“Integrated Water Resources Management in Central Asia, Model region Mongolia”

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The IWRM-MoMo Project: Past, Present & Future

Kharaa River basin,
Urban and rural water management analysis,
city of Darkhan and Orkhon Sum
Identification of
- existing problems
- impacts on population & environment
- effective programs of measure.

Testing of measures
- Evaluation of proposed measures from MoMo 1 → pilot measures
- Methods for *multi-disciplinary* planning of effective and efficient measures → toolbox model

Implementation of measures of MoMo 1 and 2
- application and optimisation of measures,
- evaluation of the IWRM approach.
Model Region: River Basin Kharaa, City of Darkhan

Kharaa River Basin
- Kharaa Catchment area ~15.015 km²
- Kharaa flow at Darkhan: MQ ca. 10.5 m³/s
- Catchment Orkhon (~132.835 km²), Catchment Selenge (~280.000 km²), → Baikalsee, Russland
- Population of Darkhan ca. 90.000
Air Temperature Change Mongolia

1971-2000

2071-2100 (B1-CNCM3)

2071-2100 (A2-ECHAM5)
Water Availability Change Mongolia

2071-2100

Change [mm]
- > 25
- 25 - 25
- < -25
Current land and water use (2015)
Water extraction for city of Darkhan: Ground water monitoring

18 wells of USAG (depth: 60-70m)  
8 km south of Darkhan  bank filtrate  
~ 9.700 m³/day

8 wells of Thermal Power Plant  
(depth: 70-80m)  
~ 8.300 m³/day

16 wells for monitoring of water quality
Water extraction for city of Darkhan: Monitoring Ground water situation

10 levelloggor measure ground water level continuously
Drinking water extraction for city of Darkhan: Ground water modelling by MODFLOW

model area: ~ 500 km² (mathematical and numerical formulation)
Drinking water extraction: Ground water simulation results

Simulated steady-state water table (hydraulic head) for warm season (April-October 2013)

- Represents average flow conditions
- Warm season => - river and soil water not frozen
  - groundwater recharge (10mm/year)
- GW-flow in alluvial aquifer from South to North parallel to Kharaa River

Draw down in 8 TPP wells gallery is larger than in 18 USAG wells gallery

TPP wells are further away from the Kharaa River
Drinking water extraction: Assessment of ground water quality

Result 2: Ground water quality

Legend
- sampling points
- groundwater at risk
- groundwater possibly at risk
- groundwater not at risk

Kharaa Subbasins

- Fissured aquifer, moderately productive
- Insignificant aquifer, limited groundwater
- Porous aquifer, highly productive
- Porous aquifer, moderately to highly productive
Automated real-time monitoring of dissolved oxygen, pH, temperature, turbidity, chlorophyll and electrical conductivity started in mid 2011 (15 min intervals)

→ allows for rapid detection of changes and monitoring of long-term trends
New WWTP in city of Darkhan

- Investment 20.7 Mill.$ by MCUD,
- Begin of construction work: 2017
Pilot decentralized Waste Water Management in rural Region

Treatment Plant
- for a kindergarten
- in Orkhon soum
- Capacity 50 PE

Pre-treatment - Biological stage - Final clarification

Working plan
March 6th-13th 2011 “Undur Kharsh” in Penig and Ilmenau
04.2011 – 06.2011 - construction work
06.2011 - start-up
07.2011 – 01.2013 - operating time

03. Sep. 2011 visit and opening ceremony by Minister Mr. Gansukh of Environment, Nature, Tourism
Objective: Identify an affordable waste water treatment approach that is compatible with the harsh climatic conditions of the Darkhan region.

Result: Reuse waste water components for local environmental and economic benefit.
19 de-centralized waste water treatment plans are constructed in northern Mongolia in last two years.

Contribution for the protection of fresh water resources in Kharaa, Orkhon, Selenge river basins and lake Baikal basin

Borderline between RU and MGL

Waste water treatment plants
Nitrogen balance has a significant deficit of -20 kg(ha/yr)
Thank you very much – Баярлалаа