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MODEL UNITED NATIONS

January 10th - 12th, 2019

First Edition

United Nations Environment Program

“Water Scarcity”

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WHAT IS WATER SCARCITY ?

Water scarcity can mean scarcity in availability due to physical shortage, or scarcity in access due to the failure of institutions to ensure a regular supply or due to a lack of adequate infrastructure.

Water scarcity already affects every continent. Water use has been growing globally at more than twice the rate of population increase in the last century, and an increasing number of regions are reaching the limit at which water services can be sustainably delivered, especially in arid regions.

Drought in Niger in 2011. Photo: WFP/Phil Behan

CHALLENGES

Water scarcity will be exacerbated as rapidly growing urban areas place heavy pressure on neighbouring water resources. Climate change and

bio-energy demands are also expected to amplify the already complex relationship between world development and water demand.

Aerial shots of Ricefields near Baucau, Timor Leste. UN Photo/Martine Perret

OPPORTUNITIES

There is not a global water shortage as such, but individual countries and regions need to urgently tackle the critical problems presented by water stress. Water has to be treated as a scarce resource, with a far stronger focus on managing demand. Integrated water resources management provides a broad framework for governments to align water use patterns with the needs and demands of different users, including the environment.

A GENERAL OVERVIEW BY THE WWF:

Water covers 70% of our planet, and it is easy to think that it will always be plentiful. However, freshwater—the stuff we drink, bathe in, irrigate our farm fields with—is incredibly rare. Only 3% of the world's water is

fresh water, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use.

As a result, some 1.1 billion people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year. Inadequate sanitation is also a problem for 2.4 billion people—they are exposed to diseases, such as cholera and typhoid fever, and other water-borne illnesses. Two million people, mostly children, die each year from diarrheal diseases alone.

Many of the water systems that keep ecosystems thriving and feed a growing human population have become stressed. Rivers, lakes and aquifers are drying up or becoming too polluted to use. More than half the world's wetlands have disappeared. Agriculture consumes more water than any other source and wastes much of that through inefficiencies. Climate change is altering patterns of weather and water around the world, causing shortages and droughts in some areas and floods in others.

At the current consumption rate, this situation will only get worse. By 2025, two-thirds of the world's population may face water shortages. And ecosystems around the world will suffer even more.

THE IMPACTS

The effects of water scarcity can be grouped into these 4 broad areas—Health, Hunger, Education, and Poverty.

Health

In many developing countries, people are forced to drink low quality water from flowing streams, many of which are contaminated. There are many water-borne diseases that
people die off.

Less water also means sewage does not flow, and mosquitoes are other insects breed on still (stagnant) dirty water. The result is deadly malaria and other infections.

Lack of water or quality water causes huge sanitation issues. Clinics, local restaurants, public places of convenience and many other places

are forced to use very little water for cleaning. This compromises the health of the staff and people who use the facilities.

Hunger

It takes a lot of water to grow food and care for animals. Experts say that globally we use 70% of our water sources for agriculture and irrigation and only 10% on domestic uses.

Less water means farming and other crops that need water to grow have lower yield. It means farm animals will die and others will not do well without water. The result is constant hunger and thirst and low quality of life.

Education

It is a bit hard to see how water and education is related. For many people in other parts of the world children (and teen girls) have to be up at dawn to collect water for the family. They have to walk for several miles to get water. The children get tired and some have to miss school as a result. Doing this for many years take away school times and the cycle continues. In other places, girls and women are not allowed to go to school at all so that they can serve the family by getting water and taking care of other family needs.

Poverty

Access to quality water is key to economic prosperity and better living standards. Businesses and schools thrive when people come to work on time and not have to spend all morning looking for water. Restaurants, hotels and shopping places need to keep clean to attract tourists and foreign investments. Manufacturing activities, commercial farms, and mining processes all need a lot of water to thrive. Lack of water means no economic activities will happen and the people will be in constant poverty.

MAIN ACTORS:

- **SOUTH AFRICA AS THE AFRICAN LEADER AGAINST WATER SCARCITY :**

South Africa is a good example of collaboration. Water is a serious issue here. Low rainfall and limited underground aquifers means it already has to import water from neighbouring countries, and supply is set to decline further if current trends of inefficient use, leakage and wetland destruction persist.

At the same time, the demand for water from agriculture, industry and growing urban centres is expected to rise by 52% over the next 30 years. Unless the problems are addressed, 2030 Water Resources Group (WRG) estimates there will be a water supply-demand gap of 17% by 2030.

The South Africa Strategic Water Partners Network (SWPN), a partnership between the Department of Water Affairs (DWA) and WRG, works with businesses such as SABMiller, Coca-Cola and Sasol to help South Africa address three priorities: improving the efficiency of water use and reducing leakage; reducing water use in the agricultural supply chain; and creating partnerships to treat effluent.

SABMiller, brewer of Castle Lager and Hansa Pilsener, has a net water footprint of about 511,100m litres for its South African operation — 95% of which is associated with growing crops. The company identified water shortages and quality as a risk to its agricultural supply chain and its brewing operation in Polokwane.

- **GERMANY, WHICH MANY CONSIDER AS “THE WATER SAVIOR OF THE WORLD” :**

Germany is the European champion when it comes to saving water and is supporting projects around the world that are designed to protect this vital resource.

A precious resource: publicly accessible drinking water

Germany. A cycle that makes good sense: over 96 percent of waste water from private households and public institutions in Germany is channelled to sewage treatment plants for purification. No other European country treats as much waste water for reuse.

Which themes is Germany representing?

Numerous institutions and actors from Germany are playing a major role in water savings: such as the Federal Foreign Office, which is supporting work on a Compendium of Sanitation Technologies designed for humanitarian emergencies, and the Karlsruhe Institute of Technology (KIT), which is presenting a simulation of how energy could be generated from waste water.

Why is waste water in the spotlight?

Untreated waste water contaminates drinking water and thus poses a risk to health. Among others, representatives of all the major german water control organizations alongside the German Toilet Organization are discussing how important the interplay of water, sanitation and hygiene (or WASH for short) is. An NGO that is a member of the German WASH

network, the German Toilet Organization is working to ensure that as many people as possible in the world have access to clean toilets and sustainable waste water management systems.

What other issues are on the agenda?

Another global challenge is the pollution of waterways by plastic waste. During World Water Week, the KfW Development Bank took part in a discussion of this issue. It initiated the Blue Action Fund which supports NGOs in their marine conservation efforts and promotes the establishment of new environmental protection areas, sustainable fishing and eco-friendly tourism. The idea is for roughly a dozen projects with a volume of at least 20 million euros to be funded by 2019.

KEY QUESTIONS TO CONSIDER

Any geographically-extensive water-saving initiative in agriculture will require leadership and funding support from governments. But we all need to help.

For example, in an effort to improve overall water security and restore badly-damaged freshwater ecosystems in the Murray-Darling Basin of Australia, the Commonwealth government has set a goal to reduce consumptive water use by 20%. To date, more than AUS $13 billion has been appropriated for this purpose, which is being implemented through direct buy-backs of water-use entitlements from farmers as well through investment in on-farm irrigation infrastructure improvements and other water-saving measures.

Any such ambitious endeavors to resolve water scarcity will need to be custom-tailored to the political economies, cultural values, and water-use context of each country, river basin, or aquifer. Here I will offer some ‘big questions’ that should be addressed in most instances; academic

institutions, corporations, NGOs, and governments should all be giving these questions their due consideration and working toward implementing the results. I invite your reactions or additions to this list.

- Are we deploying the most effective water-saving measures in irrigated agriculture in all places, and for all crops, and if not, how can we stimulate full implementation?

- Are we growing the right crops, optimized for water productivity and (a changing) climate but also for maximizing economic returns and employment opportunities, and if not, how can we incentivize crop shifting?

- Conversely, are there some areas of crop production so essential to food security, at both national and international levels, that we should avoid reallocating water away from those farms?

- Do national or even regional imports and exports of agricultural goods make sense from a water perspective, as well as comparative advantage, and if not, what trade incentives or disincentives might drive desired shifts in global trade?

- Are agricultural producers able to trade water-use rights in a manner that enables desired shifts in crop production, or financially incentivizes water savings and reallocation (i.e., sale of rights to saved water), and if not, how might water markets be reformed to minimize transaction costs and obstacles to trade?

- Is it legally possible to dedicate water savings back to the environment to restore degraded freshwater ecosystems, and if not, what legal reforms are needed?

THE SOLUTIONS AI CAN BRING TO THE TABLE

3 possible hypothesis for the investigation of “Artificial Intelligence on Water Scarcity”.
If we use desalination to remove salt from seawater, then potable water sources can be created in order to satisfy everyone’s needs and

preserve natural freshwater supplies.
If we implement artificial neural network in the water treatment system, then we can improve the quality and efficiency of the process by creating robots to make decisions and learn things in a human way like.
If we use artificial intelligence in desalination plants to replace human work (despite its efficiency and quality), then the unemployment percentage can increase amongst the population.
Hypothesis Investigation: “If we use artificial neural networking by creating robots able to analyze data, then we can replace human work in the process of desalination and be capable of improving water quality with the obtained information of human work and provide potable water to citizens.”
It has been said that around 3% of the water is potable and unfortunately, more than half of this quantity is inaccessible due to its location or depth. Therefore, as world population keeps growing exponentially, so will the demand for fresh water. For this reason, improving water treatment will become one of our top priorities since this actions will require hard work, capital and time.
Even though scientists are always searching for different ways to enhance this water treatments and satisfy the needs, the processes seem not enough since more than two hundred million people have water shortage at home and four hundred million, are struggling to have proper sanitation services. However, there has been several organizations, such as UN (United Nations), that support one of the most important projects towards developing countries aiming water scarcity; this process is known as desalination.
Desalination is known as the process that separates salts and other minerals usually from seawater through a technology called “reverse osmosis”. Reverse osmosis is the operation used to remove contaminants from the water under pressure through a semipermeable membrane, a biological sheath that allows certain particles to pass from “side a” to “side b” by diffusion.
Artificial Neural Networking (ANN) is the simulation performed on the computer or the creation of robots assigned to copy specific tasks of human activities such as learn things and make decisions in a human way like. The ANN receives information from the outside and processes the input as a pattern and image in vector form and sets up the

information inside artificial networks which are called “units” linked by “weights”, the connections in the system. ANN is composed of three layers called the input layer, output layer and the hidden layer. Starting with the input layer, it receives all the explanatory observations and delivers to hidden layers, it is important to know that this layer is known as “passive” since it does not modify the given data, sending it just as it was received.

The hidden layer can contain one or more hidden layers where the information is processed in different nodes and then connected to the various output layers that will later receive the processed information. Last, there is the output layers receive the connections either from the hidden layers or the input layers. The active nodes located at the output combine and change the obtained data. Later on, this data is then weighted by the same output layer and manipulates in order to obtain and release the most accurate data.

The difference between a conventional information process and an Artificial Neural Networking lies in the before mentioned weighing of data to release a processed information, not only the first result obtained.

As in the real world specifically talking about Germany’s industrial sector artificial intelligence (AI) is finally bringing a multitude of capabilities to machines that were long thought to belong exclusively to the human realm with this we expect the possible appliance of this referred machines to the automatization of a desalination process plant established near the sea to facilitate and make a more efficient and productive process.

In matter of quantitative data, the price of this appliances at the moment elevated but according to ARK anticipates that industrial robots will cost less than $11,000 per unit, much less than the Boston Consulting Group’s (BCG’s) expectation of $24,000, by 2025. This cost of machinery plus the addition of the Machine Learning or Artificial Intelligence program that will lead the work.

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