

Preface

Hard rock hydrology, especially in areas where climatic conditions are severe, has been well studied over the past 15 years in our efforts to find more efficient ways to prospect, exploit and manage surface and groundwater resources. Two observations need to be made: the first is that the lines of research have not all been equally successful, and the second is that many of the studies have been empirical. It is now time to achieve a better integration of experimental results with analytical interpretation, and to determine the essential trends for future research.

Present fault and fracture prospecting techniques have been derived largely from economical methods developed in geophysics, remote sensing, natural tracing and mixed techniques for the rapid location of productive sites. The practical and theoretical analysis of connectivity, however, is still a difficult task, with few available field indications that could help predict a steady productivity over many years. Connections and water flux exchanges between the elementary parts of the hydrosystem, such as between atmosphere and soil (recharge and evapotranspiration), surface drainage and aquifers, the weathered unsaturated/saturated zone and fresh rock, etc., still need to be much better qualified.

The time has also come to synthesize the many attempts at managing water resources through artificial methods (dams, underground barriers, soil management for increased infiltration rates, artificial fracturing, etc.) so that we can move away from the field of empirical studies into that of deterministic studies. The first steps taken towards creating artificial aquifer structures in fractured rocks, i.e. local artificial fracturing for better conductivity, and artificially increasing infiltration potential for storage, were aimed at improving the hydrodynamic characteristics and resource potential of this medium. Surely imagination in this field is sufficient to be able to arrive at a situation where we need no longer be concerned with difficult ground conditions and no longer rely on creaming off the best parts of natural structures.

Groundwater will remain safe as drinking water provided that its quality can be managed. This can possibly be approached through a transfer, with suitable adaptations, of research results obtained from large sedimentary basins so as to be able to build up combined methods for quantity/quality management.

We must nevertheless bear in mind that hard rock hydrology concerns weak to medium production yields and that expected financial subsidies are proportional to economic benefits. Thus it is clear that an imaginative approach is required for hard rock hydrogeology, making the maximum use of inexpensive methods to try to determine field indications of potential productivity and storage capacity.

The Rabat Symposium on Hard Rock Hydrosystems attempted to highlight the theoretical and methodological benefits of recent applied research and to point out the need and orientations for future development. Of paramount importance in this field is improved scientific cooperation between research teams.

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