ASSESSMENT OF ENVIRONMENTAL CHANGES IN ARGUN RIVER BASIN WETLANDS DUE TO WATER INFRASTRUCTURE DEVELOPMENT.

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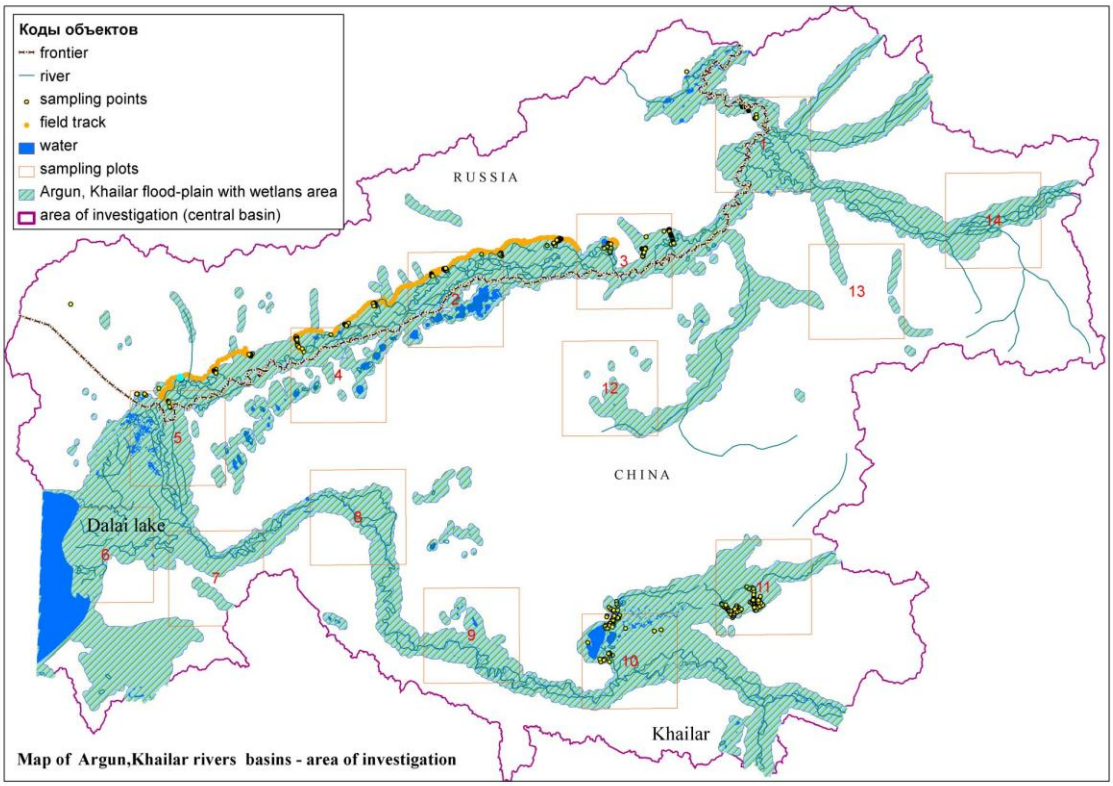
Abstract:

The Argun-Hailaer River straddles the China-Russia border in northeast Inner Mongolia (China) and Zabaikalsky Krai(Russia). The region has pronounced natural climate cycle with a span of 25-40 years, and has been affected by its drought phase for last 7-10 years. The wetlands that are supported by the Argun River and its tributaries provide habitat for breeding populations and internationally significant numbers of several IUCN Red List and migratory species, which are also found in the Ramsar wetland of adjacent Dalai Lake Nature Reserve. Natural dynamics of wetlands are threatened by several water transfer and reservoir-building projects in Argun River Basin. Proposed inter-basin water transfer from Hailaer River to Dalai Lake may lead to degradation of both Argun River and Dalai Lake wetlands, but justification in project's EIA claims that Argun River wetland ecosystems are much more resilient to environmental change than Dalai Lake. Validity of this statement could be indirectly checked through studying change in different wetland areas during last drought cycle.

Habitat mapping was undertaken on 5700 sq.km. of wetlands along with developing long-term monitoring transects in Argun River Valley. Wetland habitat change in 2000-2007 wass assessed for the whole study area; and changes in 1987-2007 were assessed on selected model plots.

Fig1. Map of study area, location of monitoring transects, proposed water infrastructure in Argun River
Midflow)

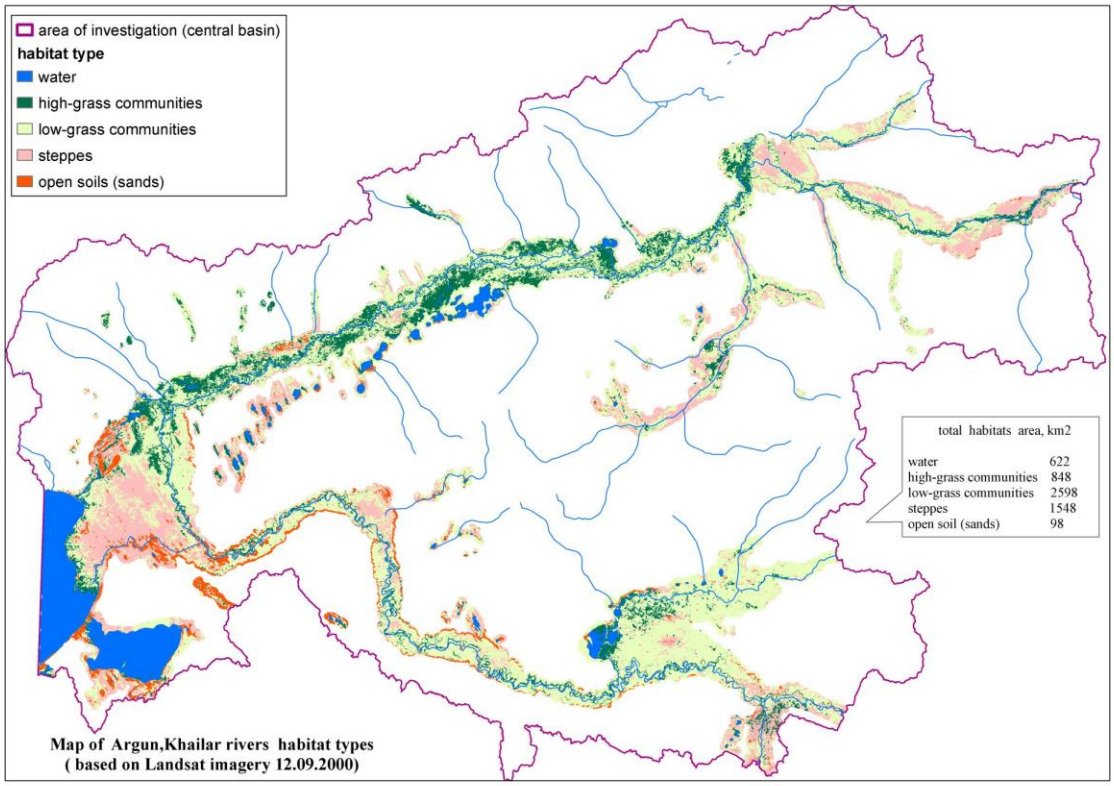


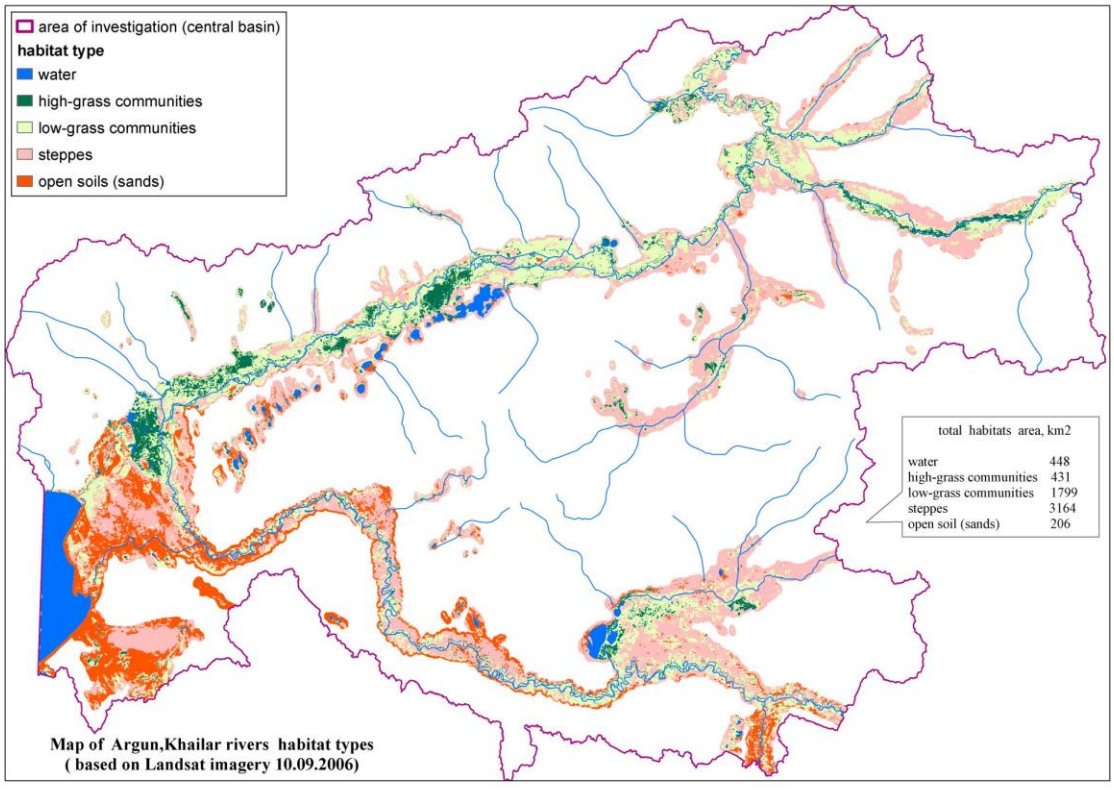
Project used Landsat TM/ETM+-donated by SCANEX Company(Moscow), Topographic maps 1:200000 and 1:500000, SRTM-relief model, field observations and standard botanical survey data. Methods included delineation of floodplains and other wetland areas, geo-referencing, classification of vegetation cover and change analysis based on combined non-supervised and expert methods, verification of classification by field data from botanical transects, statistical analysis, development of thematic maps.

FINDINGS: Factors influencing change in Argun wetlands include: climate fluctuation, water pollution, annual wildfires, overgrazing, soil erosion, fragmentation of habitats, water withdrawal and planned water transfer.

All wetland land cover was divided into 8 classes of habitats roughly corresponding with gradient of humidity/density of vegetation. Change analysis from 2000 to 2006 has shown that significant changes occurred over 31% of study area and within those zones of significant changes 82% shifted towards dryer conditions. (Fig 2. Comparison of 2000 and 2006 habitat maps).

Fig 2. Comaprison of 2000 and 2006 habitat maps





Change analysis in model plots over 15-20 years period also shows trend towards drying, but in some plots habitats shift to more humid conditions, which is most common in areas most affected by flooding and meandering processes. These processes sustain ecosystem dynamics, diversity and structure in floodplains.

Changes occurring in wetlands in 2000-2006 were classified in 15 change patterns, with leading reasons investigated for each change pattern. **(see Fig 4. Generalized map of change patterns from 2000 to 2006 and Table 5).**

Fig 4. Generalized map of change patterns

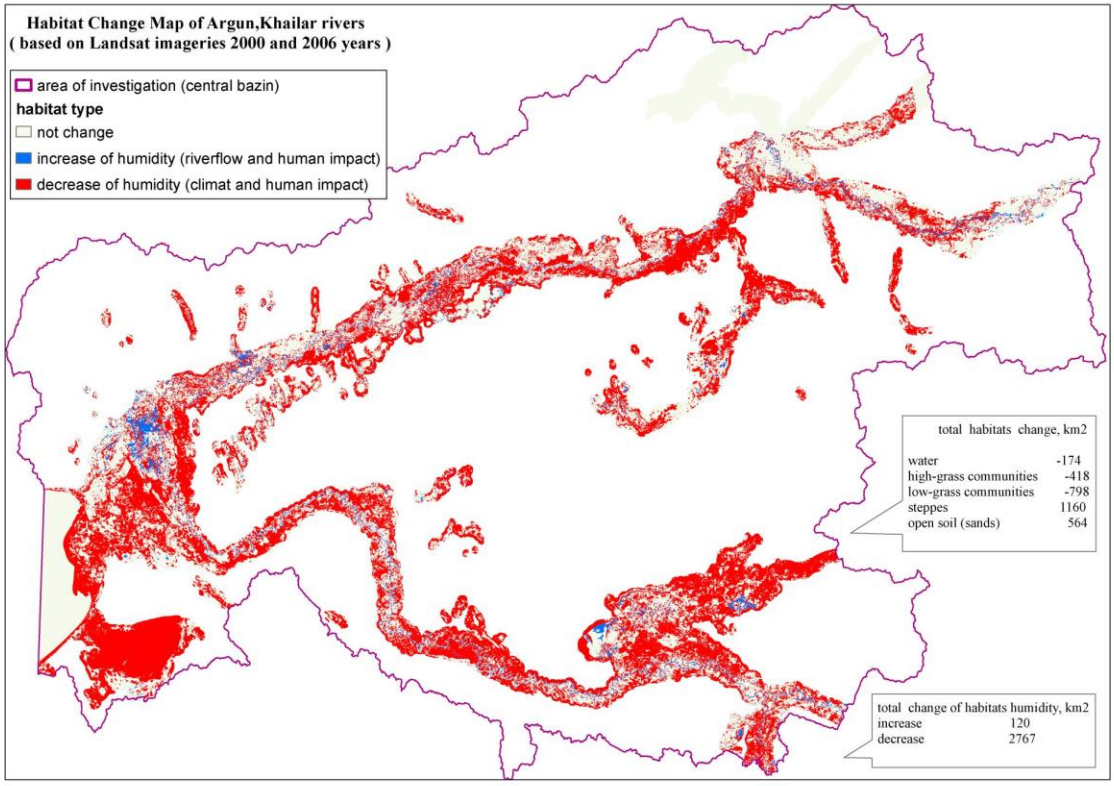


Table 5. Change patterns from 2000 to 2006 for the total study area and 3 distinct wetland areas within it.

	Wetland areas:	All wetlands		Dalai Lake (Hulungou)		Argun River Floodplain		Three rivers delta		Possible leading reasons
№	Type of process	ha	%	ha	%	ha	%	ha	%	

1	**Insignificant decrease in grass cover (humidity)**	167733	29	26597	23,8	23439	28,1	4250	21,2	Insignificant changes/ within error limits/
2	**Insignificant increase in grass cover (humidity)**	47112	8	5736	5,1	7031	8,4	2933	14,6	Insignificant changes/ within error limits/
3	**Dessication. Meadows change to bare surface**	51075	0,8	1474	1,37	208	0,24	10	0,05	Drought/dessication/ , wind erosion/ dune development, human disturbance.
4	**Water retreats. Development /exposure of open substrate (sand,etc. wet mud,etc.)**	22120,	3,8	17928	16	718	0,86	107	0,53	Drying of lakes -retreat of water/ nude riverbanks in meandering process
5	**Grass overgrowing former waterbodies**	12488,	3,8	2123	2,6	4028	7,06	714	4,7	Result of drought in places with high water-retention capacity. Meandering
6	**Abrupt/strong decrease in grass density**	85020	14,9	7848	7	17008	20,4	2037	10,1	Drought, strong dessication, recent hay-cutting, overgrazing. (also could be most affected by fires)
7	**Water bodies colonized by wetland plants/ dense vegetation**	3842	1,6	807	1	1016	2,7	182	1,3	Retreat of water due to drought
8	**Water covering previously bare substrate / sparse vegetation**	984	0,1	113	0,1	19	0,02	25	0,12	In river –meandering
9	**Water covering grasslands**	922	0,2	28	0,0	45	0,05	47	0,23	Human-induced inundation near infrastructure
10	**Wetland vegetation replacing grassland and bare soil**	1550	0,3	65	0,05	104	0,12	38	0,19	Human-induced inundation near infrastructure
11	**Grass density increase. Grassland developed in place of bare soil/sparse vegetation**	23165	4	2878	2,55	3794	4,5	2074	10,3	Various reasons: floodplain dynamics, not yet cut hayfields (cut in 2000 image), Human-induced inundation near infrastructure, natural phenology
12	**Water in place of wetland vegetation**	4528	0,8	132	0,11	756	0,9	227	1,1	Change of depth or other conditions in water body.
13	**Wetland –no change**	41091	7,2	2388	21,4	2992	3,5	412	2	
14	**Grassland no change**	136838	24	15194	13,6	22042	26,4	6965	34,7	
15	**Bare land no change**	16666	2,9	6658	5,9	129	0,15	18	0,09	

Comparison between Dalai Lake and Argun River Floodplain has shown that both wetland areas have similar percent of territory undergoing drying (28% and 31% respectively). During the drying phase of climate cycle the leading change pattern for lakes is fall of water level with vast areas of bare substrate being slowly colonized by halophytic

vegetation. For floodplains in the same phase the leading change pattern is dessication/degradation of dense meadows and reed beds, which is reinforced by fires and overgrazing. Hydrologically much more stable Three River Delta floodplain shows yet another set of change patterns with only 16% of territory drying. (see Table 5)

Our initial research shows gross inaccuracy of claims that Argun River floodplain wetland ecosystem is highly resilient to human and natural impacts on hydrology. It has similar degree of change during drought as Dalai lake, but recovery and persistence of its floodplain ecosystem is more dependent on flooding dynamics, which would be severely altered if water transfer project goes ahead. Therefore any such project changing hydrology of transboundary watercourse in globally important wetland should be subject to bilateral Sino-Russian study and assessment. More extensive cooperation on situation analysis and longer-term monitoring is needed to make comprehensive recommendations for adaptation of land-use and conservation measures in Argun River wetlands to local fluctuating climate.