Groundwater and the 8th World Water Forum

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"The exposure of multinational companies to depleting and degrading groundwater is increasing. The rapid depletion of aquifers is a systemic risk to one billion people in the world's growing economies. Aquifers are shared across national borders and have the potential to spark conflict. Companies must act beyond their site operations and help improve groundwater governance if they are to ensure their sustainable growth." – Foreword, 'Global Depletion of Aquifers', Chapter 4 *in* *Earth Security Index 2016 Report*, http://tinyurl.com/zdot9dp

The MDGs are now history and we have moved into the era of the SDGs. Although water now has its own goal - #6 Clean Water and Sanitation - it is a crosscutting issue that affects all goals. Besides SDG 6, water is arguably especially important to SDGs 2 (Zero Hunger); 5 (Gender Equality); 7 (Affordable and Clean Energy); 11 (Sustainable Cities and Communities); 13 (Climate Action); 14 (Life Below Water); 15 (Life on Land); and 17 (Partnerships). Groundwater, by far the largest liquid freshwater reservoir, looms large in all these goals. Its importance likely has been magnified by the desiccation of surface freshwater resources via global warming. It should therefore be afforded a significant presence at the 8th World Water Forum. Groundwater quality must also be addressed; to consider only groundwater quantity is to deal incompletely with the resource.

With the aforementioned as background, we, the American Water Resources Association, the National Ground Water Association and the International Groundwater Resources Assessment Centre, propose the following sessions at 8WWF [note that Session 7 includes all freshwater resources]:

1) ***Sustainable Groundwater.*** What exactly is meant by 'sustainable' groundwater? Experts speak about groundwater as being sustainable, renewable, unsustainable, nonrenewable, etc. What do these terms mean? Others assign sustainability or renewability using a temporal criterion. Is it renewable over a 50-year timespan? 100 year? Does it matter? What guidance can hydrogeologists and modern groundwater science provide to water managers and planners?

2) ***Groundwater in a World of Diminishing Surface Freshwater Supplies.*** Can we identify geographical hotspots where groundwater supplies could be utilized to mitigate conflict and supplant declining surface water supplies? This session will involve identification of areas where surface water supplies are expected to decline, populations increase, and groundwater can be developed.

3) ***Groundwater, Hydrophilanthropy, and Water, Sanitation and Hygiene (WaSH).*** How can groundwater and the concept of hydrophilanthropy be used to enhance our ability to bring WaSH to the world's population so that the MDGs can finally be met and exceeded? [This could be separated into two sessions, with hydrophilanthropy given its own session that would include all freshwater.]

4) Groundwater Governance and Management. With the increased importance of groundwater, its governance and management become more important. Governance and management models will be examined and case studies examined. The combined (integrated) governance of groundwater, surface water, quality, and ecosystem requirements will be addressed.

5) ***Managed Aquifer Recharge (MAR).*** MAR can be implemented at small and large scales. Local entities [India is a good example] have developed successful MAR schemes. MAR at regional scales might be able to harvest water from faster-than-normal melting glaciers (Andes, Himalayas, etc.) and store the water from this 'one-time-only' melt for use as a buffer to replace declining surface freshwater resources. [This session could be combined with **[2]** above.]

6) Groundwater Tools for the 21st Century. Groundwater has entered the realm of 'Big Data', cloud computing, satellite remote sensing (GRACE, etc.), mobile phone ubiquity, nanosensors, non-invasive porous medium and fluid characterization, etc. How can these technologies best be integrated into groundwater management? What technologies are on the horizon? [note that 'new' GRACE satellites will be launched in 2017.]

7) A Quarter Century of IWRM: What Have We Learned? This session transcends groundwater by including all freshwater resources. By the time of 8WWF in 2018, the concept of IWRM will be about 25 years old. It is time for a thoughtful retrospective to assess IWRM's efficacy and suitability for a world now focusing on SDGs. Is IWRM obsolete? Does it adequately address and inform water management in a [hydroclimatologically] non-stationary world?