Report

Working session and Training on Advance groundwater monitoring and analysis
Delft, Netherlands 23-28 February 2015

Participants:

Mr. Beisen Aidymbekov, the head of the department of hydrogeology of UzhKazNedra (Subsoil of South Kazakhstan) of the Ministry of Investment and Development. UzhKazNedra

Oleg Podolny – GGRETA national coordinator

Nurmukhamed Baizakov – GGRETA expert

Valentina Salybekova – GGRETA expert

Suren Gevinian – UNESCO

Neno Kukuric UNESCO- IGRAC, Director

Nienke Amsems - UNESCO- IGRAC

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GGRETA project, Kazakhstan segment of Pretashkent case study

Recap

Neno Kukuric and Suren Gevinian have presented the overview of the project. The following main subjects were discussed among the others:

- The results on collection and processing of hydrogeological, socio-economic and environmental data relevant for the Kazakhstan segment of Pretashkent Aquifer;
- Recap of legal and institutional aspect of groundwater management in Kazakhstan;
- In depth assessment of the Pretashkent Aquifer;
- Indicator assessment;

Assessment report

The participants of the session reviewed the assessment report, previously submitted,

by the Kazakhstan's experts. The main objective was to get a common understanding of the content. Corrections and clarification were applied were possible.

The parties agreed that Kazakhstan experts would continue work on the report with taking into consideration input fromm the working session.

Recharge – discharge

After a long discussion and demonstrations it has been decided that natural outflow and natural recharge should not be taken into consideration due to the fact that the quantities of those are virtually equal. The specialist from Kazakhstan have conveyed that certain amount of water that comes in and goes out naturally in equal quantities, regardless of pumping.

Other issues discussed

Stress and pressure storage

Recharge v Renewability

Mineral v Fresh water

Geological occurrences and faults

Hydrogeological model

Development of more applied indicators

Fieldwork

Mr. Baizakov explained the method with which the field works were conducted in detail

- Water level has been measure in 16 self-flowing borehole. The presented figures are the average annual values of the piezometric head in meters above the ground;
- Method of measurement: Water level in the borehole is determined, theoretically, once a year. Those measurements are taken by running a few brief outputs from boreholes at different production rates for the subsequent graphical processing
  The number of outputs depends on borehole production capacity. Transition into another mode of output controls by valve. During the output it is necessary to achieve stabilization of borehole production and head. This method of experimental filtration work allows to determine the value of piezometric level,

close to the real one
The figures indicate the average annual values of abstraction, measured in litters per second.

- The ground water level data show value of water in meters above the ground
- The units used for abstraction data are litters per second

Although, Mr. Bzaikov admitted to his methods being outdated, nevertheless he is certain that results of the abstraction and water level measurements can be trusted.

The discrepancy of the ground water level measurements form the Cenomanian aquifer systems is caused by the wrongly input data by technician in previous years in places like Abay Bazar village for instance

Borehole location	2010	2011	2012	2013	2014
Abay Bazar village	68.92	73.92	73.65	73.28	73,0
Aul Baskubur	78.63	78.63	78.45	78.27	78,5

The correctness of the assumption is yet to be verified. That is why only the latest measurements are recommended to be taken into account.

Information Management System (IMS)

The training participants were presented with the global, interactive portal to groundwater-related information and knowledge and explained its functions

The IMS is designed to incorporate

- Indicators
- Parameters/variables
- Tabular data
- Thematic maps
- Background maps
- Documents
- Images

and:

- Meta information

The date is spiritually distributed that allows creation of map overlays with transparency sliders

The training addressed searching and browsing, International standards: WMS, WFS services, protected and public view work spaces, data uploading and publishing and other basic function of the IMS system

A special set of Information Management System Exercises has been designed to help the training participants get accustomed to the system

Overall 10 exercises ranged from m Log in, Registration, Searching & Browsing, Layer Properties and downloads, Map overplays, Data on Shape files, Adding WMS layers, Publishing, Meta Information Module. Excel and Shape files, File Requirements, Creating notes and documents were explained and tested by the participant

Comments:

During the exercises the following were established

The uploaded data needs to be quality controlled by the national experts
Data verification mechanisms could be necessary
Indicators need to be integrated into the system
Additional analytical values could be necessary
More search options

Resolution:

The IGRAC team will upload data into and fine-tune the IMS doing two upcoming months.

Its been agreed to hold a workshop in Kazakhstan, provisionally in April 2015, were data were IMS would be tested locally by Kazakh specialists.

Presentation and training of Kazakhstan's Committee of Geology might be necessary as well.

Technical assessment report will be presented during the April workshop

Lectures

Water management in the Netherlands

De. Yangxao Zhou – IHE presented a compressive overview of the Dutch water management model covering:
Impression of The Netherlands

- Climate and Hydrology
- Man-made Lowland
- Flood Protection (Delta Works)
- Integrated Water Management
- The practices of delta works and land reclamation such as the Zuiderzee generated a lot of interest

Integrated Water Management

The water governance in the Netherlands generated a lot of interest from the participants especially the government representative. A very education experience was learning about the distribution of funds generated from taxes and the elective nature of water boards.

Who is in charge and who pays

- National waters:
  Minister of Transport, Public Works and Water Management

- Local waters: water-boards under supervision of the provinces
  Urban waters: increasingly water-boards

- Full cost recovery for O&M from inhabitants
- For modernization: subsidies

Who is in charge, who pays
- Sewerage: municipalities
- Waste water treatment: water-boards and municipalities
- Control of diffuse pollution: Ministry of Housing, Planning and Environment
- Remediation and handling of contaminated aquatic sediments: Ministry of Transport, Public Works and the water boards
- inhabitants pay
- Cleaning: governments and inhabitants

Groundwater Monitoring

Dr. Yangxao Zhou – IHE, presented a compressive overview of Groundwater Monitoring covering:

- Groundwater monitoring in The Netherlands
- Groundwater monitoring in USA
- EU WFD groundwater monitoring

- China groundwater monitoring

Summary of the interests of the participants

- Characteristics of European approach on groundwater monitoring:
– River basin context;
– Integration of quantity and quality;
– Cyclic long-term monitoring and assessment;
– Assessment of status, detection of trend and identification of impacts of pressures.
- Groundwater monitoring in China concentrated mainly on well fields and urban areas – "local problem monitoring", not yet as "regional process monitoring". However, impact on groundwater occurs at river basin scale.
- Groundwater regime zone and groundwater pollution risk mapping provides effective tools to design regional groundwater level and quality monitoring networks. They are also helpful for interpreting monitoring results.
- The challenge for implementing national groundwater monitoring in China is to establish a national coordinating body to coordinate monitoring activities by different ministries and provincial departments. A national standard approach should be developed, all monitored data should be stored in a national database and shared by all ministries and departments

Groundwater quality

Dr. Jan Willem Foppen presented cases of poor groundwater quality in Yemen and Uganda

Explained the sampling and testing

Laboratory

During the IHE laboratory tour Dr. Jan Willem Foppen has presented the projects and themes the students are working on and the fellow IHE staff members gave a detailed description of certain pieces of equipment. Participants were permitted to observe and take the experiments conducted during the visit.

The trading participants conducted testing of two separate water samples with a portable kit and Atomic absorption spectroscope (AAS)

Parameter			

Upgradient (n=4x5)	Downgradient (n=6x5)		
EC (µs/cm)	1306 (±306)	5061 (±1073)	
pH	6.6 (±0.3)	7.5 (±0.2)	
T (°C)	25 (±2)	25 (±2)	
DO (mg/L)	2.3 (±0.9)	2.5 (±0.9)	
HCO_3	322 (±117)	1114 (±356)	
NO_3	85 (±(38)	228 (±237)	
NH_4	4.9 (±5.1)	57 (±42)	
o-PO_4	0.05 (±0.09)	2.4 (±3)	
TP	0.27 (±0.23)	3.2 (±11.3)	
TKN	4.9 (±0.9)	130.4 (±126)	
Na	48 (±19)	172 (±114)	
K	42 (±28)	307 (±173)	
Mg	16 (±21)	21 (±13)	
Ca	22 (±10)	61 (±32)	
SO_4	20 (±6)	127 (±86)	
Cl	110 (±45)	380 (±206)	

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Visits

TNO – Geological Survey of the Netherlands Groundwater in the Netherlands

Wim Westerhoff presented and explained the function of TNO

- geoscientific data, information and knowledge for:
- management of earth resources
- safe living on subsiding lowlands
- reduction of risks and costs associated with unforeseen ground conditions in construction projects

- DINO system (national repository for geologic data and information)
- borehole data, cone penetration tests

- geophysical and geochemical data
- models (interpretations)
- national coverage, high data density
- own and third party data
- standardized
- freely accessible current and historical data
- knowledge about processing, characterization and interpretation
- detailed geological and lithological 3D models of the subsurface
- TNO provides the models via the Internet:

data, models, and viewer software: http://www.dinoloket.nl

mineral resources: http://www.delfstoffenonline.nl/

Subsurface Viewer (free download on www.dinoloket.nl)

Deltares

Harm Duel, the Head of Department Groundwater Resources Management and Gualbert Oude Essink presented the work of Deltares' groundwater unit with specific concentration on Fresh-saline groundwater issues.

Groundwater management works in

- groundwater modeling
- salt water intrusion
- climate change & droughts
- global groundwater related risks
- groundwater resources (ASR)

- Interactively editing the geometry of the subsurface

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Royal Eijkelkamp

Barry Asskafha presented the activities of Royal Eijkelkamp with regard to soil and water research.

The participants demonstrated particular interest towards divers for

- (Ground-) water monitoring (Diver® family)
- Hydrological research
- (Ground-) water sampling
- (Ground-) water analysis

The training participants were allowed into the control room of the Royal Eijkelkamp where on 6 big screens the participants were demonstrated the various monitoring, managing and visualizing groundwater levels, surface
water levels, rainwater, soil moisture and water quality functions in action.

Conclusions and recommendations:

IMS

1. The validation and quality control conducted by national experts would be required to verify the righteousness of the uploaded data
2. the back up options to the online IMS have to be considered

Indicators

1. The working group needs to work on a way of integrating the indictors into the Information Systems
2. Additional aquifer management analytical criteria need to be developed in the future to help decision makers further with the management of aquifers
3. A feedback from the end users is required to further refine the information system

Conceptual model

1. Perhaps a section called a conceptual model has to be added to the report

Mission to Kazakhstan

1. Another workshop has been recommended to be held in Kazakhstan to finalize the technical assessment report and IMS
2. A training of the local specialist on the utilization of IMS could be held during the

proposed mission

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