



Report of the Training: 'Advanced Groundwater Monitoring and Analysis' 19-23 October 2015, Delft The Netherlands

IGRAC and UNESCO-IHP have organised a one-week training course on 'Advanced Groundwater Monitoring and Analysis' for groundwater professionals from Uzbekistan. This course took place at the UNESCO-IHE office based in Delft, the Netherlands, from 19 to 23 October 2015. In addition to the programme at UNESCO-IHE, field trips were organised to the [Amsterdamse Waterleidingduinen](#) and [Royal Eijkelkamp](#)..



Groundwater Resources Assessment

Groundwater resources assessment was the main topic discussed during the first day. After IGRAC Director Neno Kukuric had given a warm welcome to all participants, Mr Kukuric gave an introduction on IGRAC's activities, particularly in the field of groundwater assessment. Afterwards, Vice Rector Stefan Uhlenbrook introduced UNESCO-IHE, the UNESCO institute for water education which had a contribution to the content of this training course. Suren Gevinian, who represented UNESCO-IHP during the course, gave a presentation on IHP's activities in Central Asia. In order to have a good understanding on the current state of Uzbekistan's groundwater resources, Head of International Department and State Committee on Geology and Mineral Resources Azam Kadirhodjaev gave a very informative presentation as well.



Groundwater Information Systems

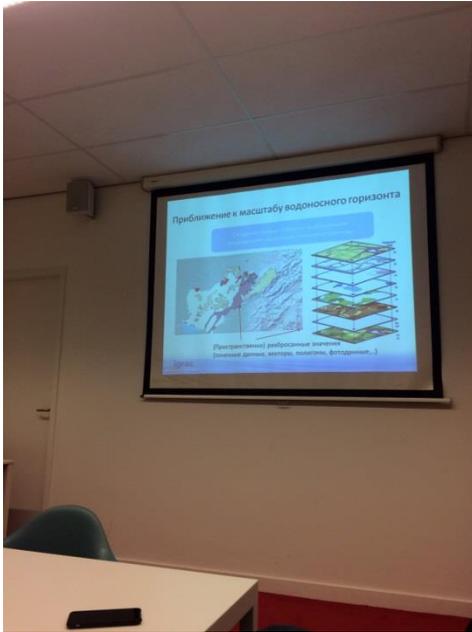
After these introductory sessions, the attention was shifted to data collection and analysis. Neno Kukuric kicked off this part of the course by giving a presentation on IGRAC Global Groundwater Information System (GGIS), which is an interactive, web-based portal to groundwater-related information and knowledge. Then IGRAC Researcher Nienke Ansems gave a more detailed demonstration of this information management system followed by a Q&A session. Afterwards, participants became familiar with the GGIS web-application via the GGIS exercises. For each participants a login and example data were provided in order to get started with the data upload etc.. The participants were enthusiastic about the IMS. The possible use of the GGIS in Uzbekistan on national level was emphasized. The session on the information system was concluded with some input from participants regarding requirements and suggested improvements for the system. An overview of the feedback is given below.

Later Nienke Ansems focused on the Global Groundwater Monitoring Network programme (GGMN), which is an IGRAC initiative that facilitates periodic assessments of changes in groundwater quantity and quality by aggregating data and information from existing groundwater monitoring networks and regional hydrogeological knowledge. Geert-Jan Nijsten, Senior Researcher at IGRAC, explained how he dealt with data and information management within the framework of TWAP Groundwater.

Recommendations Global Groundwater Information System

- Improve the data download. It should be possible to download shapefiles in the private and/or public workspace. Create functionality that the data owner can indicate if the shapefile is available for download in public viewer. It was recommended to achieve this by adding a button on the GGRETA ‘manage layers’- page, here the person can already indicate if the data are visible in the public viewer, improve by additional option to indicate if it is downloadable in the public viewer.
- It was requested to develop a functionality to show cross sections/ profiles in pop-up window. This is particularly interesting do better understand the 3D of the aquifer because it shows the several aquifer layers and/or geological layers.
- It was suggested to add buttons to the main menu to easily move between the ‘public viewer’ and to the ‘private viewer’.

Table 1. Overview on feedback and recommendations for the Global Groundwater Information System



Groundwater Monitoring

On Wednesday, the morning programme was offered by Yangxiao Zhou, Associate Professor at UNESCO-IHE, who lectured on ‘Groundwater monitoring in the Netherlands and beyond’. Firstly, he gave an overview of how groundwater monitoring was organised in the Netherlands. Afterwards, Zhou focused on methodologies for the design of groundwater monitoring networks.

After this informative morning programme, the group gathered for a field trip to the Amsterdamse Waterleidingduinen (AWD). Frank Smit and Marit Jekkers showed all participants around the AWD, which is a nature reserve that also helps supply drinking water for Amsterdam. The hundreds of dunes of the AWD filter rainwater, the first step in the process of creating fresh drinking water for the city’s residents.

Groundwater Quality Analysis

Also the Thursday morning programme on groundwater quality analysis was provided by UNESCO-IHE. Associate Professor Jan Willem Foppen gave a lecture that touched on the basics of hydrogeology, transport of mass in the subsurface, hydrochemical processes and acid-base reactions.

Groundwater Monitoring Equipment

The final day of this training course was a full-day field trip to Royal Eijkelkamp. After an introduction on Royal Eijkelkamp activities, Export Manager for Asia Barry Leuerman gave a presentation on water quality and quantity sampling and monitoring. In the afternoon, Leuerman gave demonstrations on care-free monitoring systems and monitoring-telemetric data transmission.