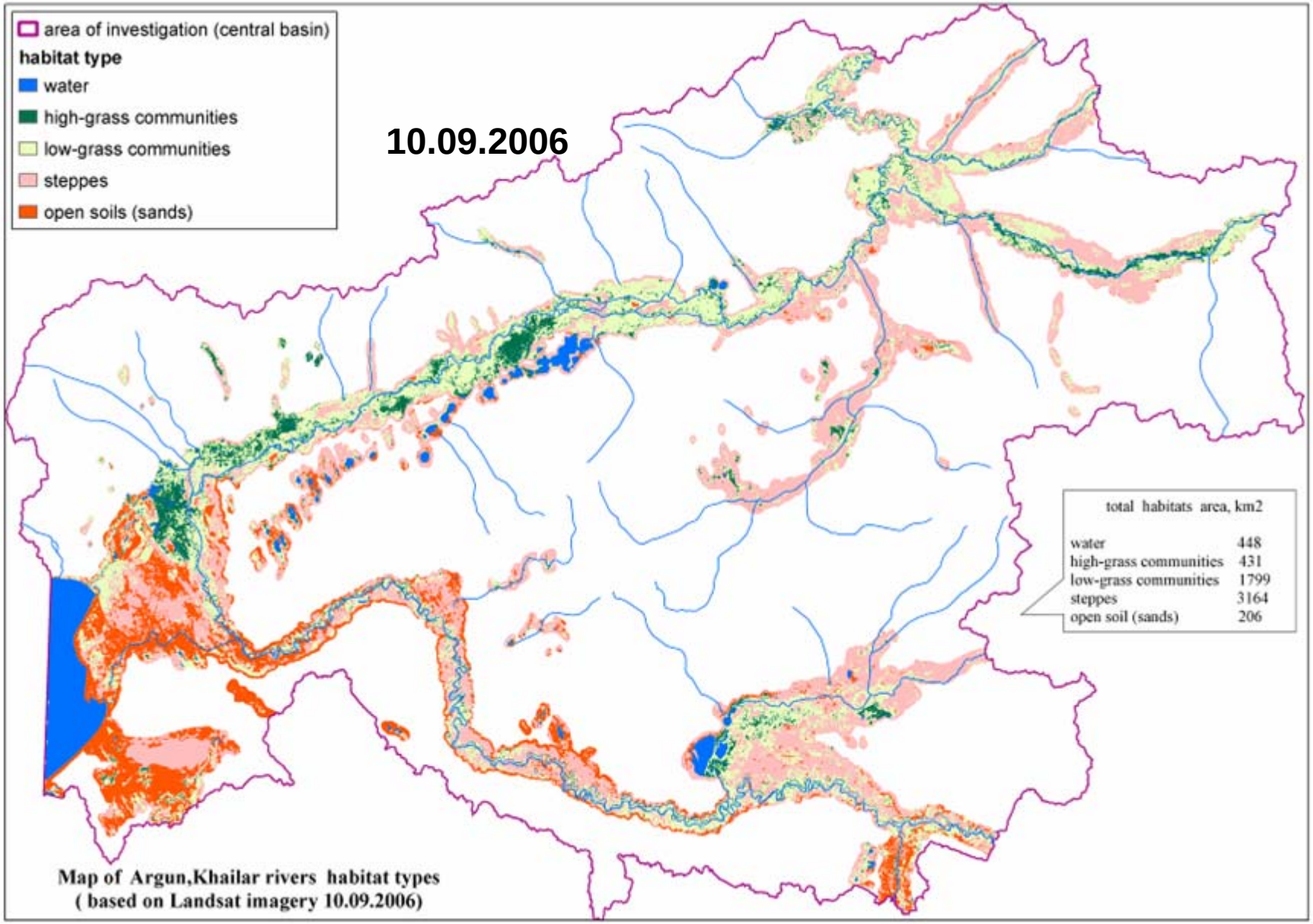
Trend of water resources at the Kherlen river



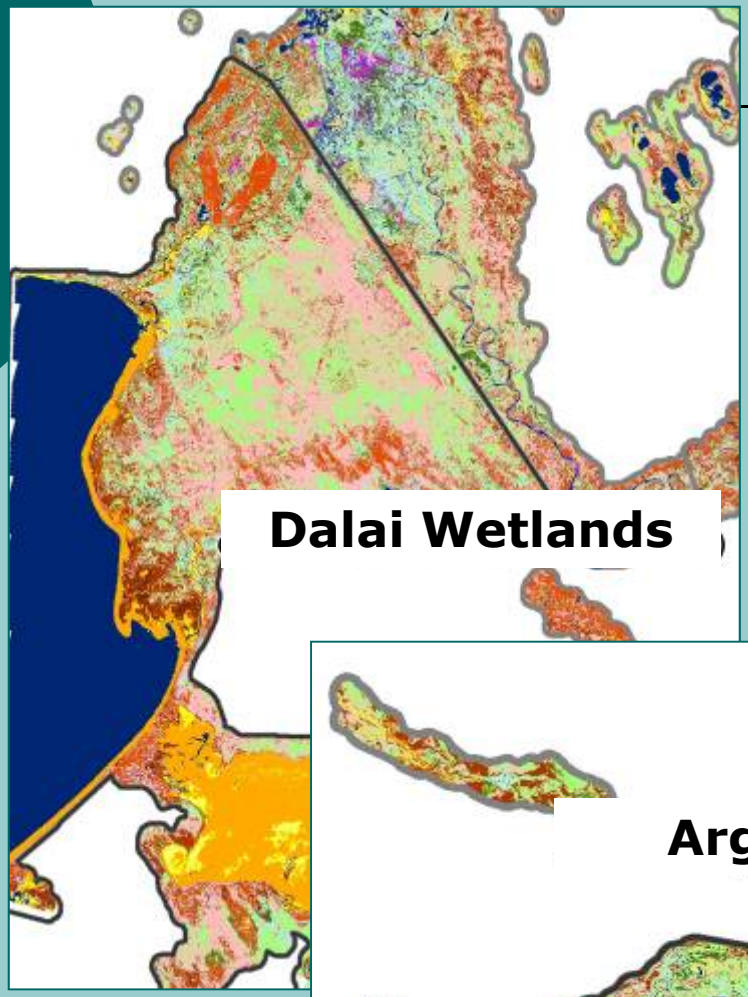
Natural climate cycles make ecosystems resilient
Comparison of 2000 and 2006 habitat maps



Comparison of 2000 and 2006 habitat maps

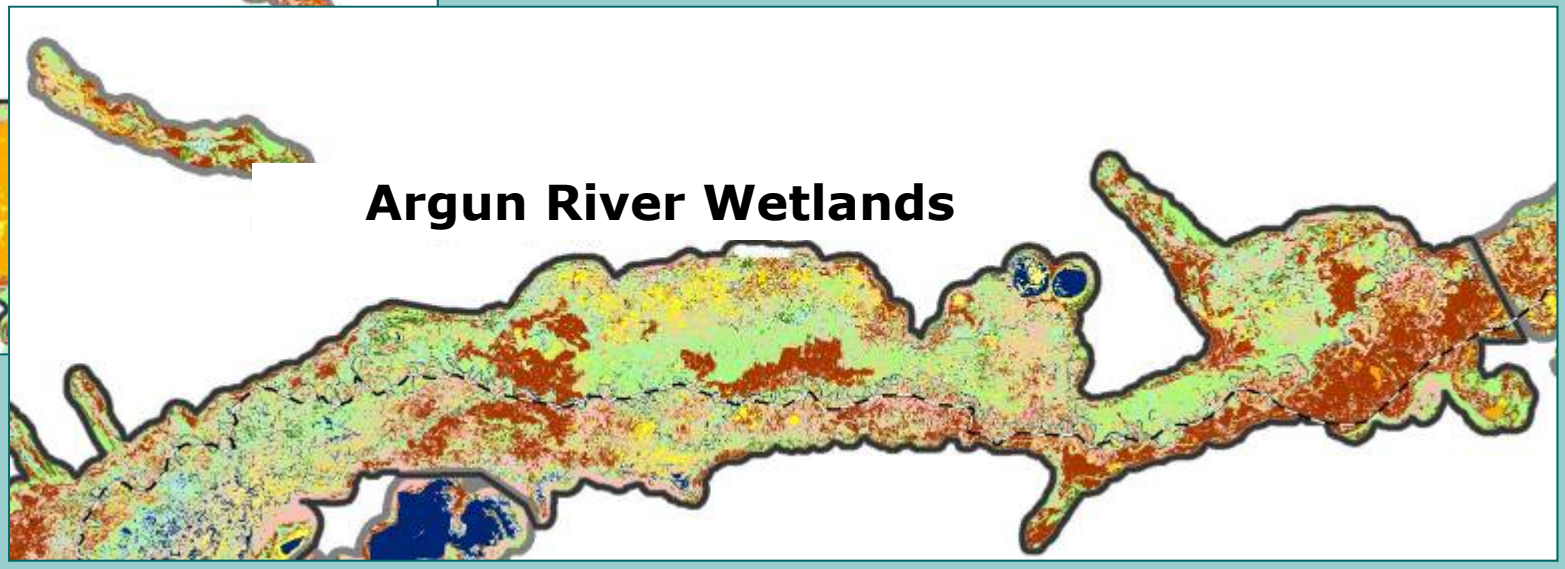


Argun and Dalai habitat change comparison 2000-2007



28% of Dalai Lake wetlands have significant change to drier communities.

31% of Argun River floodplain wetlands have significant change to drier communities.



Study area in Argun River Midflow.
Location of monitoring transects and data collection points

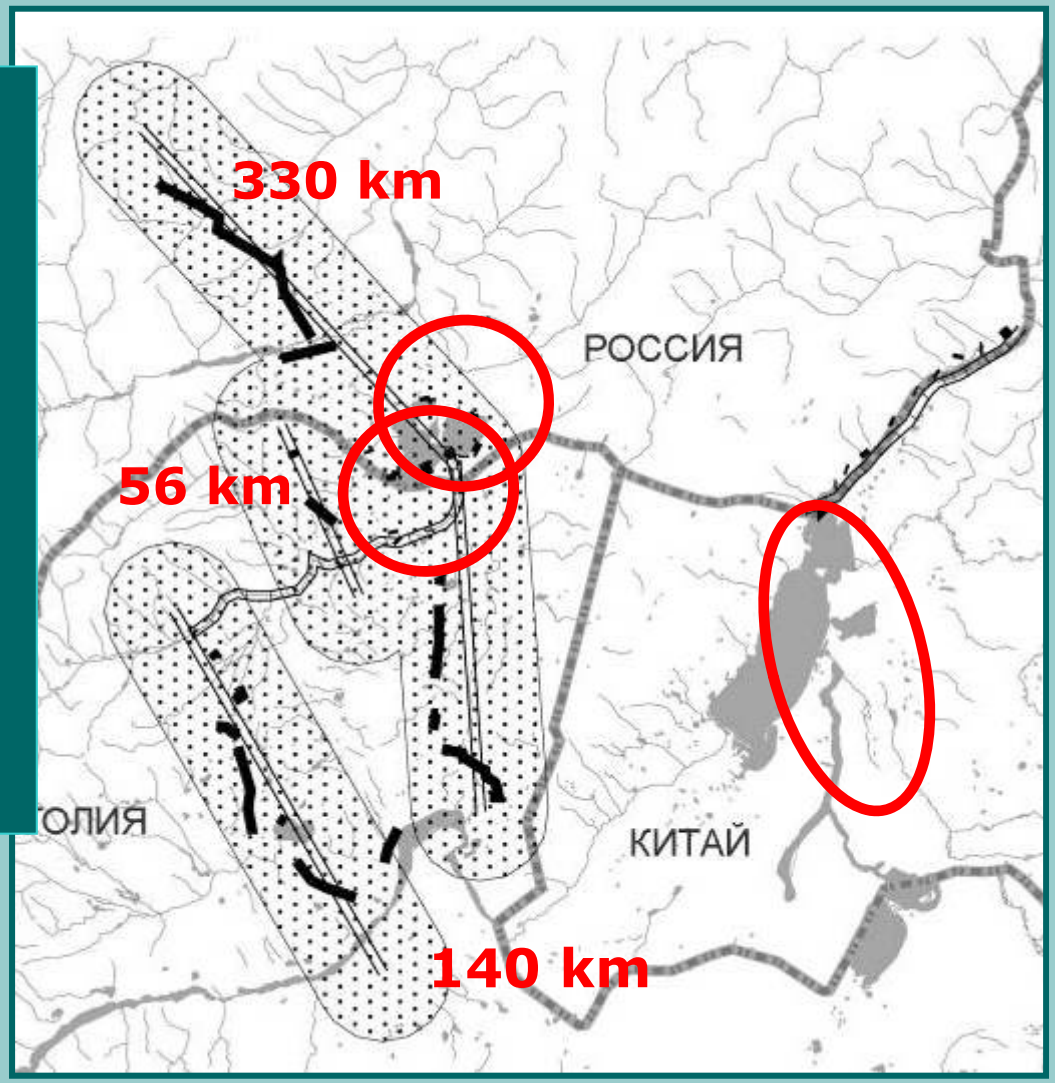
Monitoring network of Dauria Project

In 2010 we started to establish transboundary Ecosystem Monitoring Network and International Ornithological Station

Ecosystem Monitoring Network will include more than 100 monitoring sites (in 2010 we established 60 sites)

Ornithological monitoring;
Botanical monitoring;
Chemical monitoring of water;
Monitoring of anthropogenic pressure;
Ground photo monitoring;
Satellite images / GIS monitoring

Meteorological and hydrological monitoring data derived from state-run sparse hydrometeorological network - 10 stations



Main objectives of the transboundary Ecosystem Monitoring Network:

To study of influence of the global climate change and human activities on ecosy in transboundary Dauria ecoregion;

- *Adaptation of national and international natural resource policies in Dauria to climate change and development of measures for conservation of biodiversity and sustainable use of natural resources*

Difficulties encountered

- Very difficult communication with officials on China side, to the point they officially refuse to recognize that Hailaer (Upper Argun) is a part of transboundary watercourse.
- High level of uncertainty in prediction of future conditions due to simultaneous action of 30-year climate cycle and global climate change
- Lack of awareness on climate cycle and climate change among stakeholders: officials and local population
- Lack of funding
- Lack of automatic hydrological monitoring stations

Lessons learnt that could be of use for the other projects

Natural climate fluctuations indigenous to the area may mask presence of linear climate change.

- Change in water temperature may affect river ecosystems earlier than change in flow volume (loss of habitat of native species and invasions of exotics)
- Poorly planned human activities initiated in anticipation of climate change (including some adaptation measures) may drastically hurt ecosystem much earlier and more severe than consequences of actual global climate change
- Riverine wetland conservation is an essential component in any basin-wide adaptation Programme and should first of all focus on protecting natural refuges during most unfavorable climate conditions and sustaining environmental flows.

Need for technical support

- **Legal advice on international law that could be foundation for climate adaptation and water management cooperation with non-UNECE neighbors (Mongolia and China)**
- **Help in independent expert evaluation of some project-related materials (e.g. reports on climate change predictions , etc) and modelling of change in hydrology (if common methodology must be adopted in our pilot projects)**
- **Help with inexpensive modern methods of hydrometeorological monitoring**

Reflection on the Guidance: was it useful, in what respect, were any flaws or omissions found?

- Guidance is useful first of all just because its existence. Russian Guidance for Integrated Basin Management (SKIOVO) do not address climate change issues.
-Guidance is insufficient on freshwater ecosystem conservation measures as a part of basin-wide adaptation program. Section on key wetland habitat conservation and environmental flow norms should be added/expanded.


Thank you for your attention!