

LAND USE CAUSED WATER CONTAMINATION ANALYSIS, PREVENTION AND SELF-PURIFICATION POTENTIALS (LUCWACA-PSP) WITHIN THE SELENGA-BAIKAL RESEARCH



(Status quo analysis and proposals for a sustainable and integrated land use and water management in the Baikal Region)

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General Objective

In the proposed project we emphases on

- the analysis of the land use caused matter input into the Selenga River,
- the interaction with the water quality
- in different sections of the Selenga River, including the Selenga-Delta.

In addition to this status quo assessment a survey

- for prevention and
- for self-purification potentials
- at different land use levels (units)
- and different river basin levels / sections will be carried out.



History of land use influences on Lake Baikal and its environment



Introduction State of the art



Objective 1) Land Use Analyses (including stakeholders)

Research Approach 1) Different kinds of land use

Kinds of land use

- Pasture land
- Arabe land
- Mining land
- Settlements
- Industry
- Forestry
- Protected areas
- Tourism

Meth. (Resp.) of data coll.

- Landsat (MR, UU)
- Google Earth (MR, UU)
- QuickBird (MR, UU)
- Statistics (UU)

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- Atlases (UU, MR)
- Field survey (UU,MR)

Spatial Units

- Rep. of Buriatia
- Districts
- Rayons
- Selenga Catchment
- S. Tributary Catchm.
- Selenga Sections
- Test sites (river, delta)

Matter storage potential Matter emission potential

percentages of land use / per spatial unit





Objective 2) Ways of matter input [point, non-point polution] Analysis (including stakeholders)

Research Approach 2) Water input determination

Kinds of water input

- Point input by Selenge (Mongolia)
- Point input by tributaries
- Point input by irrigation samplers
- Point input by settlements
- Point input by industry
- Non-point input from different kinds of land use

Meth./ (Resp.) of data coll.

River post (Sukhebator, Naushki) (UB,UU River network analysis (UU,MR) Irrigation network analysis (UU) Sewage water analysis (UU) Waste water analysis (UU,MR)

River bank profile diffuse water input meassurements (MR,UU)



Objective 3) Water quality Analysis (including stakeholders)

Research Approach 3) Water quality composition Analysis

Kinds of water flow

- River water of Selenge (Mongolia)
- River water of tributaries / sections
- Spring (ground) water
- Interflow from irrigation systems
- Sewage water from settlements
- Waste water from industry

Meth./ (Resp.) of data coll.

River post (Sukhebator, Naushki) (UB,UU Upstream-downstream analysis (UU,MR) Eukrenal and well analysis (MR,UU) River bank analysis (MR,UU) Input, up-&downstream analysis(UU,MR) Input, up-&downstream analysis(UU,MR)

 Non-point pollution from different kinds of land use River bank profile diffuse water input meassurements (MR,UU)

Selenga Delta estuary Analysis of different water flows



Objective 4) Prevention and protection potentials Analysis of rivers, catchments, land use

Research Approach 4) Prevention & Protection Potentials Analysis (PreProPotA)

Survey of PreProPot Structures

Floodplains and river banks
Rivers and lakes network (catchment)
Man-made PreProPot structures in flood plains, river banks, lakes, and catchments, incl. land use (incl. settlements, industry, mining,etc.)

Meth./ (Resp.) of data coll.

Retention and buffer analysis (MR,UU) Retention and sink analysis (UU,MR) Remote sensing and field a. (MR,UU) + evaluation of the degree of efficiency (MR,UU)

Selenga Delta estuary and land use units Analysis regarding **PreProPot Structures**



Objective 5) Self-purification potentials Analysis of rivers and river-lakes network

Research Approach 5) Self-Purifikation Structures Analysis (SePuStrA)

Survey of self-purification Structures

- Natural self-purification structures
- thinning effect of water itself
- Flood plain sedimentation
- River bank sorption
- River sediment sorption
- Lake sediments
- Man-made self-purifikation structures

Meth./ (Resp.) of data coll.

discharge & concentration a. (UU) soil & sediment concentration a. (UU,MR) soil & sediment a. (UU,MR) sediment concentration a. (UU,MR) sediment concentration a. (UU,MR)

Selenga Delta estuary (including lakes and swamps) and land use units Analysis regarding **Self-purification Structures**



Objective 6) Proposals for prevention & self-purification structures

Research Approach 6) Selection of Proposals for initiating prevention & self-purification structures (based on research approach 1-5) \rightarrow ecosystem services free of charge (MR,UU)



Objective 7) Proposals for technical improvement and innovations for a better water quality

In cases, where ecological services are not possible, we will select proposals for the technical improvement of the water quality [MR, UU]



Study area: Sections of the Selenga River

- Selenga River at the Mongolian-Russian state borderline
- Selenga-Dzhida confluence
- Selenga-Chikoj confluence
- Selenga-Khilok confluence
- Selenga (south of Ulan-Ude)
- Selenga (north of Ulan-Ude)
- Selenga, Selenginsk
- Selenga-Delta (different sections)













Excurs: study areas: out of the Selenga Basin (for analysing tourism – water quality interactions)

- Maksimikha,
- · Goryachinsk,
- Turka (special economic zone of tourist-recreation's type)
- P-I Svyati Nos (Zabaikalsky NP),
- Tunkinsky NP,
- Olkhon (Pribaikalski NP),







Excurs: study areas: out of the Selenga Basin – Baikal NPs (for analysing tourism – water quality interactions)



Tourism – Water Quality Interactions

Tourism:

7,735

Baikal Region:

2000	2004	2020			
50, 000	250, 000	1 million (forecast)			
		(ROSABAL & DEBONNET 2006, STUI 2006)			
Olkhon Island:					
2005 – 2006	2007	2009	2010		

Tourism is very important to strenghtening the economy. Officials see nature based tourism as potentical to reach sustainable development

5, 583



12,000

(RAYON ELANCY 2007)

22,000?

Study areas: out of the Selenga Basin (for analysing tourism – water quality interactions) – Tog the example of Zabaikalsky National Park wit

Together with partners from Ulan-Ude





Universität Marburg Study areas: out of the Selenga Basin (for analysing tourism – water quality interactions) – **the example of Zabaikalsky National Park**



Nationalparkzonen im Transbaikal-Nationalpark (Zabaikalski NP)





Rekreationsstandort Karga (Zabaikalski Nationalpark)

Zonierung

Grenze der Funktionszonen

eschützte Vegetation

Piste, Wege

Wasser (Baikal) Sanddüne

Stell- und Zeltplätze zwischen Einzelbäumen, Baumgruppen

Sumpf (Übergang zum ornithologischen Zakaznik)

Vordüne Pfade Planung

\bigcirc	geschützte Vegetation		Sumpfvegetation
<u> </u>	Zelte	Ω	Laubbäume
*	Lagerfeuer, Tisch	Λ.	Nadelbäume
WC	WC. Waschtisch , Dusche	Ш	Kraut- und Grasvegetation
P	Parkplatz	¥	Wiesenvegetation
٦٣	Hinweisschilder, Stellplätze, Aussichtspunkte		
風	Aussichtspunkt	Kartographie: Gabriele Ziehr (2009) Entwurf: Ch.Opp (2009), nach Shirikov et al. (2002)	

Study areas: out of the Selenga Basin (for analysing tourism – water quality interactions) – Together the example of Tunkinsky National Park



Study areas: the example of Tunkinsky National Park



the example of Tunkinsky National Park

Local Scale Gradient Analyses Approach

Strong influence of mineral/thermal water

Medium influence of mineral/thermal water

External influence (not water related)

sampling plot

Low influence of mineral/thermal water

Study areas: the example of Tunkinsky National Park



Study areas: out of the Selenga Basin (for analysing tourism – water quality interactions) – the example of Olkhon Island (Pribaikalski National Park)





Study areas: the example of Olkhon Island (Pribaikalski National Park)







The Tourists

- \rightarrow Mainly Russian tourists by own car
- \rightarrow Wild camping is prefered
- → Motivation: seeking nature by

→ Strong pressure on nature





Study areas: the example of Olkhon Island (Pribaikalski National Park)

Effects from tourism

- \rightarrow Destruction of flora
- \rightarrow Disturbance of fauna
- → Left rubbish
- → Water pollution
- ➔ Negative impacts







Study areas: the example of Olkhon Island (Pribaikalski National Park)



Study areas: Lake Bakal and Baikal Region



Thank you for your attention!



Selenga in winter time