What's new in water, what's not, and what to do now

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1 What's new? A wider water perspective

Some recent global developments are both new and promising. The concern for water now spans a wider range of spatial scales. The meso-scale focus on river basins will no longer suffice, and many are focusing correctly on the need to understand the influence of water on a regional and global scale. New is also the realization, and perhaps more importantly the articulation, of a Planetary Boundary for water use. This has helped to fuel growing interest in vertical water flows back to the atmosphere and their link to the river depletion, which now covers more than 25% of the land surface. Our ability to monitor broad atmospheric vapor rivers by satellite has been a vital development that has allowed scientists to observe how water links between regions. As a result, special interest is now paid to the way these flows move upward, condensing the vapor into precipitation and flood generating downbursts in regions like California and Pacific Northwest. Finally, we are beginning to see a new feeling of uneasiness as people begin to realize that the

way we influence the moisture feedback may in fact intervene with such atmospheric rivers and global scale phenomena, such as the monsoon systems on which whole regions depend on for moisture.

2 What's not new? The way the planet works and our ability to neglect its importance

Today, 40 years after the 1972 UN Conference on Human Environment, known as the Stockholm Conference, the world is approaching a turning point when it comes to freshwater. In many decision making communities there has remained a widespread neglect of how the life support system of our Planet functions. Humanity persists to govern itself as if it occupied a planet where interventions with land and water—in terms of quantity as well as quality—do not have consequences.

Water's importance to maintaining this world is unchanging and non-negotiable. This marvelous substance H_2O is a physically, chemically and biologically unique matter that continuously circulates around the globe, between atmosphere, land, oceans and back to the atmosphere. Here on earth, all living things depend on it for their survival. It is provided to the land by precipitation formed from water vapor in the atmosphere. It regulates the climate by its energy transformations between frozen, liquid and vapor forms. It is the substance that helps transform CO_2 to plant matter by the photosynthesis in which water

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evaporation constitutes the pump that lifts water up from the soil to the foliage where it meets CO₂ to jointly form plant matter. In that lifting process water also carries nutrients, dissolved from the soil, up to the plant.

With its unique dissolving capacity—which goes back to the dipole character of the H₂O molecule—water is active in carrying soluble matter around; not just nutrients for the plants but also pollutants originating from human activities in households, agricultural and industrial activities travel into the landscape and cause biological damage to water dependent animals and biota. This is not cutting-edge science—it simply illustrates that water operates the same way in nature as it does in the kitchen and bathroom at home.

Despite steady advancements in our understanding of the natural system, people continue to pollute the planet as if no one would suffer as a result. Other human impacts of lasting neglect of the way the planet operates can be seen in groundwater overdraft of regional dimensions, in river depletion throughout the irrigation-dependent regions, in pollution even of inland seas to the point where algal clouds prevent summer bathing and where not even dogs could drink the water; and even in polar bears with deformed genitals caused by water contaminated with emerging pollutants. Yet the absurd misuse of the planet's resources continues to be whipped forward by a relentless rider named "Market", who is not only water blind but blind to the future of his own children.

The future of these children is now taking form under the inexorable influence of the whole set of driving forces currently at work: ongoing population growth in water short regions, and advancing environmental degradation in response to earlier disturbances, rising expectations of poor populations, and consumption based social structures addicted to buying and building more stuff. Their future is also in the winds of an ongoing climate change, caused by a thickening CO₂ blanket wrapped around the globe, a phenomenon that seems to leave many economists and politicians (even those with children of their own) surprisingly undisturbed. Although the natural blanket of primarily CO₂ and H₂O as the two dominating greenhouse gases keep the surface of our earth habitable by keeping it 33 centigrades warmer than it would otherwise be, these and their climate negotiators seem to believe that we can

unpunished continue to increase the thickness of this cover without serious effects on the climate of coming generations.

Of course, climate change will hit the global inhabitants, not by choking them with an overdose of CO₂, but by complicating their lives with all the changes it will cause in the water system—the blood stream of both the biosphere and the socio-sphere. Therefore, water concerns have to be entered into climate change negotiations. Since climate change adaptation is largely about water, it has to be merged with water security challenges.

3 What now? Make a real plan to achieve water security

We need a better navigation system to guide the governance of nations and the economy. Sustainable development is neither a new nor novel concept. It should be evident that an economic development involving manipulations with land, vegetation and water cannot go on forever as the earth is a limited system. At some point or another, the living world would be expected to breakdown. "Development towards sustainability" is a slightly steadier conceptual compass. It reflects a situation where people have reached an acceptable quality of life, and the life support system still continues to work and produce food and other vital ecological services. To make that possible, the politicians that are to lead humanity must have a proper idea of how the planetary ecosystem operates. The Earth is a living system guided by natural laws that are non-negotiable like the law of gravity, which makes water move from the mountains to the sea; and the laws of thermodynamics, which makes water evaporated from the low latitudes carry latent heat to higher latitudes and delivered there as precipitation after condensation. We must consider this before we set out our manipulations of land, water and the natural system.

Critically, we must build upon the growing awareness that freshwater is in fact the underlying determinant of social and economic growth. In realization of the decent life hoped for in less developed regions, a basic WATER SECURITY will be essential because of all the water-related services needed. Efforts to achieve water security has to include adequate water storage to overcome both the seasonality of rainfall,

especially in low latitude regions, but also the increasing rain variability, now accelerated by the ongoing climate change. The importance of this water security is reflected in the regional differences of countries, emphasized by World Bank officers Gray and Sadoff: the rich countries that have already harnessed their hydrology, the emerging economies that are still hampered by hydrological phenomena, and those poor countries that remain hostages of their hydrological difficulties, i.e. the poor semiarid countries where under-nutrition and rate of population growth cumulate.

Among all these dilemmas facing the kids of “Market the Rider”, the most important are those pertaining to the three basic elements needed for a decent life: primarily food, freshwater, and energy. The next set of leaders will need to go beyond the sectoral thinking that dominated their father’s generation. Such thinking is profoundly mismatched to handle the challenge.

4 A challenge for the next generation

Today’s youth will need to understand that a shift in water thinking will be essential to develop a governance

system that may really lead their generation to the future they hope for—a governance composed of both top down and bottom up approaches and that makes sound water management possible and well adapted to the way the Planet works. One central challenge will be to find out how to secure compatibility between the core challenges of sustainable provision of food, freshwater and energy, so that they can all be provided to megacities, towns, settlements and villages. Another is to ensure that the accelerating speed of human expansion does not push us past the Planetary Water Boundary.

The modernization of governance has to be built primarily around existing knowledge. There is not enough time to wait for results from new grand research projects. The good news is plenty of knowledge does exist. It tells us that the centre of the life support system is the circulation of H₂O, the dominant component of the human bodies, circulating between land and sea, land and atmosphere, and providing life support to the ecosystems, terrestrial as well as aquatic. Human ingenuity will likely take care of the unseen technological innovations that will push progress in the future. But, we need to get the basics right. We do not have another 40 years to wait.