Socio-hydrogeology:

enhancing the role of hydrogeologists as advocates for public engagement in water management and governance

Viviana RE, PhD

Ca' Foscari University of Venice - Department of Molecular Sciences and Nanosystems, Venice (Italy)

National Engineering School of Sfax - Laboratory of Radio-Analysis and Environment, Sfax (Tunisia)

re@unive.it

Abstract 1716

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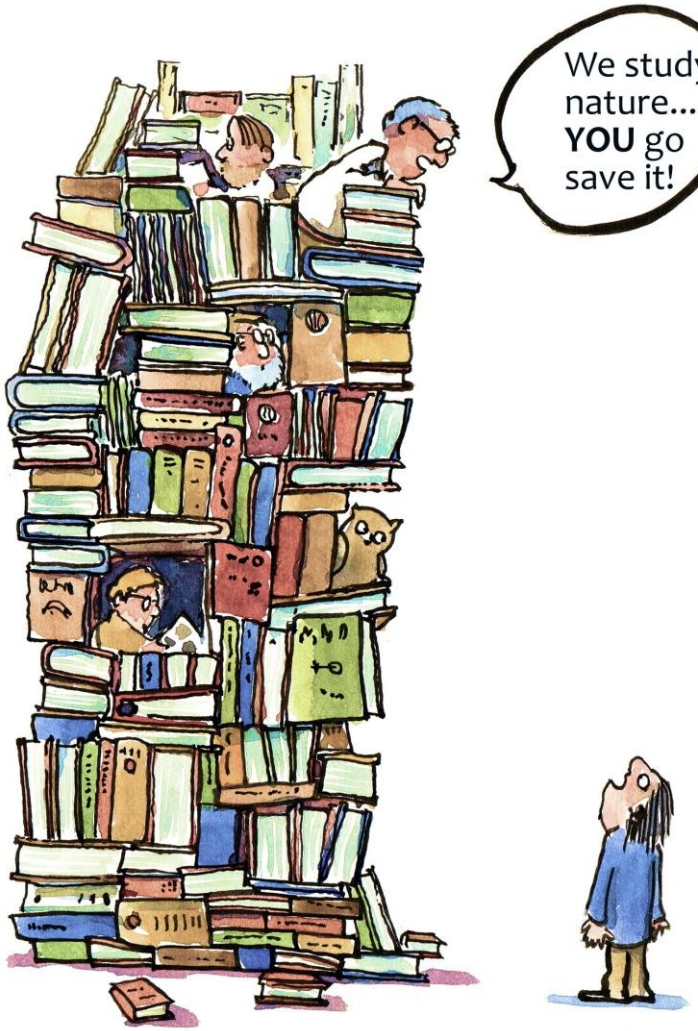
Why?

- **Hidden** nature of groundwater resources

- **Hidden** nature of contamination

- Governance **limitations** (central-local level)

Why?



Science and Society gap

Lack of adequate capacity building and knowledge transfer

Ivory towers of academia

Missing opportunities

Why?

What?

Improving information sharing

Public engagement

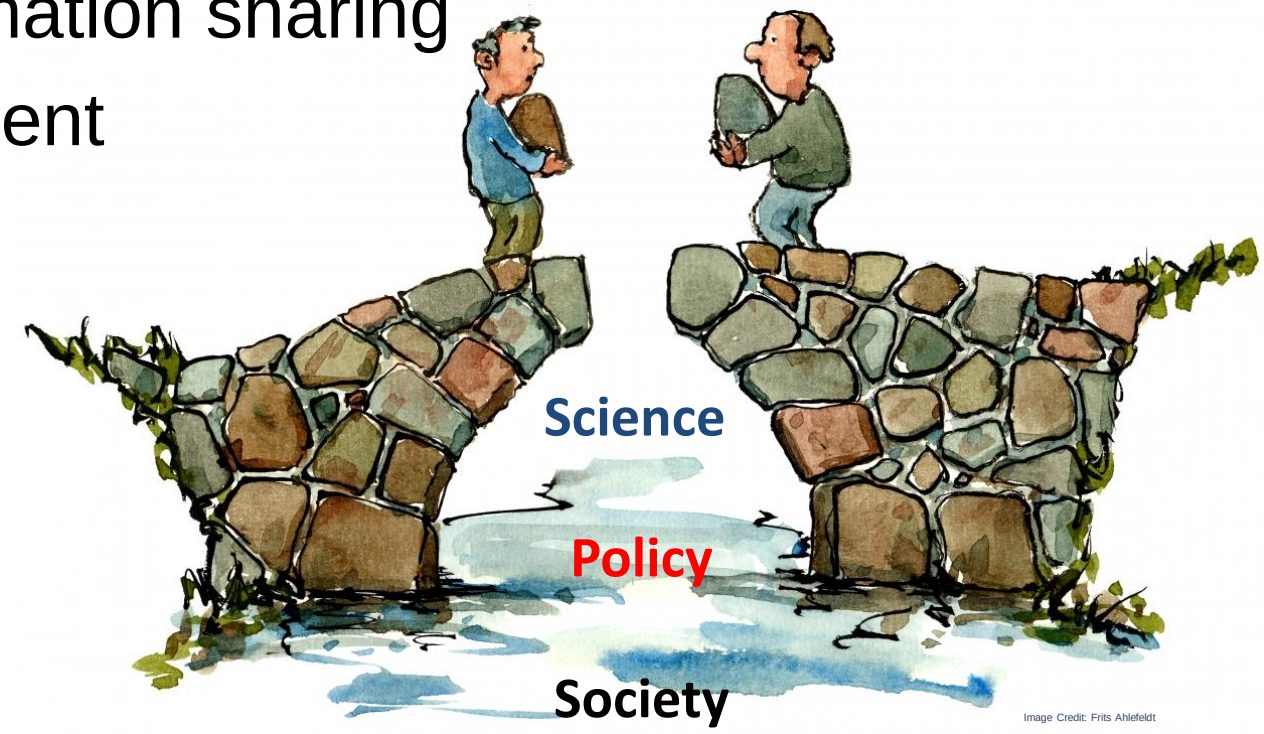


Image Credit: Frits Ahlefeldt

Socio-hydrogeology

Re, 2015. Incorporating the social dimension into hydrogeochemical investigations for rural development: the Bir al-Nas approach for Socio-Hydrogeology. Hydrogeology Journal 23, 1293–1304

Springer Campaign "Change the world one article at time" -Hydrogeology Journal Choice for 2015

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Socio-hydrogeology

SOCIO-HYDROLOGY (Sivapalan et al., 2012)

- Treat people as an endogenous part of the water cycle
- Understand the dynamics and co-evolution of coupled human-water systems

SOCIO-HYDROGEOLOGY (Re, 2015)

- Focus on the reciprocity between groundwater and its consumers/polluters

→ Identify the cause and effect relationship between groundwater and society

→ **UNDERPIN IWRM**

What?

Socio-hydrogeology

➜ Identify the cause and effect relationship between groundwater and society

Who *is affected (directly or indirectly) by the groundwater system in question?*

Is the project/investigation likely to raise ***conflicts****?*

If so, ***how*** *can we avoid this and* ***who*** *can help?*

Who *can support the implementation of new science-based management practices?*

What?

Stakeholder analysis

Public engagement

Capacity building

Outreach

Hydrogeological assessment

Hydrogeochemical analysis

Modelling

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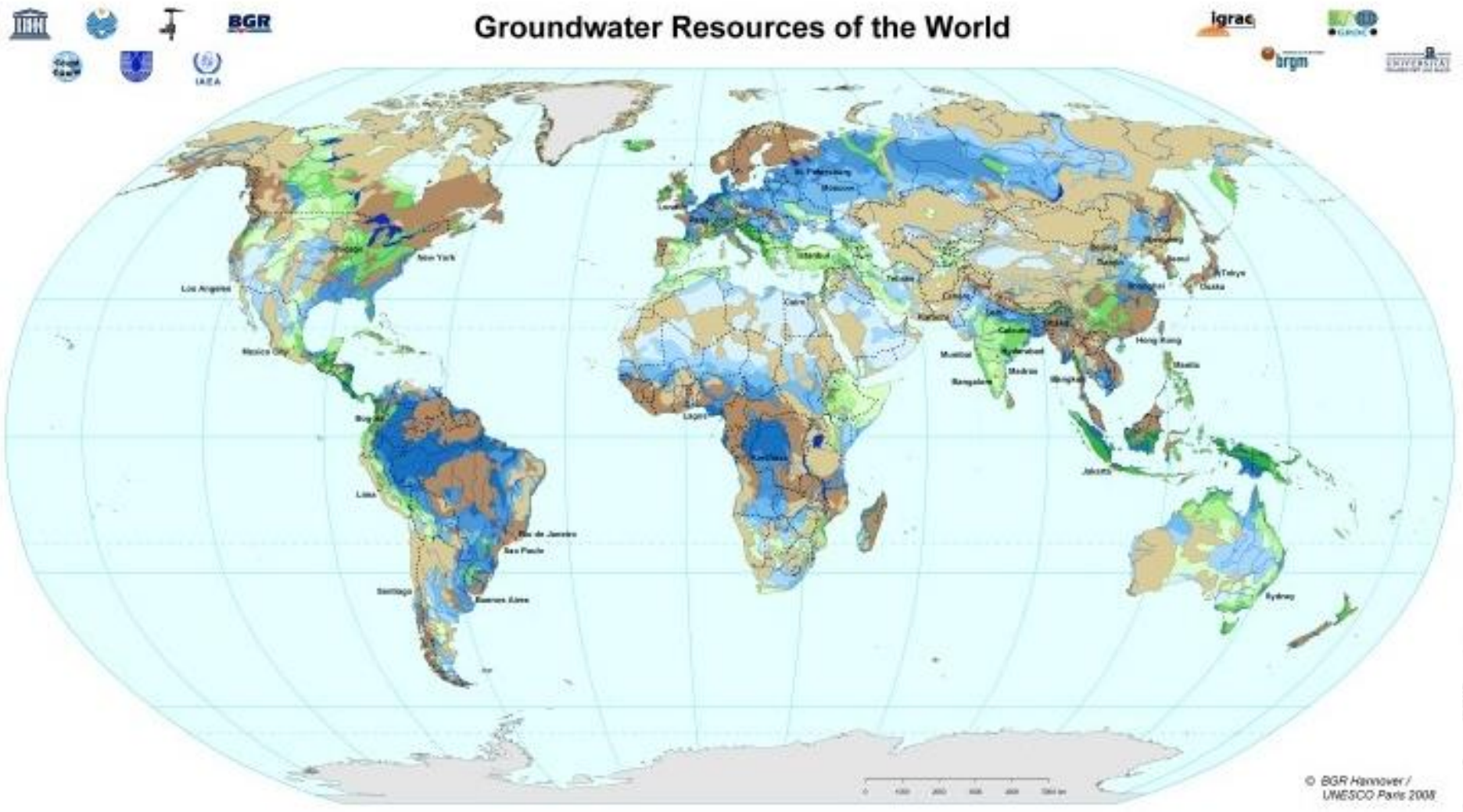
Who?

Hydrogeologists

Advocates for groundwater management and protection

Making the best use of scientific outcomes

Where? When?


Groundwater Resources of the World
BGR
IAEA
igrac
brgm
© BGR Hannover / UNESCO Paris 2008

….how?

Bir Al-Nas approach

Bottom-up IntegRated Approach for sustainabLe grouNdwater mAnagement in rural areaS

- FP7-PEOPLE-2012-IOF: National School of Engineering of Sfax, (Tunisia) and Ca' Foscari University of Venice (Italy)

'People's Well' بئر الناس

Objectives

- to develop a replicable example of socio-hydrogeology
- to enhance rural development strategies by strengthening hydrogeologists' role

….how?

Bir Al Nas approach

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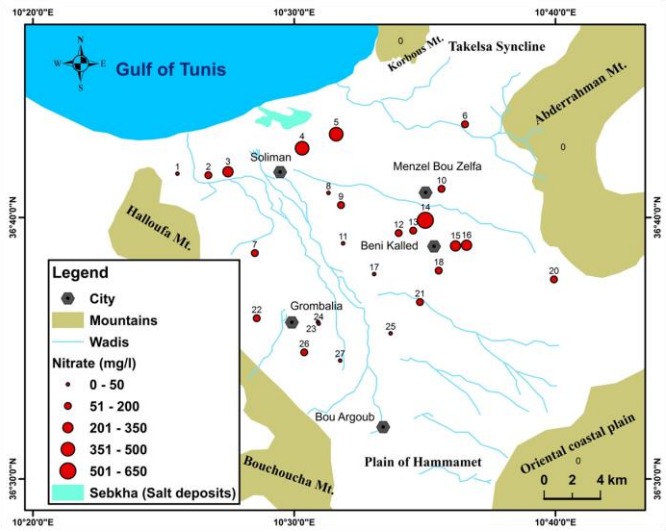
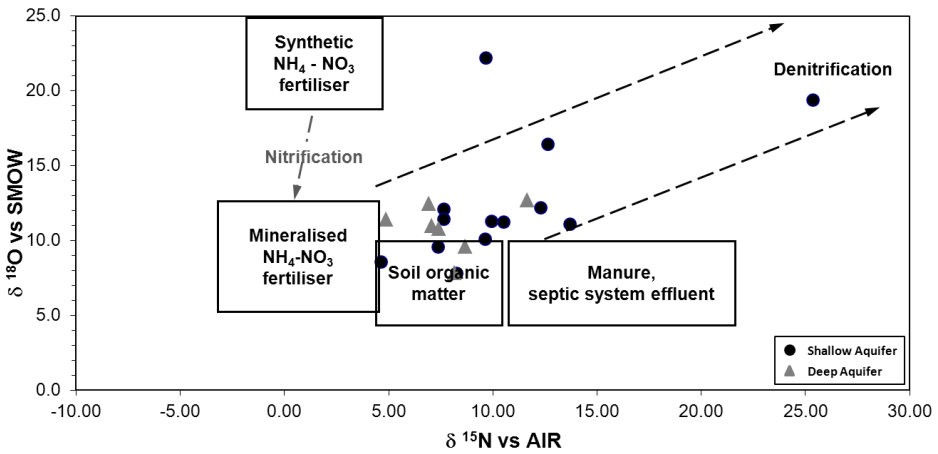
Bir Al Nas approach

Hydrogeochemical investigation

- To identify the origin of nitrate contamination in the aquifer
  - General chemistry
  - Isotope geochemistry (δ^2H, $\delta^{18}O$, $\delta^{15}N_{NO3}$, $\delta^{18}O_{NO3}$, $\delta^{11}B$)





Bir Al Nas approach

Social Network Analysis (SNA)

- To identify the main actors involved in the studied water issue, to assess their links, their influence and the possible existence of conflicts among them.

"Who/which actor will influence the implementation of new groundwater management strategies based on the hydrogeologycal outcomes?"

Bir Al Nas approach

Public Engagement (PE)

- To assess the needs and issues of water end-users while also retrieving information on local groundwater use patterns and issues

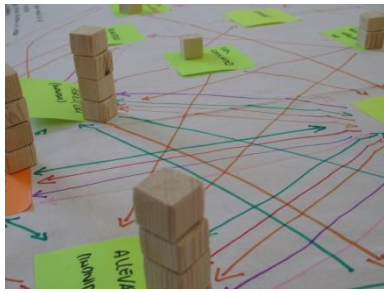
Involve farmers and well's holders since the early stages of a project through a direct confrontation

↓

Structured interviews/questionnaires on water and agricultural practices during *in situ* measurements and field work

….how?

Bir Al Nas approach (☞abstract n 2168)



Public engagement & SNA

Stakeholders have scarce perception of

→ local groundwater issues

→ potential role in supporting local groundwater management strategies

Bottom-Up/Public engagement

→ Increased gw awareness at local level

→ assess local needs since the very early stages of the investigation

Lessons learned...

- Why not?
  - Favour scientific results communication & dissemination (→ optimal use of the hydrogeological information and outcomes available)
  - Pave the way for participatory groundwater monitoring
  - Science Demystification

    → connect science with society

    → go beyond academic sphere and have a real positive impact on local populations'

Aknowledgements

Prof. Kamel Zouari (ENIS)
Dr. Rim Trabelsi (ENIS)
Dr. Najiba Chkir (ENIS)
Dr. Elisa Sacchi (UNI. PAVIA)
Dr. Enrico Allais (ISO4 Laboratory)

Jihed.Henchiri (MSc –ENIS)

Siwar Kammoun (PhD candidate – ENIS)

Chiara Tringali (MSc UNIVE)

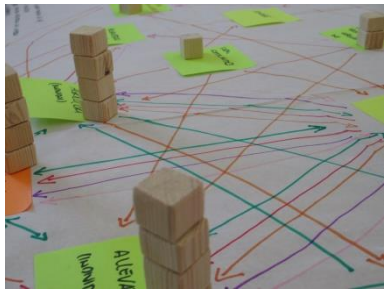
All the farmers and well's holders for their kindness, groundwater samples…and oranges

...and future perspectives

- Combining the information retrieved with SNA and PE with the geochemical data – Grombalia study
- Improving questionnaires (full households consultation)
- Test the approach in a different contexts (e.g. Po plain, Italy; Inle Lake watershed, Myanmar)

….how?

Bir Al Nas approach (abstract n 2168)



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Bottom-Up/Public engagement

→ Increased gw awareness at local level

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Enhance communication among scientists, authorities and final water users/polluters

Lessons learned...

- The social appraisal, performed through Social Network Analysis and public engagement of water end-users, allowed hydrogeologists to get acquainted with the institutional dimension of local groundwater management, identifying issues, potential gaps, such as weak knowledge transfer among concerned stakeholders, and the key actors likely to support the implementation of new science-based management practices resulting from the ongoing hydrogeological investigation.