

## Climate Change and Water Resources

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### **Drier Conditions Ahead**

The findings from the latest climate reports entitled, "Impacts, Adaptation and Vulnerability"<sup>1</sup> and "Mitigation of Climate Change"<sup>2</sup> released by the Intergovernmental Panel on Climate Change (IPCC) on 31 Mar 2014 and 11 Apr 2014 respectively came as no surprise to many. A quick summary of some of the key highlights in the Working Group II report, "Impacts, Adaptation and Vulnerability" in relation to water resources are as follows:

- Climate impacts are already widespread – impacts from recent extreme climatic events, such as heat waves, droughts, floods, and wildfires, demonstrate significant vulnerability and exposure of some ecosystems and many human systems, such as food production, to climate variability
- Ecosystems and species, food and water security, livelihoods and human health are already impacted and are at increasing risk as warming continues - the tropics, the Arctic, the coasts and low-lying regions face particular challenges
- Climate change is an increasing threat to human security, as it harms access to food, water and shelter, destroys property, compromises culture and identity, increases forced migration and rivalry, and challenges the ability of states to provide the conditions necessary for human security. Indirectly, it can fuel risks of violent conflicts
- 4°C warming by 2100 – implies high or very high risks and impacts to natural and human systems. Adaptation is of limited help
- Climate change will hurt the economy and more warming implies higher losses, but estimates vary wildly and aggregate impacts hide large differences between countries

Separately, the latest report released by the Earth Institute, Columbia University "Global Warming and 21<sup>st</sup> Century Drying"<sup>3</sup> on 31 Mar 2014 carried a key message that the Earth is getting drier due to changing rainfall patterns and warmer temperatures that will cause more evaporation that could lead to a third of the Earth drying up by the 21<sup>st</sup> century.

The study, amongst the first to use the latest climate simulations to model the combined effects of changing rainfall patterns and evaporation rates has projected that 12% of land will be subjected to drought by 2100 through rainfall changes alone. However, the drying will affect up to 30% of land if higher evaporation rates from the added energy and humidity in the atmosphere are included in the climate model.

### **More Pressures on Water Availability and Quality**

Besides a drier Earth that will lead to prolonged drought that impact the availability of water resources, climate change has shown to have far-reaching impacts on the environmental, social and economic conditions. The associated increase in frequencies of extreme weather events such as floods, heat waves, droughts and rising sea-level in recent years have major consequential humanitarian impacts that could cause political and security risks at both national and regional levels.

According to the United Nations Children's Funds (UNICEF) and World Health Organisation (WHO), one-fifth of the world's population or more than 1.2 B people live in areas of

physical water scarcity (where there is insufficient water to meet all demand) or economic water scarcity (where human or financial resources are insufficient to provide for adequate water resources). Secondly, access to fresh water is a local issue given the uneven distribution of fresh water across countries and regions. About 60% of the world's fresh water supply is available in only nine countries, namely; Brazil, Russia, China, Canada, Indonesia, the US, India, Colombia and the Democratic Republic of Congo.

However, even though countries like China, India and the US have abundant fresh water when considered from a country perspective; local variations within the country can be significant due to the vast geographic land masses. For example, in China, most of fresh water is found in the southern part of the country and impacts from climate change have caused periodic flooding in the Yangtze River region in the south while a third of the wells, rivers and basin in China's northern region have dried up and ground water levels falling by some two metres yearly.

Making the matter worst, a number of media companies<sup>4</sup> have cited a report release last week by Xinhua net that man-made pollutions have rendered nearly sixty percent of ground water in China unfit for human consumption. In the northern region encompassing several of the country's largest farming provinces, up to seventy percent of its ground water is contaminated and this could expose crops and livestock to dangerous contaminants as well. India is also not spared<sup>5</sup>.

Besides water availability, WHO has also identified that about 12% of the world's population living in the poorest or most undeveloped areas; e.g. sub-Saharan Africa suffer economic water scarcity. The lack of funding or poor policy planning and implementation has hindered the development of the necessary infrastructure that is needed to provide access to clean water.

According to the IPCC report, climate change and effects from global warming will put more pressures in the following countries/regions:

- Africa – water stress, reduced food productivity, spread of diseases
- Asia – flooding, heat-related mortality, drought-related water and food shortage
- Australasia – damage and loss of coral reefs & other species, flood damage, coastal damage
- Central and South America – water shortage, urban floods, food production
- Europe – flooding, freshwater availability, extreme heat events
- North America – wildfires, heat extremes, floods
- Polar regions – risks for ecosystems, risks for health and well-being of Arctic residents and unprecedented challenges and hazards to northern communities

History has shown that scarcity in critical resources can lead to tension and unrest whether in localized areas within a country or in a region. Since water lies at the heart of everything that is crucial for human life: food supply (agriculture), sanitation, energy, production of goods and services, transportation, etc; the impact of a changing climate on water availability and quality will lead to immediate, tangible and local risks in many of the countries and regions that are facing the increased levels of climate change consequences. Even organizations that are heavily reliant on water for their daily operations; e.g. clothing, automobile, food and beverage, biotech/pharmaceutical, chemical, forest products, electronics, mining, refining and electric utilities will be severely hampered by the increased risks of water scarcity. The unusual long dry spell experienced by Malaysia since early Jan this year has led to water rationing and increased costs of procuring water supply impacting many manufacturers and retailers in Selangor, Malaysia's most industrialised state. Many of them are considering moving their businesses should there be no improvements in the current situation.

So what can be done?

## **Developments to Improve Situation of Water Scarcity**

Water scarcity is a complex and multi-faceted issue due its inter-relationship with several factors including rapid growing population, industrialisation in developing countries, changes in local, regional and global precipitation due to climate change, uneven distribution of water sources, inadequate infrastructure for processing and distribution, poor planning and management, lack of government policies and foresight, etc. In other words, water scarcity is always interconnected to social, political, economic and environmental factors.

According to the UNICEF and WHO 2012 Updated Progress Report on Drinking Water and Sanitation<sup>6</sup>, the Millennium Development Goals has been reached as more than 2 billion people have gained access to improved drinking water sources since 1990. However, more works need to be done as there are still 780 million people without access to an improved drinking water source. Some regions, the report highlighted which include sub-Saharan Africa has lagged behind as many rural dwellers and the poor often missed out on improvements to drinking water and sanitation projects due to a myriad of challenges.

As highlighted earlier, water scarcity is a complex issue and even within the United Nations, the responsibilities and competencies relating to freshwater governance are highly fragmented amongst different organisations, programmes and funding sources. To rectify this abnormality, the UN-Water was set up in 2003 to put forth the Global Water Governance (GWG) mechanism but it lacked the formal decision making power to achieve the set goals. The Millennium Challenge Corporation (MCC)<sup>7</sup> was established in 2004 by the US as an alternative to traditional foreign aid – its priority is to award aids to countries that demonstrate good governance, encourage economic freedom and invest in its people. The development programmes including access to water supply and sanitation awarded by MCC are conceived and implemented by the host countries.

Sanitation and Water for All (SWA)<sup>8</sup>, a global partnership of more than 90 developing country governments, donors, civil society organisations and other partners have come together since 2006 to catalyse political leadership and action, improve accountability and use scarce resources more effectively to work towards a common vision of universal access to safe water and adequate sanitation.

Despite efforts of these and other government and non-government bodies, progress to address water scarcity issue remain slow. SWA in its mission has highlighted the 4 key common challenges faced by such organisations, donors and developing countries:

- National plans are not being developed and implemented mainly due to the lack of adequate institutional or human resource capacity
- Financing is unpredictable, insufficient and often does not reach the countries of people that need it most
- Lack of reliable evidence, data or analysis to make informed decision and difficulties in tracking progress resulting in donors and financing organisations being reluctant to invest more or prioritise their investment
- Low levels of mutual accountability between developing countries and their donors and between developing countries governments and their people

The good news is that the UN General Assembly<sup>9</sup> has on 28 Jul 2010 recognised that safe and clean drinking water and sanitation are human rights, essential to the full enjoyment of life and all other human rights. Towards this end, the UN Human Rights Council has in Sep 2010 affirmed that the right to water and sanitation is derived from the right to an adequate standard of living and inextricably related to the right to the highest attainable standard of physical and mental health, as well as to the right to life and human dignity.

While the combined effect of these two resolutions was to anchor the right to water and sanitation in the framework of the right to an adequate standard of living, making it

legally binding like any other of the rights inscribed in UN treaties, the road ahead is still full of humps and challenges.

## References:

<sup>1</sup> IPCC Climate Change Report 2014: *Impacts, Adaptation, and Vulnerability by Working Group II*: <http://ipcc-wg2.gov/AR5/>

<sup>2</sup> IPCC Climate Change Report 2014: *Mitigation of Climate Change by Working Group III*: <http://mitigation2014.org/>

<sup>3</sup> The Earth Institute, Columbia University: *Global Warming and 21<sup>st</sup> Century Drying*: <http://www.earthinstitute.columbia.edu/articles/view/3164>

<sup>4</sup> The Guardian, 23 Apr 2014, *China says more than half of its groundwater is polluted*: <http://www.theguardian.com/environment/2014/apr/23/china-half-groundwater-polluted>

<sup>5</sup> India Today, 29 Mar 2014, *Vast amount of industrial effluents behind unfit drinking water in Ghaziabad*: <http://indiatoday.intoday.in/story/ghaziabad-water-unfit-drinking-industrial-effluents-delhi-ncr/1/351796.html>

<sup>6</sup> UNICEF-WHO: *Progress on Drinking Water and Sanitation- An updated Report 2012*: <http://www.unicef.org/media/files/JMPReport2012.pdf>

<sup>7</sup> The Millennium Challenge Corporation (MCC): <http://www.mcc.gov/pages/about>

<sup>8</sup> Sanitation and Water for All (SWA): <http://sanitationandwaterforall.org/about>

<sup>9</sup> General Assembly declares access to clean water and sanitation is a human right, 28 Jul 2010: <http://www.un.org/apps/news/story.asp?NewsID=35456#.U14dk1eTn4Y>

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