

Course 2.1. Report. 2nd-4th June 2014

Interpretation of Hydrochemical Data

This course was held Monday-Wednesday 2nd-4th June 2014 at the training room of RuWatsip MRRD, Kabul. The course lecturers were

- David Banks - NORPLAN

Translation, where needed, was provided by Prof. Noorahmed (Kabul University) and Eng. Ewaz Ali Poya (MRRD).

The objective of the course was to **provide the participants with a basic understanding of how groundwater acquires its characteristic hydrochemical signature and how to use various methods to represent and evaluate hydrochemical data.** Emphasis was placed on natural inorganic chemistry.

The course comprised:

Day 1

- **Introduction to groundwater chemistry.** An introduction to the idea that every groundwater has a unique chemical “fingerprint” and an overview of the processes and reactions that result in this “fingerprint”.
- **The Fundamentals of Water Chemistry.** This introduced participants to concepts such as pH, alkalinity, moles and equivalents. It required a reasonable (European high-school) level of chemical and mathematical ability which was not present in all participants. The lecture included a demonstration of an alkalinity titration, first by the lecturer and then “hands-on” by one of the course participants. The lecture also contained a practical exercise in the use of the “moles” concept.
- **Water Quality Guidelines.** A consideration of national Afghan, WHO and SPHERE standards. Focus on a limited number of elements / parameters with health significance.

Day 2

- **Data Presentation.** An introduction to a number of methods for presenting inorganic hydrochemical data, including statistics, boxplots, cumulative frequency diagrams, pie diagrams, Kurlov formula, Piper diagrams, Durov diagrams.
- **Practicals 2 and 3.** Class exercise based on two spreadsheets of hydrochemical data, one from Norway (Practical 2) and one from Faryab (Practical 3). Due to lack of time, some groups were assigned the Norwegian data, and some the Faryab data. The class was required to comment on the evolution of the chemistry, and to present the data as pie charts and Durov diagrams.

- **Microbiology.** An overview of microbiology in groundwater (bacteria, viruses, protozoa, helminths) and the relevant standards. A discussion of analysis of faecal coliforms using the DelAgua type kit.
- **Day 3**
- **Stable isotopes.** An introduction to ^2H and ^{18}O isotopes in rainfall, surface waters and groundwaters, and a presentation of data from Faryab.
- **Groundwater chemistry and evolution in Faryab.** An overview of hydrochemical data on a wide variety of inorganic elements / parameters in Faryab, coupled with discussions on the evolution of the characteristic hydrochemical gradients from south to north.

The course assumed a reasonable basic level of chemical knowledge. This should have been clearly advertised and participants without this fundamental knowledge should have been discouraged from attending. The level of understanding of course participants was very varied from almost nothing to degree-level. This made the early part of the course difficult to teach, although all seemed interested in aspects such as health aspects of water quality guidelines and hydrochemistry of Faryab.

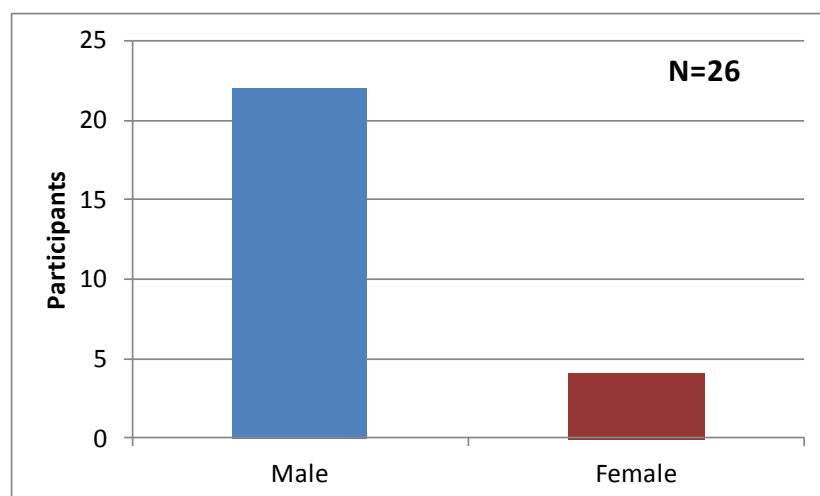
I believe that the level of the course was pitched slightly too high relative to the ability of participants. Nevertheless, almost all participants appeared both engaged and challenged.

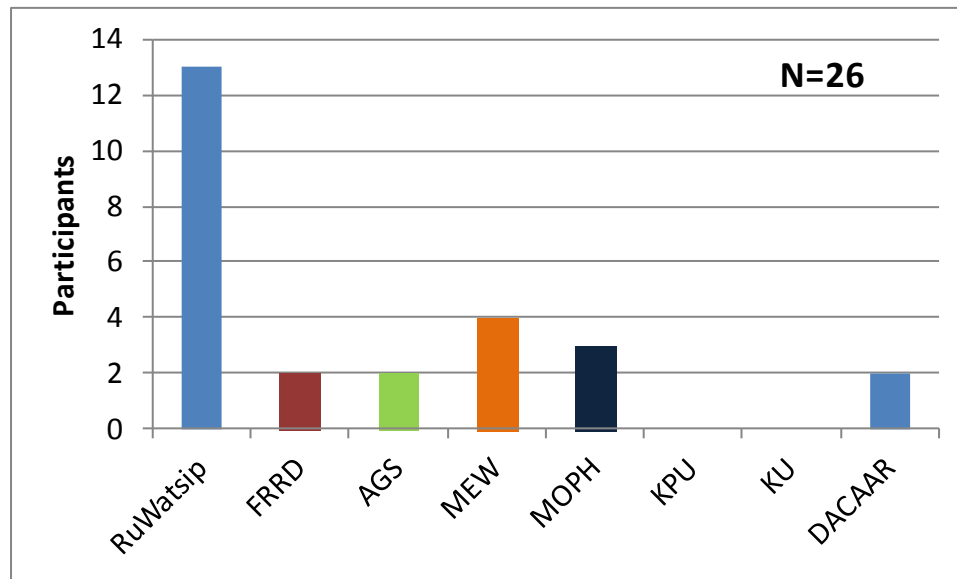
The ideal length of this course should be **4 days** (with translation), or 3 days if taught in Dari. The current 3 day course meant that some lecture material had to be omitted.

Participation

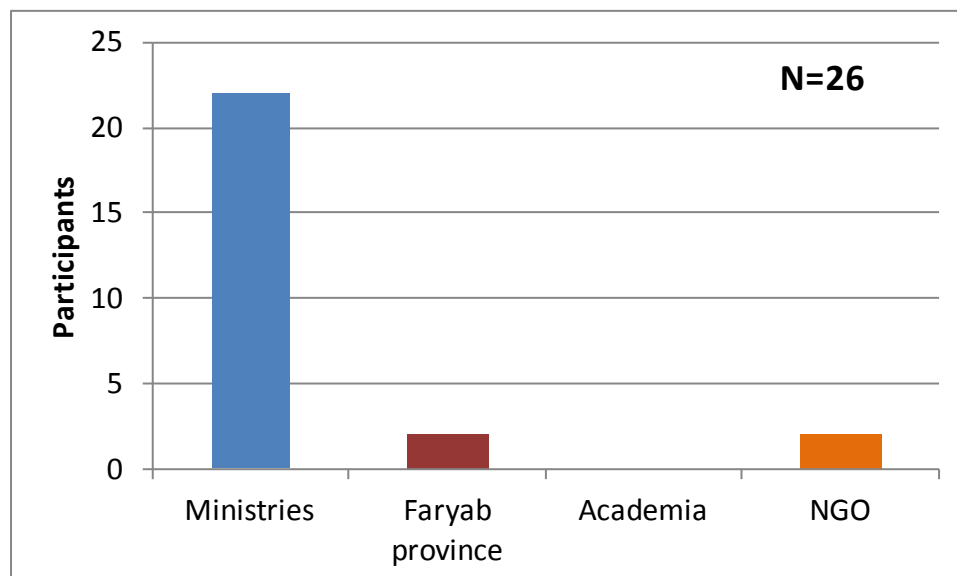
26 participants were registered on the course comprising 22 men and 4 women.

The participation was divided as follows:





Participation in course 1.7 by institution. RuWatsip = MRRD RuWatsip; FRRD = Faryab Department of Rural Rehabilitation and Development; AGS = Afghan Geological Survey; MEW = Ministry of Energy and Water; MOPH = Ministry of Public Health; KPU = Kabul Polytechnic University; KU=Kabul University.



Participation in course 1.7 by sector.