

ORSAM

ORSAM WATER BULLETIN

Events-News-Politics-Projects-Environment-ClimateChange-Neighbourhoods-Cooperation-Disputes-Scarcity and more







Issue 116

ORSAM WATER BULLETIN

18 February 2013 – 24 February 2013

- Changing status of water in Turkish foreign policy
- Climate change to exacerbate water supply in Mideast
- * The Middle East Lost a Dead Sea-Size Amount of Water in 7 Years
- **Will Water Shortages Unleash Instability in the Middle East?**
- * NASA Probes Show 'Alarming' Water Loss in Middle East
- ***** Transhumanity: Water wars
- ✤ UN warns of 'humanitarian tragedy' in Syria
- Thirsting for Justice Campaign Teach-in for Palestinian water rights World Water Day
 22 March 2013
- ✤ Israeli water tech draws new European investment
- ✤ NanoH2O awarded membrane order for expansion of Israel desalination plant
- ***** Harish Rawat launches national Ganga rights campaign at Mahakumbh
- * After China's multibillion-dollar cleanup, water still unfit to drink
- ✤ Dams to irrigate 2,688 acres in Fata
- Small dams to irrigate 2,688 acres of land in Waziristan
- ✤ Kenya: 'Sand Dams' Bank Water for Dry Season in Semi-Arid Kenya
- Solution Bloomberg BNA Launches Water Law & Policy Monitor
- ***** To Control Floods, The Dutch Turn to Nature for Inspiration
- ***** Securing a sustainable future
- ✤ Australia's Water Markets Succeeding, Yet Severe Challenges Loom
- Bill targets bottled water in Maine governments



Changing status of water in Turkish foreign policy

Turkish foreign policy problems on transboundary waters started to emerge in the 1960s.

In parallel with the overall tendency in the world, the utilization of water for irrigation and to generate hydroelectric power was also at a limited level in Turkey before this period, thus transboundary and border-determining waters did not pose any problem with neighboring countries. In this period, which could be called the first period, arrangements related to transboundary and border- determining rivers were made instead on the designation of boundary lines. In the aforesaid period, two agreements on the Euphrates and Tigris rivers -- aiming to take advantage of transboundary waters -- were signed between Turkey and Syria and yet another between Turkey and Iraq.

According to an Article in the 1921 "Ankara Agreement" signed with France, which had a mandate for Syria, the city of Aleppo may organize a water supply from the Euphrates in Turkish territory at its own expense in order to meet the requirements of the district. Also, the 1926 "Convention of Friendship and Good Neighborly Relations" between Turkey and Syria envisaged cooperation between the two countries to increase productivity in using the water. The additional protocol of the 1946 "Treaty of Friendship and Good Neighborly Relations" between Iraq and Turkey envisaged that Turkey and Iraq regulate the Tigris, Euphrates and river reach waters and that both countries share the expenses for that purpose. These are the developments that took place during the first period.

After Turkey initiated activities to improve water resources on the Euphrates River in the 1960s, the second period began. This is when the dispute on the utilization of transboundary waters started between Turkey and its neighbors. After construction of the Keban Dam on Euphrates River began in 1965, objections arose from Syria and Iraq, the riparian countries sharing the downstream banks of these rivers. The leading motive of Syria and Iraq's objections during this process was suggested to be a decrease in the quantity and quality of the water of the Euphrates River caused by the dams Turkey constructed. Even though certain negotiations were made among the three riparian countries through a joint technical committee during the same period, they could not reach a decision that would please each party.



After the construction of the Karakaya Dam was started on the Euphrates River, Syria and Iraq repeated their objections. During that period, the problems in the basin increasingly reached an international level and the basin started witnessing interventions from third parties. The loans Turkey took out from international organizations and the United States Agency for International Development (USAID) for the construction of the Keban and Karakaya dams were conditioned on negotiations with the downstream riparian countries and to provide a certain amount of water. Those preconditions were the main reasons why Turkey had pursued a policy against interventions from third parties of the basin until that point.

Moreover, Iraq and Syria were on the verge of a war due to the considerable decrease in the flow of water in Iraq caused by the coincidence of the filling up of the Keban Dam reservoir as well as the Tabkha Dam constructed by Syria. However, close combat between the two countries was prevented as a result of joint efforts by the Arab League and Saudi Arabia. The risk that the issue might turn into an armed conflict was caused by the fact that both countries were under different Ba'ath regimes opposing one another. The reason for the tension Turkey experienced with Iraq and Syria on transboundary waters in the 1970s was caused by the fact that while Turkey was part of the Western bloc, Syria and Iraq had a close relationship with the Soviet bloc.

The fact that Turkey started putting the Southeastern Anatolia Project (GAP) into practice in the 1980s increased Iraq and Syria's concerns. While the hydroelectricity-generating Keban and Karakaya dams played a positive role by regulating the Euphrates -- which did not have a stable flow -- this time Iraq and Syria raised their voices as GAP would lead to a decline in the total amount of water available for irrigation. Turkey was isolated in putting GAP into practice as a result of the stipulations of the international organizations to get the approval of the downstream riparian countries for financing the project and also due to the policies of Iraq and Syria to include the Arab League in the issue.

Striving to put this project into practice by its own means, Turkey also continued negotiations on the issue with Iraq and Syria via the joint technical committee. During this process, Syria unofficially demanded more water from the Euphrates River to cease support for the Kurdistan Workers' Party (PKK). Although Turkey strongly objected to this demand, Syria insisted on maintaining this relationship and thus the relations evolved in that direction. This kind of tense relationship that



continued throughout the 1990s started to calm down from the beginning of the 2000s. Iraq went to war with Iran in 1980, invaded Kuwait in 1990 and sustained great damage as a result of the attack by US-led coalition forces. Therefore, Iraq had to play a more passive role regarding the water issue throughout 1990s, as it had to deal with more important matters.

When the relations between the countries started normalizing after the then Turkish President Ahmet Necdet Sezer attended the funeral of the late Syrian President Hafez al-Assad in 2000, the water issue fell off the agenda. This water issue, which has been going on since the 1960s, has now entered a new period.

The efforts for opening up to different regions, especially Africa, started changing the status of water in Turkish foreign policy. The Euphrates-Tigris basin riparian zones and Turkey have not reached any conciliation on transboundary water utilization. However, Turkey has been pursuing new foreign policies to help African countries improve water resources for development of those countries where growing populations have difficulty in meeting urban water needs. With the technical support of the State Waterworks Authority (DSI), water wells were drilled in Ethiopia, Sudan, Burkina Faso and Niger. In addition, Turkey says it could provide Palestine with water in order to find a solution to the water problem in that country.

Recent developments show that water is not only a means of conflict as in previous periods but that it might also be a means of cooperation for Turkish foreign policy. Despite the continuing problems regarding the use of water which originates in its territories and then flows into the territories of other countries, Turkey shows that water might be used as a means of cooperation in the new period. In the case of this understanding also being approved by Syria and Iraq, the other riparian countries, on the issue related to the Euphrates-Tigris basin -- of which Turkey is a party -- it should be accepted that the problem that has existed among the countries for a long time might easily be solved.

"Changing status of water in Turkish foreign policy", Seyfi Kılıç, 24/02/2013, online at: <u>http://www.todayszaman.com/news-307931-changing-status-of-water-in-turkish-foreign-policy.html</u>

BACK TO TOP



* Climate change to exacerbate water supply in Mideast

Population growth, economic boost, changes in land use, pollution and negative effects on water resources will further increase as a result of climate change. Climate change directly affects the natural hydrologic cycle of water.

According to a statement by NASA last week, the water problems which the Middle East experiences the most in the world will become worse in the coming years. According to a study carried out by NASA by reviewing satellite images, dry spells and climate change from 2003-2009 led to a loss of 144 billion cubic meters of water from the Euphrates and the Tigris basin. The aforementioned loss includes not only losses from water surfaces but also from groundwater as well. Sixty percent of the water loss was from groundwater reserves. In 2007, when a drought in the region was at severe levels, groundwater use was observed to have increased significantly, especially in agricultural fields.

While the contribution of groundwater in the region to the demand for water is 52 percent, the amount of actively drawn water was 60 percent. While excessive use of groundwater negatively affects the sustainability of a limited source, it also has a negative impact in socioeconomic terms; saltwater intrusion takes place, especially in coastal aquifers. Drawing excessive amounts of water leads to the intrusion of pollutants into the groundwater, thus causing quality problem. Institutional studies on groundwater use are disorganized and insufficient. Countries lack groundwater management tools and are not well-informed. In addition, public participation and awareness is weak in the region.

In the region, where management and surveillance related to use of groundwater is weak; for instance, the water table in wells located in the eastern part of the United Arab Emirates decreased to 150 meters in the 1980s while it is around 400 meters today. In Yemen, where water shortages prevails, it is legally prohibited to drill wells. It is estimated that 2,500 wells were drilled in aquifers.

Studies show that due to climate change, dry zones will become drier and temperate zones will be more temperate. While climate change, which has an impact on the average precipitation rates and temperatures, leads to intense precipitation periods and floods, decreasing precipitation rates in the Middle East, which is located in a semi-arid/arid climate zone, will increase the existing water shortage. Besides, rising temperatures and thus rising evaporation will also affect the biological,



chemical and physical characteristics of lakes and rivers. Furthermore it was stated in a report prepared by the Arab Forum for Environment and Development (AFED) that the surface temperature in the region where Arab countries are located will increase between 2.5-5.5 degrees Celsius towards the end of the 21st century and that the aforesaid rise will decrease the precipitation rate in the region by 20 percent.

The annual average water potential of the Euphrates-Tigris basin, which is at the forefront of the news by NASA, is some 87 billion cubic meters. This figure equals the size of the Nile River whose annual potential is 84 billion cubic meters. The total surface area of the Euphrates-Tigris basin, to which Syria, Iraq, Iran, with a contribution of 10 percent, and Turkey are riparians, is 879,790 squared kilometers. Considering the statistics of the Food and Agriculture Organization of the United Nations (FAO) as a reference, hydro-geologically 46 percent of the basin is located in Iraq, 22 percent in Turkey, 11 percent in Syria, 19 percent in Iran and the rest of the basin is located in Saudi Arabia. The annual average discharge of the Euphrates River is 33.7 billion cubic meters. While Turkey contributes 33.1 billion cubic meters (98.5 percent) to the Euphrates River, Syria's contribution is 500 million cubic meters (1.5 percent). Iraq does not contribute to Euphrates River. The annual average discharge of the Tigris River, on the other hand, is 52.7 billion cubic meters. According to Turkey's calculations, on the other hand, the Tigris River's discharge is 16.2 billion cubic meters. Within the borders of Iraq, the flow rate of the Tigris River reaches 21.3 billion cubic meters with the contribution of the Great Zab which rises in Turkey. The amount of water per capita in basin countries annually are estimated to be 1,700 cubic meters in Iraq and 732 cubic meters in Syria for the year 2025. According to the State Waterworks Authority (DSİ), on the other hand, this figure is some 1,200 cubic meters in Turkey. Those figures show that water shortage will increase especially in Syria and Turkey.

Throughout the Middle East, and especially in the aforementioned countries, water demand, population growth, food safety concerns, non-efficient use of water and especially using ancient irrigation techniques in agriculture lead to major water loss. As it is necessary to organize water management structures on the productive use of water, users especially should be trained to use water economically. In addition to this, climate change will also change the operations and functions of current water structures (hydroelectric, flood control, drainage and irrigation system) as well as water



WATER RESEARCH PROGRAMME -Weekly Bulletin-

management. The studies show that current water management is not strong enough to overcome the impacts of climate change. Water management also affects energy, environment, health, nature conservation and food policies. Therefore, it is necessary to keep the record of deficiencies caused by climate change and to adapt water-related methods into new circumstances.

"Climate change to exacerbate water supply in Mideast", Tuğba Evrim Maden, 24/02/2013, online at: http://www.todayszaman.com/news-307933-climate-change-to-exacerbate-water-supply-in-mideast.html

BACK TO TOP



The Middle East Lost a Dead Sea-Size Amount of Water in 7 Years

This week my research team and I published a <u>new study on recent (2003-2009) water losses in</u> <u>Turkey, Syria, Iraq and Iran</u>. We used data from a NASA satellite mission called <u>GRACE</u> (short for Gravity Recovery and Climate Experiment) that essentially weighs regional water storage changes from space. The picture is not a pretty one.

In the seven-year period that we analyzed, the region lost over 144 cubic kilometers of fresh water, an amount equivalent in volume to the Dead Sea. More detailed analysis revealed that over 60% of the water loss was due to groundwater pumping. Much of this occurred during the drought that began in 2006, and was most likely used for agricultural irrigation.

Depending on varying standards for per capita water use in the region, that's enough water to supply tens of millions, to over a hundred million people with water for a year. We continue to monitor the region, and the rates of water loss that we report are continuing into the present.

Our team's expectation is that the water situation in the Middle East will only degrade with time, primarily due to climate change. The best available science indicates that the arid and semi-arid regions of the world will become even more so: the dry areas of the world will become drier (while conversely, the wet areas will become wetter). Consequences for the Middle East include more prolonged drought, which means that the underground aquifers that store the region's groundwater will not be replenished during our lifetimes, nor during those of future generations.

Moreover, the rapid rates of groundwater depletion that we report will only accelerate the drying of the region, placing additional stress on already overtaxed resources. After all, a typical human response to drought is to rely more heavily on groundwater resources, since more accessible surface waters are not available.

Declining water availability in the Middle East is consistent with an emerging, if not <u>alarming</u>, <u>global</u> <u>picture</u>. Our satellite data and available measurements on the ground now tell us that most of the world's aquifers in the dry parts of our planet are being rapidly depleted. The human fingerprint of water management has left an indelible and irreversible impression on our water landscape. Climate change and population growth only conspire to make this bad situation worse. The Middle East is by



no means alone in its water woes. Analogies are present on nearly every continent, including the key aquifers in the U. S. – the <u>Ogallala</u> and the <u>Central Valley</u>

Water for Peace

Following the release of our report, lead author Kate Voss (our Water Policy Fellow at the UC Center for Hydrologic Modeling (UCCHM)), UCCHM Graduate Fellow Sasha Richey, Larry Gold from the UC Irvine Chancellor's Office, and I are visiting Israel, Jordan and Palestine for a two-week water diplomacy trip. We will present and discuss our findings with the national water authorities, at university campuses and to NGOs like the Friends of the Earth Middle East. We also expect to learn much about how our hosts cope with some of the most severe levels of water stress in the world. Please look for our series of Water Currents posts during the course of our trip.

Serendipitously, our report and trip provide a timely opportunity for President Obama in the run-up to his own upcoming visit. The groundwork could not have been better prepared: a unique opportunity has presented itself to encourage new dialogue on Middle Eastern water issues, and in particular, how they can be a source for collaboration rather than <u>continued</u>, if not <u>heightened</u> <u>conflict</u>.

Better Water Management

We cannot reverse climate change and its impact on water availability, but we can and must do a far better job with water management, including the modernization of national and international water policy. Our research and its implications point to the following critical needs, not only for the Middle East, but in all regions of the world where groundwater resources are in decline.

First, it's high time for groundwater to be included under the water management umbrella. In most of the world, groundwater pumping is unmonitored and unregulated. It is as true in much of the U. S. as it is in the Middle East. That's no different than making withdrawals from a savings account without keeping track of the amount or the remaining balance: irresponsible without question, and a recipe for disaster when multiple account holders are acting independently.

Second, since nearly 80% of the world's water resources are used to support agriculture, continued improvements in agricultural and irrigation conservation and efficiency should be an important focus



for research, development, investment and cooperation. In the Middle East, some countries, notably Israel, are pioneers of efficiency, while others are less advanced. Much of the technology is in place. It just needs to be disseminated and embraced across the entire region.

Third, our report and others that have preceded it clearly demonstrate that satellite technology has advanced to the point where a reliable assessment of regional hydrology can be produced with little access to observations on the ground. Our <u>2009 study of groundwater depletion in India</u> is yet another example of current capabilities. My point is that data denial policies amongst nations will ultimately be rendered obsolete. It will be far better to share key measurements now, to enhance and fully utilize the satellite picture for mutually beneficial water management in the long term.

Finally, the priority of international water policy discussions must be elevated. All around the world, we will increasingly be faced with the need to share water across political boundaries, either within nations or between them. More generally, our common water future must accommodate the ability to move water, either literally or virtually, from the regions that have it to the regions that do not. The international policy and legal framework is simply not in place to ensure peaceable water management capable of circumnavigating the complexities of the 21st century water landscape. In the Middle East, the difference in interpretation of how Tigris-Euprhates waters should be shared amongst riparian countries is a prime example of obstacles that must be overcome, cooperatively.

A sustainable water future, in the Middle East and around the world, is going to require considerable thoughtfulness, planning and cooperation. Collaboration amongst diverse stakeholders, including those with significant economic, political, or social differences, is imperative. There really is no other choice. But with great effort, an effective strategy is within our reach.

With President Obama's upcoming visit, now seems like a very good time to start the process. Otherwise, I'm afraid he may find it difficult to get even a glass of water.

"The Middle East Lost a Dead Sea-Size Amount of Water in 7 Years", 22/02/2013, online at: http://newswatch.nationalgeographic.com/2013/02/22/weighty-water-matters-in-the-middle-east/

BACK TO TOP

WWW.ORSAM.ORG.TR

Mithat Paşa Caddesi 46/4 Kızılay-Ankara TURKEY Tel: +90(312)4302609 Fax: +90(312)4303948 orsam@orsam.org.tr



Will Water Shortages Unleash Instability in the Middle East?

A NASA study, released last Friday, indicates that water shortages could affect millions in the Middle East. Images, captured by NASA's twin Gravity Recovery and Climate Experiment (GRACE) satellites, reveal significant water loss, in a period of six years, in the Tigris and Euphrates river basins—a region that includes parts of Turkey, Syria, Iraq, and Iran. The study has focused attention on the Middle East's water woes and the possible instability it could unleash in the region.

The NASA study

The rise and fall in water reserves alters the Earth's mass, which influences local gravitational attraction. GRACE measures gravity, and thereby, tells how much a region's water reserves change over time.

"GRACE data show an alarming rate of decrease in total water storage in the Tigris and Euphrates river basins, which currently have the second fastest rate of groundwater storage loss on Earth, after India," says Jay Famiglietti, the principal investigator of the study from the University of California, Irvine, quoted by NASA.

According to the study, the majority of the water lost — approximately 73 million acre feet — was caused by reductions in groundwater. Famiglietti also said that irrigators turn to groundwater when drought reduces surface water. The Iraqi government drilled about 1,000 wells in response to the 2007 drought. According to a 2012 Yale study, the drought stunted agriculture in the Tigris and Euphrates river basins, causing thousands of people to flee Iran, eastern Syria, and northern Iraq.

The NASA study shows just one part of the water crisis that the Middle East is undergoing. A study conducted by Maplecroft finds that of the top 20 countries suffering extreme or high water stress, 19 are in the Middle East and North Africa (MENA) region.

Unsustainable water extraction and consumption

Rich and poor Middle Eastern countries have exhausted groundwater supplies in their quest for selfsufficiency when it comes to food security. This was part of a "green revolution" that began in the 1970s.

Often cited as an example of unsustainable water extraction and consumption practices in the Middle East, Saudi Arabia has provided farmers virtually free electricity to pump ground water to the surface



in its quest for food-security. Because of the water loss caused by these practices, the Saudi government plans to cease wheat production by 2016.

In Yemen, where irrigated land tripled between 1970 and 2000, the capital, Sana'a, has come under severe water stress. A 2010 report by the Mckinsey Institute forecasts that if water consumption in the Sana'a basin is not controlled, the city could run out of water by 2020.

A few oil-rich Arab countries are beginning to address water loss caused by groundwater extraction. Some of these countries have focused on desalination, a process that makes saline (salt) water into fresh water. According to a report by the Guardian, more than 1,500 plants line the Gulf and Mediterranean, providing most of the MENA region's drinking water by separating salts and impurities from the water. However, the impurities extracted from the water end back in the sea, threatening marine life, which in turn affects fishing. According to the Centre for Strategic and International Studies, Saudi Arabia and the United Arab Emirates spend \$3 billion every year on desalination.

Political implications of water shortages

Aside from the impact on the environment, water loss is problematic for the already unstable region as the demand for water continues to rise alongside population growth.

According to the US Intelligence Community Assessment of Global Water Security, by 2030, the world's water needs will exceed current sustainable water supplies by 40 percent, which could generate widespread instability and contribute to state failure in certain regions, including in the Middle East.

Another report by the Center for Strategic and International Studies (CSIS) states: "the real wild card for political and social unrest in the Middle East over the next 20 years is not war, terrorism, or revolution — it is water. Conventional security threats dominate public debate and government...water is the true game-changer in Middle Eastern politics."

According to the report, water is a fundamental part of the social contract in Middle Eastern countries: governments rely on subsidized food and fuel, and cheap or free water to avoid dissent. While water has played a limited role in prompting unrest, permanent water loss will change water's role in potential internal conflicts.



Water shortages, according to some analysts, could also lead to international conflicts as governments act to ensure access to drinking water. Peter H. Brooks, writing for Foreign Policy, notes that more than anywhere else, the Tigris and Euphrates river basins — already affected by border disputes, conflicts over Kurdish autonomy, and the conflict in Syria — could become prone to transboundary water disputes.

While launching the Blue Peace: Rethinking Middle East Water report in February 2011, Swiss foreign minister Micheline Calmy-Rey said: "In the future the main geopolitical resource in the Middle East will be water rather than oil."

Calmy-Rey's views are also shared by many in policy circles. However, Jon Alterman and Michael Dziuban of CSIS argue that while a large portion of the literature points to a relationship between water and conflict, in reality, several Middle Eastern countries have cooperated over water. For instance, in 1994 Jordan and Israel reached an agreement over the Jordan River and Turkey, Syria and Iraq have kept their water tensions manageable. Alterman and Dziuban believe that conflicts will instead be domestic.

Land grabbing

One response to water shortages has been to shift farming to Africa, an initiative led by the MENAcountries along with China and South Korea.

In Gambella, Ethiopia, to where Saudi Arabia has shifted much of its farming, there have been signs of unrest. In 2009, the Saudi Star Agricultural Development company signed leases for approximately 25,000 acres of land in Gambella, where it planned to produce rice for the Saudi market. In April 2012, five Saudi Star workers were killed in the company's residential camp. To find the instigators, government soldiers searched local villages, torturing men and raping women.

Moreover, Human Rights Watch reports that a policy of "villagization" enforced by the Ethiopian government for commercial land use has resulted in threats, intimidation, and violence against those who resist resettlement. Through villagization, scattered farming communities are grouped into small villages to promote rational land use, conserve resources, strengthen security, and provide access to clean water, health and education and infrastructure.



However, the history of villagization in Ethiopia, as relayed in a Human Rights Watch report, illustrates a contrast to this rationale. The report notes that in the 1980s, these villages were often a source of forced labour for government projects, such as road construction, agricultural production, and other infrastructure development. Further, the report claims that villagization has involved and still involves human rights violations: government forces implementing and overseeing villagization burned property and committed theft, rape, torture and extrajudicial executions.

Human Rights Watch claims that Saudi Star's current land investment in Gambella has the potential to undermine the food security of the poor indigenous population. Currently, there are no limits on water use, which may have a significant negative impact on the local environment and on future agriculture practices.

The Ethiopian government and Saudi Star present a different side of the issue. According to a May 2012 Bloomberg report, the Ethiopian government says resettlement has been voluntary and unrelated to the Saudi Star agriculture investment. The report also notes that to overcome local opposition, Saudi Star plans to offer jobs and training to the locals.

It is unclear whether agriculture companies such as Saudi Star will employ more sustainable water practices in Africa and allow the locals to reap potential benefits of their agriculture investment. It is also unclear the extent to which these agriculture companies' pursuit of water will create tension between the locals, the governments, and these foreign companies.

Thus, as the Middle Eastern countries continue to seek ways to address water shortages at home and in Africa, only time will tell how important a role water will play in unleashing instability in the region and beyond.

"Will Water Shortages Unleash Instability in the Middle East?", 20/02/2013, online at: http://www.theinternational.org/articles/347-will-water-shortages-unleash-instability

BACK TO TOP



* NASA Probes Show 'Alarming' Water Loss in Middle East

Parts of the Middle East are losing groundwater reserves at "an alarming rate," according to a new analysis of <u>NASA</u>satellite data.

From the beginning of 2003 to the end of 2009, portions of Iran, Iraq, Turkey and Syria that lie within the Tigris and Euphrates river basins shed 117 million acre-feet of water. That's roughly equivalent to the volume of the Dead Sea.

About one-fifth of that water disappeared during a drought that began in 2007, which decreased snowpack that feeds the rivers and dried out soils. Another 20 percent of the lost water came from surface lakes and reservoirs.

But the bulk of the water loss — about 60 percent — came from aggressive groundwater pumping, said the <u>new study</u>, which was published in the journal *Water Resources Research*. That includes 1,000 new groundwater wells the Iraqi government dug between 2007 and 2009, to compensate for water lost when it increased flows from its major reservoir, Qadisiyah, to raise drought-lowered river levels along the Euphrates.

"The region is one that really calls out for attention," said lead author Jay Famiglietti, a hydrologist at the University of California, Irvine.

The overall rate of freshwater loss from the region during the 7-year study period is one of the highest in the entire world, second only to water loss in India, his study concluded.

"I'm concerned, from a sustainability perspective," Famiglietti said. "I worry about climate change" — which scientists believe will decrease rainfall in the region — "and population growth, and whether there is going to be enough water to drink and grow food and produce energy."

Adding to those concerns, researchers said, is the lack of regular, reliable monitoring of water storage in much of the Middle East, and a reluctance to share what little information is available.

"When you're in a water-stressed region and you share resources across political boundaries, there's a real reluctance to publish information, to make it freely available," Famiglietti said.

And there is no legal pressure to do so. Countries in the Tigris and Euphrates basins have not established a system to allocate water rights and jointly manage freshwater flows.

But NASA's <u>twin GRACE satellites</u> have allowed scientists a clearer view of the region's water woes than they have been afforded in the past.

The probes — formally named the <u>Gravity Recovery and Climate Experiment</u> — can detect tiny changes in the Earth's gravity field caused by changes like groundwater depletion. "They're like a scale in the sky," Famiglietti said of the satellite tandem.



WATER RESEARCH PROGRAMME -Weekly Bulletin-

Despite GRACE's utility, the scientist said he's hoping to wield an even older tool to help improve water management in the Middle East: diplomacy.

Famiglietti and colleagues were scheduled to leave Saturday for a two-week trip to the region, where they will meet with scientists, water managers and other government officials in several different countries.

"We're going to present some of these results and talk to water ministers, just to show them what [GRACE] is capable of," Famiglietti said. "If there's any interest in Israel, Jordan or Palestine in learning how to use the data, we're happy to help."

"NASA Probes Show 'Alarming' Water Loss in Middle East", 19/02/2013, online at: http://www.climatecentral.org/news/nasa-probes-show-alarming-water-loss-in-middle-east-15618

BACK TO TOP



***** Transhumanity: Water wars

Earth contains a finite, unchanging amount of H2O. Usage has escalated dangerously, due to human population explosion (1.65 billion - 9 billion from 1900-2025) and the myriad cubic-acres of water demanded in mining, industry, agriculture, and recreation, Hank Pellissier writes in <u>Transhumanity</u>.

One ton of wheat requires <u>one thousand tons of water</u>; watering the world's golf courses requires <u>2.5</u> <u>billion gallons per day</u>, and 650 gallons only gets you either a pound of rice or one cotton shirt.)

Global warming also dwindles our freshwater: glaciers are vanishing, lakes, rivers, and aquifers are shriveling. Lake Chad has <u>95% of volume</u> in the last 50 years. Lake Meade (water source for Las Vegas) could be <u>dry n a decade</u>. The Yellow River in China <u>often fails to reach</u> the ocean.

The Population Institute warns that the demand for fresh water already exceeds the supply by 17%. By 2030, <u>47% of the world's population</u> will be living in areas of high water stress, claims the OECD.

Will armies battle each other, as the cry for "blue gold" gets furious? Will "water wars" be as prevalent as conflict for the "black gold" of oil? Two documentary films have wetted public interest - <u>Blue Gold: World Water Wars</u>, and <u>Last Call at the Oasis</u>, and a dystopia novel - <u>The Water Wars</u> - warns of its imminence.

In actuality, history's pages are already splashed with dozens of conflicts. In 2,450 B.C. the Sumerian cities of Lagash and Umma <u>warred over Tigris-Euphrates</u> water. More recently, Senegal and Mauritania<u>battled in 1989 over grazing rights</u> in the Senegal River Valley - hundreds were killed, 250,000 fled their homes. The Pacific Institute provides an <u>excellent map and timeline</u> of 225 water skirmishes.

In the future, here's nine danger zones:



North Yemen vs. South Yemen - Hydrologists predict that the capital - Sana'a - of this impoverished area <u>could run out of water by 2025</u>, as private wells and aquifers dry up. (Primary usage? <u>40% of water</u> is used by farmers of *khat*, an addictive stimulant plant that's the drug-of-choice for Somalia pirates, plus it's suspected that it's marketing is <u>partly controlled by al-Qaeda</u>.) The unstable region contains many armed operatives, several linked to al-Qaeda, who could mobilize to gain control of the dwindling water supply.

Egypt vs. Ethiopia - The Nile River is the life-blood of Egypt, with the vast majority of its 83 million population residing near its banks. But who does the water belong to? The Nile originates 4,000+ miles away, and travels through nine nations before it becomes "Egyptian." Sources suggest that two ex-presidents, Anwar Sadat and Hosni Mubarak, both threatened to blow up dam projects in Ethiopia.

Tensions were renewed in 2011 when Ethiopia declared its intention to build the <u>`Great Millennium</u> <u>Dam`</u> - one of the biggest in Africa. An *Al Jazeera* report speculates that today's unpopular Egyptian military <u>might seek to distract its disgruntled citizenry</u> by engaging in a conflict with the upstream competitor.

India vs. China - China has <u>already constructed</u> 10 dams on the 2,900 kilometer long Brahmaputra River, and another 18 are in progress. Repercussions in lower riparian NorthEast India and Bangladesh could be catastrophic. China is probably intent on damming 8-10 great rivers that flow from the Tibetan plateau, <u>the world's largest water tank</u>. China seeks to nourish its droughtstricken central and eastern provinces; it's expecting 25% water shortage by 2030. "Over 6,000 lakes in China are now dry. The Yellow River basin in the north is 30 per cent dead," Sandeep Waslekar, president of Mumbai-based Strategic Foresight Group,<u>told *India Today*</u>.

Burkina Faso vs. Ghana - The Volta River flows from Burkina Faso (formerly named Upper Volta) to Ghana, with the two nations <u>squabbling</u> over how to share it. Ghana depends on the river to generate its huge hydroelectric Akosombo Dam that accounts for <u>80% of the nation's electricity</u>; this power is crucial in expanding the nation's industry. Burkina Faso is damming upriver, to acquire irrigation water to combat the Sahel's desertification. The region's inhabitants suffer abysmal poverty, with 31% living on less than \$ 1 per day. Exacerbating the problem is an estimate that the Volta



Basin population <u>will increase 80% in the next 25 years</u>, while rainfall declines due to climate change that is making <u>the region hotter and drier</u>.

Thailand vs. Laos vs. Vietnam vs. Cambodia vs. China - Downriver Southeast Asian nations are irritated by their huge northern neighbor, due to <u>eight massive Chinese dams built, or under</u> <u>construction</u>, on the Upper Mekong. The SE Asian nations are also suspicious of each other, for the same reason. <u>Voice of America reports</u> that "41 large dams could be put on the Mekong and its tributaries by 2015, and 71 by 2030, with Laos following a development model similar to China." Hydrodams are viewed in the region as key energy sources to power economic growth. There's also mounting concern in the region about potential environmental damage to agriculture and fisheries.

India vs. Pakistan - Water from Kashmir is <u>a major dispute</u> in the decades-long animosity between the two largest subcontinental. <u>The Indus Water Treaty (1960)</u> divided six rivers - the Indus, the Jhelum and Chenab were given to Pakistan, while the Sutlej, the Beas and the Ravi were declared Indian. Semi-arid, drought-stricken, water-stressed Pakistan presently claims that India is illegally diverting river water to itself, via an upstream dam. 92% of Pakistan is <u>is dependent on the Indus</u> <u>River system</u>, and more than half the population is employed in agriculture.

Turkey vs. Syria vs. Iraq vs. Iran - The Tigris and Euphrates Rivers <u>are still being argued over</u>, 4,500 years after Sumer. Dams and irrigation in Turkey, Syria, and Iran are<u>troubling downstream</u> Iraq, which is threatened by desertification. Iraq utilized the rivers to build its Fertile Crescent "cradle of civilization" but Syria and Turkey have emerged as dominating rivals for Iraq's historical claim. Evaporation, sewage, and pesticide pollution have further water-stressed Iraq. Iraq and Syria nearly battled in 1975 when Syria filled Lake Assad behind its impressive Ath Thawrah Dam, reducing Euphrates flow, but today, Turkey is undoubtedly the most feared and vilified, because <u>98% of the Euphrates</u> originates there. Turkey reportedly uncovered a Syrian plot to blow up <u>the massive, mile-long Ataturk Dam</u>, after it was completed in 1992.

Central Asia, i.e., Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan and Tajikistan Conflicts in this dry region over water use from the Syr Daria and Amu Daria rivers have escalated since their freedom following *glasnost* in 1991. Kazakhstan, Turkmenistan and Uzbekistan <u>want more water</u> for



their water-gluttonous crops of cotton, wheat and rice, while upstream, Kyrgyzstan and Tajikistan seek to extract hydropower. Rising populations in the region also demand more farmland. A report by the International Crises Group indicates that "the countries are now consuming 1.5 times what they should." A sixth "stan" - Afghanistan, downstream on the Amu Daria - is <u>is also demanding a fair water share</u>.

Israel vs. Palestine - The <u>Mountain Aquifer</u>, which lies under both Israel and the West Bank, is the only water resource for the Palestinians, but is controlled by Israel, for "security reasons." Observers note that<u>Israel grants only 20% of the water to the West Bank</u>, utilizing the remainder for their own purposes. Israeli monopolization of the aquifer would be jeopardized, of course, if Palestine was ever fully autonomous. Not unrelated, Ariel Sharon <u>has said</u> has said that the 1967 conflict with Syria, whereby the Golan Heights was obtained, wasn't entirely about "security." What was the real cause? 15% of Israel's water now flows from the Golan.

Are parched throats, saber-rattling, and dead bodies inevitable in a water-desperate future? Diplomacy is obviously needed to avert the conflicts. Emerging technology can also be of great assistance - it can help quench humanity's need for more H20 with innovations in filtration, irrigation, desalinization, and recycling.

"Transhumanity: Water wars", 19/02/2013, online at: http://kavkazcenter.com/eng/content/2013/02/19/17367.shtml

BACK TO TOP



✤ UN warns of 'humanitarian tragedy' in Syria

Humanitarian chief says rebel-held north largely out of reach for aid operations while WHO reports typhoid outbreak.

UN agencies have warned of a growing humanitarian crisis in Syria, as an estimated four million people there are in need of assistance.

UN humanitarian chief Valerie Amos said the rebel-held north of Syria remained largely out of reach of aid operations, even though they had been stepped up elsewhere in the country torn by civil war.

"We are watching a humanitarian tragedy unfold before our eyes," Amos told a news briefing on Tuesday. "We must do all we can to reassure the people that we care and that we will not let them down."

The Syrian government still refuses UN convoys entry from Turkey into northern Syria, as most border crossings are controlled by the rebel Free Syrian Army, she said.

Four million Syrians were deemed in need of aid late last year, but the situation has deteriorated since due to shelling,

inflation, and shortages of food and medicine, Amos said.

Typhoid outbreak

Meanwhile, the World Health Organisation (WHO) said typhoid had broken out in an oppositionheld region due to people drinking contaminated water from the Euphrates River.

An estimated 2,500 people in northeastern Deir az-Zor province have been infected with the contagious disease, which causes diarrhoea and can be fatal, the UN agency said on Tuesday.

"There is not enough fuel or electricity to run the pumps so people drink water from the Euphrates which is contaminated, probably with sewage," the WHO representative in Syria, Elisabeth Hoff, told Reuters news agency.

The WHO has no confirmed reports of deaths so far from typhoid.

Typhoid fever is an infection of the intestinal tract and bloodstream caused by salmonella bacteria. People become infected after consuming food or beverages handled by an infected person or by drinking contaminated water.

Symptoms can be treated with antibiotics or vaccines but some strains can kill, Hoff said.

Hepatitis A, another water-borne disease which can cause epidemics, is also spreading in areas such as Aleppo and Idlib as well as in crowded shelters for displaced people in Damascus.



"This is typical when you see water and sanitation systems totally break down. Between 50 and 70 people share toilets in many shelters in Damascus," Hoff said.

Refugee crisis

Leishmaniasis, a tropical disease transmitted by sand-flies that causes skin ulcers resembling leprosy, is spreading in Syria and there are now 14,000 cases in Hassakah province in the northeast, according to the WHO.

"It is a very high number and spreading with the movement of people. Internally displaced from Aleppo have brought it to Tartous," Hoff said.

About four million people in Syria need assistance, including two million people who are internally displaced, the UN said. More than 850,000 are now living as refugees in Iraq, Jordan, Lebanon, Turkey and North Africa, and about 3,000 people are fleeing the country every day.

The UN says that about 70,000 people have been killed since the uprising began in March, 2011..

The UN hosted a Syria Humanitarian Forum in Geneva on Tuesday, attended by senior aid officials from UN agencies, the European Union and other humanitarian groups.

The Syrian government has approved the deployment of three further international aid groups, UN spokesman Jens Laerke told a news briefing on Tuesday. Eight international non-governmental organisations have been allowed to operate to date.

"UN warns of 'humanitarian tragedy' in Syria", 20/02/2013, online at: http://www.aljazeera.com/news/middleeast/2013/02/20132200453451511.html

BACK TO TOP



Thirsting for Justice Campaign Teach-in for Palestinian water rights World Water Day - 22 March 2013

On World Water Day show your support for the Palestinian struggle for water justice, organize a teach-in to learn the facts about the context and take action in support of this basic human right.

The Thirsting for Justice Campaign calls on supporters worldwide to observe World Water Day 2013 (22 March) by organizing community teach-ins[1] to gain an accurate and factual portrayal of the challenges Palestinians under Israeli occupation face in their daily lives when accessing clean water and to promote discussion on actions in support of Palestinian water rights.

Meanwhile, hundreds of Palestinians and internationals in the West Bank will be taking part in a "walk for water justice" in the Jordan Valley to mark World Water Day, an initiative of the Thirsting for Justice Campaign and the Jenin Freedom Theater.

To join the teach-in action:

1. Register intent by writing to us on info@thirstingforjustice.org. You will receive a resource pack, which contains all the information you need to organize this action.

2. Discuss with us your ideas. We will endeavor to answer your queries and support you in the organization of the teach-in. Watch our video: http://youtu.be/wva8lYEVGCk

3. Send us the details for your teach-in so we can advertise it on our website and social media. You can organize the teach-in at any time during the month of March.

4. Send us your report-back with details of what was agreed among participants during the meeting so others can be inspired by your work. See the action sheet we prepared in the resource pack with suggestions on what you could do to reach decision-makers and get them to act.

Learn more about the campaign for Palestinian water rights on our website www.thirstingforjustice.org and look for us on Facebook and Twitter.

^[1] Teach-ins are educational forums where people come together to focus on a single topic and build



WATER RESEARCH PROGRAMME -Weekly Bulletin-

a common understanding about an issue. Teach-ins are meant to be practical, participatory and oriented towards action. Their main goal is to educate people and work towards change.

"Thirsting for Justice Campaign Teach-in for Palestinian water rights World Water Day – 22 March 2013", 19/02/2013, online at: <u>http://palsolidarity.org/2013/02/thirsting-for-justice-campaign-teach-in-for-palestinian-water-rights-world-water-day-22-march-201/</u>

BACK TO TOP



* Israeli water tech draws new European investment

Atlantium Technologies is the first cleantech firm in Israel to receive funding from Europe's Aster Capital group

It's a new era in water disinfection, declares <u>Atlantium Technologies</u>, which claims to have "reinvented ultraviolet-based water disinfection with unique Hydro-Optic Disinfection." The experts will decide if that's so or not – but Atlantium's latest funding round represents a new era in cleantech funding in Israel. For the first time, Europe's prestigious <u>Aster Capital</u> venture fund is investing in an Israeli company, giving \$3 million to Atlantium to continue its development of its new products. The investment is part of a \$9 million financing round which includes Aeris Capital A.G. (Switzerland) along with the current investor Benjamin Kahn.

Thirteen-year old Aster Capital, sponsored by European companies Solvay, Alstom, Schneider Electric, and the European Investment Fund, focuses on innovative cleantech investments, and recently opened an office in Israel. The local office has been screening companies to find one that fits Aster's mission statement – investing in "highly promising companies that have developed superior solutions to solve global challenges in the energy and environment sectors," according to the fund – and came up with Atlantium, which develops ultraviolet (UV) technology for, among other things, water disinfection.

One of the biggest problems with UV disinfection of water is ensuring that the right dose is administered – sufficient to kill germs or render them harmless, but not so high that equipment is damaged or unacceptable levels of ozone are produced. In addition, verifying UV results is complicated, making it difficult to tell just how clean the water is. Atlantium has developed technology to deal with all these issues, and, in fact, is one of the few UV systems whose effectiveness has been validated by the U.S. Environmental Protection Agency.

Now, Atlantium is developing new uses for its technology, such as advanced oxidation techniques, removing toxic and non-organic materials in water, developing water purification systems for use in shale oil fracking, and for use in power plant cooling systems.



Benjamin Kahn, CEO of Atlantium, said of the deal that the company "is proud that our breakthrough technology not only attracts the brightest people but also high quality investors. We are excited to welcome Aster Capital as new shareholder and partner and look forward to extend our technology lead in water disinfection."

Alexander Schlaepfer, a partner at Aster Capital, said that the fund "has been impressed by how the Atlantium team has managed to deliver a sustained growth path in the last few years, and has been able to attract a long list of blue chip customers such as The Coca Cola Company, Nestlé, Pfizer, and others. With our three corporate sponsors holding activities both in the existing and in the new sectors to be addressed, we believe we can strongly support Atlantium's future development."

"Israeli water tech draws new European investment", 17/02/2013, online at: <u>http://www.timesofisrael.com/israeli-water-tech-draws-new-european-investment/</u>

BACK TO TOP



* NanoH2O awarded membrane order for expansion of Israel desalination plant

EL SEGUNDO, CA, Feb. 19, 2013 -- NanoH2O Inc., manufacturer of the most efficient and costeffective <u>reverse osmosis</u> (RO) membranes for seawater desalination, today announced that it has been selected by Via Maris Desalination Ltd. to provide QuantumFlux (Qfx) high rejection <u>membranes</u> for the expansion of the Palmachim desalination plant in Israel. Via Maris Desalination Ltd., owner and operator of the Palmachim plant, purchased QuantumFlux high rejection membranes for an existing 36,000 cubic meter capacity seawater RO train in 2012 and will commission two additional trains in 2013. These three trains will produce a combined total of 110,000 cubic meters of <u>potable water</u> per day.

"After one year of small scale pilot tests and eight months of full scale operation of the initial 36,000 cubic meter per day train, the high rejection QuantumFlux membranes from NanoH2O provided us with the best performance we ever experienced," said Avner Hermony, Palmachim <u>desalination</u> plant manager for Via Maris Desalination, a subsidiary of Global Environmental Solutions (GES). "Given that experience, we will now add two more trains of Qfx membranes by the end of 2013."

"This is a significant milestone for our company," said Nicholas Dyner, Vice President of Sales and Marketing for NanoH2O. "Within a year of our official launch into the membrane desalination market, we have demonstrated impressive acceleration in product development and manufacturing capacity. Palmachim is one of the ten largest seawater RO plants in the world and we are honored to have been chosen as a membrane supplier and to assist Palmachim in their expansion efforts."

"NanoH2O awarded membrane order for expansion of Israel desalination plant", 19/02/2013, online at: <u>http://www.waterworld.com/articles/2013/02/nanoh2o-awarded-order-for-expansion-of-israel-desalination-plant.html?cmpid=\$trackid</u>

BACK TO TOP



✤ Harish Rawat launches national Ganga rights campaign at Mahakumbh

ALLAHABAD: Union Minister for Water Resources, Harish Rawat who visted the Ganga Action Parivar Camp in the Kumbha Mela officially launched the <u>National Ganga Rights Movement</u>. The movement, which is being spearheaded by Ganga Action Parivar, is promoting the National Ganga Rights Act to protect and restore one of the world's most precious and beloved river systems. Addressing on the occasion, Rawat said, "Through the Ganga Rights Act, we can offer a new, important thought, we can change the direction of our society and protect future generations." He deeply appreciated the great seva for Mother Ganga being done by Pujya Swami Chidanandjiand Ganga Action Parivar.

Swami Chidanand Saraswatiji of the ganga action parivar stated that Ganga is polluted by nearly three billion litres of sewage and chemical waste every day. "Her rights are being violated, and in turn, our rights to clean water are being violated. People are getting sick. Children are dying. It's time we say no more. Ganga has the right to flow in Her clean, pristine form. Ganga's Rights are Our Rights," he said.

The National Ganga Rights Act is proposed with the purposes of establishing, securing, and defending the inalienable and inherent rights of the Ganga River, its tributaries, and watershed, and the rights of the people of India to a healthy, thriving river basin. Further, the Act establishes the rights of the people of India and their governments to defend and enforce the rights of the Ganga

Members of Ganga Action Parivar explained that the Act is necessary because laws decreeing the rights of nature also grant legal authority to residents and governments to enforce and defend those rights. These laws change the status of ecosystems from being regarded as property to being treated as rights-bearing entities.

"If Ganga dies, India dies. If Ganga thrives, India thrives. In violating Her, we are violating basic human rights, and we are putting at risk the bright futures our children so greatly deserve. Now is the time for action. Let us all stand up and say, it's time for the National Ganga Rights Act,"" saidSadhvi Bhagwati of the ganga action parivar.

"Harish Rawat launches national Ganga rights campaign at Mahakumbh", 23/02/2013, online at: <u>http://timesofindia.indiatimes.com/city/allahabad/Harish-Rawat-launches-national-Ganga-rights-campaign-at-Mahakumbh/articleshow/18647281.cms</u>

BACK TO TOP



* After China's multibillion-dollar cleanup, water still unfit to drink

(Reuters) - <u>China</u> aims to spend \$850 billion to improve filthy water supplies over the next decade, but even such huge outlays may do little to reverse damage caused by decades of pollution and overuse in Beijing's push for rapid economic growth.

<u>China</u> is promising to invest 4 trillion <u>yuan</u> (\$650 billion) - equal to its entire stimulus package during the global financial crisis - on rural water projects alone during the 2011-2020 period. What's more, at least \$200 billion in additional funds has been earmarked for a variety of cleanup projects nationwide, Reuters has learned after scouring a range of central and local government documents.

That new cash injection will be vital, with rivers and lakes throughout <u>China</u> blighted by algae blooms caused by fertilizer run-off, bubbling chemical spills and untreated sewage discharges. Judging by Beijing's cleanup record so far, however, the final tally could be many times higher.

Over the five years to 2010, the country spent 700 billion <u>yuan</u> (\$112.41 billion) on water infrastructure, but much of its water remains undrinkable. The environment ministry said 43 percent of the locations it was monitoring in 2011 contained water that was not even fit for human contact.

"The reason why they have achieved so little even though they have spent so much on pollution treatment is because they have followed the wrong urbanization model - China is still putting too much pressure on local resources," said Zhou Lei, a fellow at Nanjing University who has studied water pollution.

A close look at publicly available documents shows limited environmental ambitions, as Beijing strives to prolong three decades of blistering economic growth and fill the estimated annual water supply shortfall of 50 billion cubic meters (bcm) required to feed growing energy and agricultural demand.

At the same time, the government faces growing pressure to address environmental effects of fast growth, as public anger over air pollution that blanketed many northern cities in January has spread to online appeals for Beijing to clean up water supplies as well.

The huge costs suggest that treatment, rather than prevention, remains the preferred solution, with industrial growth paramount and pollution regarded as just another economic opportunity, Zhou said.



"They always treat environmental degradation as an economic issue. China is even using pollution as a resource, and using the opportunity to treat environmental degradation as a way to accumulate new wealth," he said, referring to <u>business</u> contracts local governments offer to big water treatment firms.

"INDUSTRIAL-USE ONLY"

On top of the 10-year rural water plan, China last year vowed to spend another 250 billion yuan on water conservation, and has since allocated a further 130 billion yuan to treat small and medium-sized rivers over the next two years.

Local governments are also spending heavily, with Dianchi Lake in southwest China's Yunnan province being lavished with 31 billion yuan of investment in the next three years in order to produce "obvious improvements" in water quality, records show.

East China's Lake Tai, a test case for China's environmental authorities after suffering a notorious bloom of algae and cyanobacteria in 2007, has spent 70 billion yuan in the five years since, and more is expected.

Both cleanup projects have been designed merely to bring water up from "grade V" - meaning "no human contact" - to "grade IV", which is designated "industrial use only", according to detailed plans listed on local government websites.

Even such negligible gains could be crucial for a country that has the same amount of water as Britain although its population is 20 times as big.

Data from China's Ministry of Water Resources shows that average per capita supplies stand at 2,100 cubic meters, 28 percent of the global average. The government has vowed to cap total use to 700 bcm a year by 2030, but that will still require a big increase in supplies, with consumption now about 600 bcm.

Costly <u>engineering</u> and technological feats, though unlikely to address the underlying causes of pollution, could at least make more water available, allowing marginal quality improvements without interfering with industrial growth or the country's ambitious and water-intense urbanization plans.



WATER RESEARCH PROGRAMME -Weekly Bulletin-

"Part of this increase in the supply of water will come from removing all 'grade V' water supplies, which is actually useless even for agriculture," said Debra Tan, director at the China Water Risk organization. "Grade IV is not safe to swim in, but it at least is usable." (\$1 = 6.2270 Chinese yuan

"After China's multibillion-dollar cleanup, water still unfit to drink", 20/02/2013, online at: <u>http://www.reuters.com/article/2013/02/20/us-china-pollution-water-</u> idUSBRE91J19N20130220?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=185fb15240-<u>RSS_EMAIL_CAMPAIGN&utm_medium=email</u>

BACK TO TOP



WATER RESEARCH PROGRAMME -Weekly Bulletin-

✤ Dams to irrigate 2,688 acres in Fata

Tuesday, February 19, 2013 - Peshawar—The two small dams constructed at cost of Rs 857.65 million, will irrigate more than 2,688 acres cultivable lands in South and North Waziristan agencies.

A sum of Rs 553.681million was spent on construction of Dandy small irrigation dam located about six kilometer away from Miran Shah North Waziristan Agency, which will be irrigated agriculture lands of around 2000 acres, with total storage capacity of water 2907 acre-feet. The total catchments areas of the dam is around 67.979 square miles, height 101 feet and length 1764 feet.

Another small irrigation dam, "Dargai Pal" constructed at cost of Rs 305 million 24kilometer away from East of Wana South Waziristan agency, will be irrigated cultivable lands of around 688 acres, with actual storage capacity of water 2178 acre feet. The dam was constructed at height of 84 feet, under catchments areas of 24.719 square miles, covered a length of around 764 feet, said a senior official at the Fata-Development Authority.

The official further said that the construction of seven small irrigation dams have been initiated in different tribal agencies, out of which tenders for five dams already been awarded, and construction work in progress. A sum of Rs79318million, estimated for construction of seven dams, would irrigate cultivable lands around 2100 acres in Fata. While, tenders have also beenawarded, for construction rest of two small dams, for which Rs 839.37 million estimated, would also irrigate agriculture lands of around 3500 acres.

"Dams to irrigate 2,688 acres in Fata", 19/02/2013, online at: http://pakobserver.net/detailnews.asp?id=196611

BACK TO TOP



Small dams to irrigate 2,688 acres of land in Waziristan

The two small dams constructed at cost of Rs 857.65 million, will irrigate more than 2,688 acres cultivable lands in South and North Waziristan agencies.

A sum of Rs 553.681million was spent on construction of Dandy small irrigation dam located about six kilometer away from Miran Shah North Waziristan Agency, which will be irrigated agriculture lands of around 2000 acres, with total storage capacity of water 2907 acre-feet. The total catchments areas of the dam is around 67.979 square miles, height 101 feet and length 1764 feet.

Another small irrigation dam, "Dargai Pal" constructed at cost of Rs 305 million 24kilometer away from East of Wana South Waziristan agency, will be irrigated cultivable lands of around 688 acres, with actual storage capacity of water 2178 acre feet. The dam was constructed at height of 84 feet, under catchments areas of 24.719 square miles, covered a length of around 764 feet, a senior official at the Fata-Development Authority, told *Business Recorder*.

The official further said that the construction of seven small irrigation dams have been initiated in different tribal agencies, out of which tenders for five dams already been awarded, and construction work in progress. A sum of Rs79318million, estimated for construction of seven dams, would irrigate cultivable lands around 2100 acres in Fata. While, tenders have also been awarded, for construction rest of two small dams, for which Rs 839.37 million estimated, would also irrigate agriculture lands of around 3500 acres.

According to document of Fata-DA said that a sum of Rs69.070million estimated for construction of Zao Dam seven kilometres south of Milward Fort in Khyber Agency, which will irrigate 250 acres land, with total water storage capacity of 800 acre-feet, and catchments areas of around 5.793 square miles, length 270 feet, and height 91 feet. The construction work on the scheme in progress would be completed in June, 2013.

Under the ongoing schemes, another small dam, Kand about 20 kilometres away from Mir Ali Town, North Waziristan Agency, would be constructed at cost Rs1 78.942million, for irrigation of 716 acres



lands, with total water storage capacity of 3375 acres feet, and catchments areas of 20.70 square miles, and height 75 feet and length 640 feet. The construction work on the project in progress would be completed by June, 2013.

A sum of Rs145.280million estimated for construction of Parwara Small Dam, about 15 kilometres away from South of Darazanda, Frontier Region D I Khan, would irrigate around 243 acres lands, with total water storage capacity of 2325 acre feet, and catchments areas of 10.20 square miles, height 72 feet and length 672, completed by December last year, according document of FATA-DA.

The Moto Sha Small Dam, about 25 Kilometres away from South of Ekka Ghund, Mohmand Agency, another scheme would be completed at estimated cost of Rs191.60million for irrigation of 627 acres land, with total water storage capacity of 1146 acre-feet, and catchments area around 10.042 square miles, height 101.38 feet, and length 377.38 feet. The construction work on the scheme would be completed by August 2014.

According to the document, a sum of Rs189.23million estimated for construction of Sheen Kach Small Dam, 32 kilometres away from East of Tank, Frontier Region Tank for irrigation of 260 acres cultivable lands, with total water storage capacity of around 12.00 square miles, height 69 feet and length 656 feet, would be completed by February, 2014.

The Raghagan Small Dam about 13 kilometres East of Khar town, Bajuar Agency, would be constructed at cost of Rs195.983million for irrigation of around 3,500 acres land, with total water storage capacity of 1252 acre-feet, height 52 feet and length 200 feet. The project would be completed by December 2014.

The Fata-DA document revealed that the authority has planned to initiate a scheme for supply of water to Mohmand Agency, for which an Rs449million has so far allocated for construction of small dam Gandao about 03 kilometres south-east of Ghalani, Mohmand agency, with total water storage capacity of around 810 acre feet, height 105 feet and length 250 feet. The scheme would be benefited for provision of potable drinking water to around 22,000 and flood control, would be completed by December 2014.



"We had identified more than 40 small dams in different tribal agencies, out of which construction work on two dams so far completed, said Muhammad Naseem Golra, General Manager, (Technical), Fata Development Authority. He further informed that the authority had initiated construction work on more than seven dams, out of which feasibility of two dams recently approved by federal government. A total of Rs8240million schemes has so far executed by authority, including small irrigation dams, social and skilled development projects in the Fata, Golra informed.

Golra said the feasibility studies of nine dams have so far completed, in progress of physical work. According to which, he said that authority had worked out on around 20 small schemes, while work on number of feasibility studies in process. "We had set a target to irrigate more than 346000 barren lands in Federally Administered Tribal Areas, by construction of several small dams. We had also identified more than 120 sites for construction of dam in tribal region", Golara claimed.

He informed that authority had also prepared a feasibility of two small dam, including GHAO Tangi Small Dam, located about six kilometer away from North-West of village of Gul Kuch, South Waziristan Agency, and Baz Ali Small Dam about 31 kilometer away from South of Sadda Town, Kurram Ageny, while Rs798million and Rs427million estimated for construction of the scheme, which was yet to be approved by the CDWP. The scheme would irrigate around 3114 acres lands, with total water storage capacity of around 15,062 acre-feet.

Golra informed the authority has initiated feasibility studies of more than nine dams, including Musa Dara Dam Frontier Region, Peshawar, Jalandar Kurram Agency, Larzan Dam, FR Tank, Shakai Dam, South Waziristan Agency, Warmola Dam, FR Lakki, Zakar Khel Dam North-Waziristan Agency, Jaji Dam, Kurram Agency, Walmai Dam, North-Waziristan Agency, and Sarobi Dam, North-Waziristan Agency.

"Small dams to irrigate 2,688 acres of land in Waziristan", 18/02/2013, online at: <u>http://www.brecorder.com/agriculture-a-allied/183/1155276/</u>

BACK TO TOP



* Kenya: 'Sand Dams' Bank Water for Dry Season in Semi-Arid Kenya

Makueni — Barely a month after heavy rains pounded Kenya, many seasonal rivers in the country's semi-arid east are already drying up, and residents are preparing for the months-long dry season.

But some, like Paul Masila and other members of the Woni Wa Mbee self-help group, are not worried about the looming dry spell. Instead, they are preparing to plant crops or are harvesting fields they planted before the rains.

The group - the name means "progressive vision" in Kamba, the local langage - have revolutionised the region's fortunes by finding a way to store millions of litres of water under the bed of the Kaiti River, providing the once-parched community with water for domestic use and irrigation throughout the year.

"Drought will never again be a problem, particularly for future generations," said Titus Mwendo, a 31-year-old farmer in Miambwani, in the Eastern region's Makueni County.

The Kaiti, like other seasonal rivers in the region, fills with water only during the rainy season, which usually arrives in December.

"The rest of the year is characterised by scorching sun, dry rivers, dusty roads - only those who are fit can survive," said Masila, a member of Woni Wa Mbee.

But Woni Wa Mbee and other self-help groups in the area, aided by local non-governmental organisations, have found a way to trap and store the Kaiti's water in its own sandy riverbed, keeping water available for months after the river has disappeared.

"The water reservoirs are called sand dams," said Kevin Muneene, chief executive officer of the Utooni Development Organisation, one of the supporting NGOs. Over the past two years, the organisation has helped 80 self-help groups construct 1,528 sand dams in arid and semi-arid areas of Kenya's Rift Valley and Eastern region.

CONSTRUCTION DETAILS



To make a dam, he said, a high concrete barrier is constructed across a seasonal river. When it rains, the water carries sand downstream, depositing it up to the level of the barrier. When the rains finish, water remains trapped in the piled-up sand for up to a kilometre upstream of the dam, depending on the dam's height.

"A well-constructed sand dam has 60 percent of its volume as sand, while the remaining 40 percent is always water," said Muneene, an expert in sand dam construction.

In terms of volume, it is estimated that an average sand dam in a relatively wide stream such as the Kaiti River can hold up to 5,000 cubic metres of water, equivalent to 5 million litres. To boost the volume of water stored, several sand dams can be built along one river.

Those numbers suggest that the 1,528 sand dams already built as part of the project will be able to store up to 7.7 billion litres of water, which can be used to irrigate thousands of hectares of land and supply thousands of households for months after the rains stop.

To use the water, community members scoop out sand from the river bed to expose it. It can then be pumped out for irrigation or other uses.

Over 3,000 households are now using water from the dams to grow vegetables, tomatoes, droughtresistant legumes, fruit trees such as grafted mangoes and oranges, and other crops.

"For the first time, we have had water throughout two years. This is not a common phenomenon in this area," said Florence Munyoki, the treasurer of Woni Wa Mbee and a smallholder farmer in Utaati village.

NO MORE WALKING FOR WATER

"Before the dams were constructed, we could walk up to 12 kilometres downstream in search of a place to sink a shallow well. This was time-consuming and very tiring," said the 52-year-old mother of four.



The sand dam technology is believed to be indigenous to Kenya, though it is now being used in other countries around the world, from Zimbabwe to Brazil to Thailand. The Kenya project is the first time the dams have been built in such large numbers and as permanent structures.

"When we initiated this project, we had our own ideas, such as sinking boreholes. But on consulting community members, they insisted that harvesting and storing rainwater would be a better answer to their prevailing water problems," said Annie Murimi, the Utooni organisation's development officer.

The NGO donates cement to eligible groups and offers technical assistance. The self-help group members then have to collect construction materials such as stones, which are locally available, and offer unskilled manual labour during construction. Experts say that 250 people can build a sand dam in one day.

"To be eligible for support by our organisation, there must be a registered group with objectives geared towards water conservation, food security, and income generation," Murimi said.

All community members are allowed to access the water for domestic use and for their animals but "irrigation is strictly reserved for group members," said David Nyala, a member of another self-help group known as Wekwatio wa Kanzoka, or "hope of Kanzoka" in the Kamba language.

The Utooni Development Organisation also collaborates with the Kenya Agricultural Research Institute to provide local farmers with a range of certified drought-tolerant seeds and seedlings.

"Kenya: 'Sand Dams' Bank Water for Dry Season in Semi-Arid Kenya", 20/02/2013, online at: http://allafrica.com/stories/201302201317.html

BACK TO TOP



Solution Bloomberg BNA Launches Water Law & Policy Monitor

New Weekly Offers Guidance on Water Rights, Use, and Pollution Issues

Arlington, Va. (February 15, 2013) - Bloomberg BNA has launched the <u>Water Law & Policy</u> <u>MonitorTM</u> with up-to-date news, guidance, and primary source materials to help water law practitioners, industrial water users, and regulators keep up with emerging water allocation and management issues across all 50 states and abroad.

The *Water Law & Policy Monitor* combines Bloomberg BNA's news and expert analysis with legal decisions, regional water agreements, and more in an easy-to-use format. This weekly publication, with news updated daily, follows water rights regulation, litigation, and legislation at the state, regional, and federal levels, as well as key international developments. Our water law digest, the *Water Table Reference Guide*TM, includes key water compacts, corporate best practices, and other important documents. Professionals can also target geographic regions of interest, creating views by state or country.

"Staying on top of the complex and shifting issues of water allocation, use, and management is increasingly important for water law practitioners, clients, and anyone interested in water policy," said John Sullivan, director of environmental news for Bloomberg BNA and managing editor for the *Water Law & Policy Monitor*. "This product offers timely coverage from industry-leading reporters and correspondents, as well as perspectives from top litigators and experts in the form of *BNA Insights* articles. Water law professionals now have a well-tailored resource to keep them up to date and help them in their day-to-day research."

"Businesses and water professionals want to know who gets water, how much, and under what conditions," said Robert Shew, vice president and group publisher, EHS and HR publishing divisions, Bloomberg BNA. "This product provides a one-stop shop covering the legal and policy issues of the day and offers insights on how to manage water resources efficiently."

The *Water Law & Policy Monitor* is also available on <u>Bloomberg Law</u>. For more information, visit <u>http://www.bna.com/water-monitor-pr</u>.

"Bloomberg BNA Launches Water Law & Policy Monitor",15/02/2013,online at: <u>http://www.bna.com/bloomberg-bna-launches-pr17179872405/</u>

BACK TO TOP



***** To Control Floods, The Dutch Turn to Nature for Inspiration

The Netherlands' system of dikes and sea gates has long been the best in the world. But as the country confronts the challenges of climate change, it is increasingly relying on techniques that mimic natural systems and harness nature's power to hold back the sea.

On a freezing winter day along the south-central coast of Holland, two beachcombers, hunched against the wind, stroll along a crescent of sand extending more than half a mile into the North Sea. Nearby, a snowkiter skims over the 28 million-cubic-yard heap of dredged sediment spreading along the shore. If all goes as planned, the mound will eventually disappear, rearranged by ocean currents into a 12-mile-long buffer protecting the coastline for the next two decades.

This is the Sand Engine, one of the latest innovations from Dutch masters of flood control technology and designed, as the national water board*Rijkswaterstaat* says, so that "nature will take the sand to the right place for us." After having constructed the country's vaunted system of sea gates and dikes, Dutch planners and engineers are now augmenting it with new technology enlisting nature to keep the water at bay.

"Normally, there is a lot of erosion here," says hydraulic engineer Mathijs van Ledden, sweeping an arm toward the snow-covered spit snaking around an elongated lagoon. Van Ledden is a flood risk reduction specialist with <u>Royal HaskoningDHV</u>, a Dutch engineering consultancy involved in creating the Sand Engine, currently 2.2 miles wide. "This big reservoir of sand should re-nourish the rest of the coast in time," he says, gesturing toward the skyline of The Hague, several miles away.

The Sand Engine is the signature project of <u>Building with Nature</u>, a consortium of Dutch industries, universities, research institutes, and public water agencies looking to harness natural systems for next-generation hydraulic engineering. Completed in late 2011 at a cost of 50 million euros (\$67 million), the Sand Engine's goal is to provide long-term fortification for eroding beaches as ocean currents gradually redistribute its dredged material. Until now, this coastline needed sand replenishment every five years, requiring expensive dredging that damaged marine ecosystems. The Sand Engine will feed beaches for about 20 years at half the price, said Marcel Stive, chair of coastal engineering at Delft University of Technology (TU Delft) and principal creator of the technology.



"At this moment, this is the safest coast we have," Stive said. When the sand is fully spread out, it will protect 20 kilometers (12.4 miles) of shoreline from the current rate of sea-level rise, he said. If the amount of water increases, "we'll just add more."

With sea levels climbing — many coastal experts are projecting rises of 3 to 5 feet this century — and climate change expected to boost storm frequency and intensity, flood protection is an increasingly pressing issue worldwide. And at the forefront of flood-control technology are the Dutch, long aware of the damage that surging oceans and overflowing rivers can wreak in their low-lying country. Hydraulic engineering has been underway here since the Middle Ages, and the country's 16.7 million residents have "dry feet" thanks to a network of dikes, canals, and engineering marvels like the Maeslant Barrier near Rotterdam: two floating gates, each the length of the Eiffel Tower, that automatically close to shield the city and its major port when a North Sea storm surge threatens.

Managing water is big business in The Netherlands: Dutch hydraulic engineers and related industries brought in around 7.5 billion euros (\$10 billion) in 2008 from projects around the world, according to the most recent figures available from <u>the Netherlands Water Partnership</u>. But while the Dutch export their high-tech engineering prowess worldwide — designing gigantic, mechanical structures like London's Thames Barrier — at home the future of flood-defense encompasses a return to basics: utilizing natural materials, mimicking natural systems, and harnessing nature's power to protect this vulnerable nation.

Projects like the Sand Engine illustrate the potential and challenges in flood-risk management, said Jos Maccabiani, a geotechnical engineer with the nonprofit applied research institute, <u>Deltares</u>, and program secretary of <u>Flood Control 2015</u>, a national initiative to improve flood management. In addition to being cost-effective, new infrastructure must minimize environmental impacts and be adaptable to changing climate conditions.

"How do you build these structures in a way that can be easily upgraded later without too much cost?" he asked. "This is a challenge that we are really working on right now."



One solution is employing living organisms as natural buffers. A mangrove forest, for instance, "has a tendency to catch sediments and grow with sea level rise," said Deltares marine biologist Mindert de Vries, "whereas these sandy solutions are losing sand all the time." De Vries, an eco-engineering expert, is designing hybrid dikes, planting vegetation such as willows on the seaward side to absorb the ocean's first blows. The dike itself can then be lower, less expensive, and more durable than a traditional dike. De Vries estimates it cuts costs around 30 percent.

"The new dikes for the new century," he calls them. "The soft solution."

Nature is also being recruited to turn existing dikes into ecologically enhanced "rich levees" that mimic rocky coasts, providing habitat for marine organisms. Adding roughness to the dike's seaward face dampens waves and reduces overtopping, said Jasper Fiselier, an environmental planner with Royal HaskoningDHV and a Building with Nature project leader.

To give nature a helping hand, Dutch researchers are working on new dike materials like flexible cement to attach energy-absorbing stones, geotextiles that prevent internal erosion — a major cause of breaches — and super-strong grass that dampens wave action. One intriguing process strengthens dikes with "bio grout" produced by bacteria fed a substance that makes them excrete calcium. So far, it only works on a small scale.

The new designs provide a longer-term solution than barriers, proponents say. "If I make a [concrete] dike, and conditions change, I have to re-do the whole dike," Fiselier said. "Whereas with a soft defense, I only have to put a half-meter [of earth] on top."

The Netherlands is now considering a host of eco-engineered structures in a proposed 1 billion euro (\$1.34 billion) package of flood-protection upgrades. Several are already in the works, including replacing the country's tallest dike, near Hondsbossche, with a sand dune, and shoring up an aging dam in the eastern delta with a small sand engine.

The country's first hybrid dike is now being built near Dordrecht. Incoming waves will lose power in



a flooded willow forest before they reach the dike. "The dike is going to be much softer and lower, because you get the waves out," de Vries said. "You get nature in front." Other countries, including Singapore and Vietnam, have expressed interest in the new designs, according to de Vries.

Building with nature is a special challenge in urban areas, said Matthijs Kok, a flood-risk professor at TU Delft and a member of the environmental consulting firm HKV Consultants. His solution is multifunctional levees, which combine ecological, recreational, and economic functions with flood control. "It sounds very easy," Kok said, "but it's not. Because there are so many stakeholders, so many interests." To satisfy the various interests, businesses such as restaurants and hotels, public facilities like swimming beaches and hiking paths, and natural areas are being integrated into flood-control projects. One such example, now under construction at the seaside resort of Scheveningen, is a new dike protected by a widened beach and concealed beneath an undulating pedestrian- and bicycle-friendly esplanade.

But using nature to fight floods is not a panacea. Dunes and plants take up more room than traditional dikes. Moreover, faced with the larger storms and swollen seas predicted for the future, natural defenses may not always have enough muscle.

"Let's be honest about it," said van Ledden. "A forest is not going to protect you against a surge of six or eight meters [20 to 26 feet], so there are limits."

In addition to bolstering flood defenses with enhanced natural systems, Dutch scientists and engineers also are working to "improve the decision-making when things might go wrong," said Maccabiani.

To that end, Deltares is developing Smart Dikes — sensor-embedded levees that relay real-time status reports via cell towers to decision-makers. The purpose is to give "more time to react when you see something inside the dike that is happening while you don't see anything on the outside yet," Maccabiani said. Early notice of a developing problem could give time for repairs or let residents evacuate well in advance.



The system is currently in the test stage, and Maccabiani said discussions are underway with the U.S. Army Corps of Engineers and several American universities to set up a pilot project in the Mississippi delta.

Another high-tech project underway at Deltares is 3DI, which uses LIDAR, a three-dimensional laser imaging system, to map out underground water-storage capacity. The system, projected for rollout in 2014, will pinpoint flood-prone spots and places where excess water, such as runoff from heavy rains, can be accommodated.

Many areas of the U.S., including the coasts of Southern California, Florida, and New Jersey, would also benefit from natural or soft defenses, according to de Vries and others. But so far, the new designs have gotten little attention across the Atlantic. American engineers are "very much into building dikes and hard structures," de Vries said. "And the nature people — well, these worlds don't know each other."

The new Dutch technology has promise, and flood management agencies in the U.S. are keeping an eye on it, said Jason Needham, a consequence specialist with the U.S. Army Corps of Engineers' Risk-management Center in Davis, Calif., who recently spent a year in the Netherlands on a staff-exchange program. But sophisticated devices like Smart Dikes are expensive, and haven't yet proven their worth, he said. As for natural defenses, Needham said the concepts are good, and "everyone agrees our wetlands need to be restored."

The two countries have different approaches to flood control, Needham acknowledged, with the Dutch focusing mainly on prevention, while Americans emphasize emergency preparedness and recovery. In the face of an uncertain future climate, however, the objectives are now converging. The goal, as Needham puts it, is "how to get people safer without putting a big wall up there."

"To Control Floods, The Dutch Turn to Nature for Inspiration", 21/02/2013, online at: http://e360.yale.edu/feature/to_control_floods_the_dutch_turn_to_nature_for_inspiration/2621/

BACK TO TOP



Securing a sustainable future

Food, water and energy are in short supply, but attempts to secure one of these resources often negatively affects the others. At a series of debates on the problem, Tim Smedley discovers 'nexus thinking' could be the solution

With the global population growing at a rate of 80 million people a year, by 2030 it is estimated that the world will need 30% more <u>water</u>, 40% more energy and 50% more <u>food</u>. To meet this need, water, food and energy can no longer be dealt with separately. Take biofuels for example. They could help to meet the energy shortfall, but in doing so will use up more water and, so, impact on food supply: in 2008 and 2011 bio-diesel's insatiable appetite for wheat saw global cereal prices spike, causing civil unrest.

This interlocking relationship is known as the "water-food-energy nexus". Put simply, "nexus thinking" recognises that any solution for one side of the nexus must equally consider the other two. Agriculture gives us the food that we need, yet it uses 70% of the world's freshwater. That water is also in demand by the energy sector to cool power stations and run hydroelectric plants. We also need water at home, which requires pumping to our taps and treating to make it drinkable, which in turn requires vast amounts of energy.

As with biofuels, many examples abound of how one side of the nexus has been ignored in blinkered pursuit of another. Power stations have been built in India, for example, only to sit forever idle with no water to cool them due to the local river basin drying up. In China, water is being pumped out of the ground at a rate of 20 cubic kilometres of water per year faster than nature can replenish. And as the world's demand for meat increases, yet more water is needed to grow the grain used to feed livestock (the International Fund for Agricultural Development believes it takes 13,000 to 15,000 litres of water to produce just one kilo of grain-fed beef).

The Guardian recently brought leading experts together to discuss these issues and possible solutions during a day of live debates, in association with brewing firm SABMiller. Split into three 45-minute discussions, incorporating questions from Guardian readers via twitter and online forums, the debates brought the nexus into sharper focus.

The problems can seem overwhelming, but as David Norman, WWF-UK's director of external affairs said in the day's second debate, there is plenty we can do immediately to start tackling the issues. Businesses, consumers, governments and farmers can all be far more efficient in how we consume and produce energy, food and water.

One major theme came out of all three discussions: collaboration. Government departments must stop working in silos forming separate policies on water, agriculture and power; businesses and NGOs can work more closely with the communities in which they harvest resources; and while more



education of consumers is needed, there is a lot that policy makers and businesses can learn from listening to them too.

An example that arose from the debates was that of a long river: along its length it passes through several different communities, countries, businesses and power stations, all dependent on it for survival. The actions of any one stakeholder along the river will affect the other. Only by working together can they ensure the resource is used equally. That might require trade-offs and compromises. But that, in essence, is nexus thinking.

Food and water for energy

The clearest example of food and water combining to produce energy is biofuels. The first generation of biofuels, such as bio-diesel, said Herbert Oberhänsli, vice-president, economics and international relations, Nestlé, were "a problem in the context of food and water... in 2008 there was a big spike in the production of biofuels, a 35% increase ... and food prices of staple cereals went up 200%".

But the second generation of biofuels now coming on to the market could "be part of the answer", said David Norman, WWF-UK's director of external affairs. "Colleagues in WWF Brazil looked carefully at biofuels from a nexus analysis," he said. The use of modern agricultural technology and availability of cheap sugar cane in Brazil means the process is "very efficient".

Like biofuels, dams are also controversial, depleting water sources and fish stocks for communities downstream, and displacing communities upstream. However, Camilla Toulmin, director of the International Institute for Environment and Development, argued that dams "are potentially a hugely important source of low-carbon power. They are also a very important means by which you can develop irrigated agriculture". A multitude of smaller dams is preferable to the "big project" approach of the past, she said. Oberhänsli agreed, saying: "You cannot imagine Swiss prosperity without dams ... In the 1860s it was one of the poorest countries in Europe."

Collaboration across all stakeholder groups is needed, said Norman. "For example, the Water Futures partnership with WWF and SABMiller looks at the water footprint of the company's operations in countries such as Peru, Tanzania and South Africa." The purpose of the project is to "share and develop that analysis with local stakeholders and come up with action plans... this is often about trade-offs between different groups and managing the shared risks."

Consumers have role too. As Norman put it: "We haven't begun to pluck the low-hanging fruit of energy efficiency." If we all became more conscious of how we use energy, less food and water would be given over to its production.

Water for food

One of the most vital aspects of the nexus is the water we need to grow our food. Agriculture already uses 70% of the world's freshwater supply; with 2 billion more mouths to feed in 20 years' time, we need to start doing things very differently.



The concept of "drought resilience" was raised by Gordon Conway, professor of international development at Imperial College London. The latest science suggests global warming will cause a 4C (7.2F) rise in temperature. If the world's temperature increases by 4C, the changing conditions could cause certain crops to fail in areas where they currently thrive. "We are probably not going to be able to grow maize in southern Africa or wheat in northern Africa," warned Conway. There are, however, options available, such as "conservation farming where you don't plough the field but let the leaves of corn lie on the ground and rot down", which helps to maintain moisture. Genetically modified (GM) crops will also have a role, he said, though they are "not the magic bullet".

We need to do more with less, said Andy Wales, senior vice-president of sustainable development for SABMiller: "Last year in our breweries we reduced water use per litre of beer by 5% [and] our carbon emissions per litre of beer by 10% ... the opportunities in agriculture are even greater. In some farms in the US we have water use down by 10% and emissions down by 20%."

Tim Fox, head of energy and environment, Institution of Mechanical Engineers, highlighted inadequate storage, transport and product handling causing 30%-40% of food being spoiled before reaching market. All agreed that, while controversial, a higher price needs to be put on water. "It doesn't [currently] in any way reflect the scarcity of the resource," said Wales. Fox agreed, saying "nothing drives innovation harder than trying to beat a cost".

Energy for water

The energy needed in the US to pressurise, move and treat water is 13% of the country's total energy use. Gérard Payen, water adviser to the UN secretary general and president of AquaFed, explained during the debate that "for the majority of people to have water at home it is necessary to pump water, this requires a lot of energy... but also the treatment of water requires a lot of energy". With increasing urbanisation, water pollution increases and "every year cities have to find water from farther and deeper" sources.

So what can be done? As it turns out, quite a lot. If we don't pollute the water in the first place then we don't need to waste energy treating it, said Jens Berggren, director for Stockholm Water Prize and Stockholm Industry Water Award: "Stockholm around 100 years ago was one of the dirtiest cities in the world. Today, the water in lake Mälaren is so clean you could almost drink it." That required changing behaviours locally.

Usha Rao-Monari, director of the Sustainable Business Advisory Department in the International Finance Corporation, also preferred local initiatives to reduce the energy required to treat and supply water, rather than centralised systems. "For example, solar-powered point-of-use systems," she said. "In a small project in Haiti, a private-sector company is looking at putting in place small kiosks that are powered by the sun to treat water collected from a nearby source." Rainwater harvesting can also be done locally, instead of moving water over large distances.



WATER RESEARCH PROGRAMME -Weekly Bulletin-

The panel agreed government ministries need to be encouraged to work together, and that a higher monetary cost needs to be attached to water. A positive vision of the future was also offered by Berggren: "From the waste water in Stockholm today, the organic content is used to make bio-gas to run buses in the city ... the heat energy is put into the district heating system [and] the nutrients are recovered and used for growing crops." A nexus future doesn't sound so bad after all.

"Securing a sustainable future", 22/05/2013, online at: <u>http://www.guardian.co.uk/sustainable-business/securing-a-sustainable-future</u>

BACK TO TOP



* Australia's Water Markets Succeeding, Yet Severe Challenges Loom

Limited water supplies and competing agricultural, environmental, industrial, and municipal interests challenge Australia's water-trading system.

The end of Australia's worst drought of the modern era has stirred a new chapter in a long national debate about whether the nation's carefully regulated system of trading water rights is the best — and perhaps the only — way to manage water during times of acute shortage.

Supporters argue that the system promotes sustainable water use and spurs innovation by directing water toward uses with the highest economic returns. But serious challenges remain as the country balances environmental limits, municipal needs, agricultural production, and a growing mining sector <u>driven in large part by Asian imports</u>. In the end, the ultimate success or failure of Australia's water market may help determine whether others around the world follow suit.

Over the course of 30 years, basin by basin and state by state, Australia developed and implemented the world's only large-scale system of water trading. As the cornerstone of the nation's watermanagement plans, Australia's markets are divided into three categories covering hundreds of watersheds: the southern and northern Murray-Darling Basin systems, plus the territory outside the Basin's boundaries. Worth roughly \$US 26 billion, the system is meant to manage water use in an uncertain supply environment.

Nothing illustrated that unsteady supply better than the 10-year drought from 2000 to 2010, when below-average rainfall dried out the Murray-Darling Basin, Australia's most populated and fertile region. During what is now known as <u>*The Big Dry*</u>, water-rights trading expanded as overall supply diminished.

Though the rains have come and the drought is now over, the federal government just this past November passed a major plan for water conservation in the Murray-Darling Basin. As it is implemented over the next six years, this plan will depend heavily on the water-rights market to reserve water for environmental flows.

It seems as though Australia's water markets are here to stay.



"The philosophy across state governments and the commonwealth here in Australia, and across both sides of our political divide, is that the market should be the mechanism that allocates this scarce resource," said Kim Morison, managing director of Blue Sky Investments, an Australian water-rights trading company.

In Australia's markets, every user must adhere to a state government-regulated limit on how much naturally available water can be used. Within that framework, users — be they farmers, mine operators, or city-dwelling individuals — can trade amongst themselves for short- and long-term rights to that water. Every large water user in Australia watches water prices as carefully as those of fuel and electricity, because each sector is competing with the others for limited resources.

In other words, anyone who wants to use more water must first work out who will be paid to use less.

The Value of Water in Australia

The purchase prices for water are determined in two asset categories:

- Entitlements: Every water user within a basin, or catchment area, owns a share entitlement. That entitlement determines how much water an individual can use, based on the total volume of water available in a basin in any given year. Entitlements are permanent, perpetual water rights that are held as permits with a state government. Another way to think of an entitlement is as a pool of water that is promised to a user every year — but the pool changes size, depending on how much total water there is that year for everyone who owns a pool in a specific basin. Users can sell these permanent rights to one another, or the government can purchase rights from private users and reserve that water for the environment.
- Allocations: Entitlement holders can exchange allocations, or volumes of water that are traded to deal with immediate, day-to-day supply issues. Allocations are exchanged between entitlement holders in a one-time transaction. Sticking with the above example, this essentially means that one pool (entitlement) owner can buy a metaphorical bucket of water (allocation) from someone else's annual pool (entitlement), but this is a one-time sale. In other words, a new deal would have to be brokered to get that same bucket of water again next year.



Owning entitlements in Australia is a lot like owning shares in a company on the U.S. stock market, according to Mike Young, a professor of water and environmental policy at the University of Adelaide.

First, state governments determine the total quantity of water that will be available to users in a given year. Then, entitlement holders receive their allotment of water in proportion to the number of shares that they hold.

Markets are concentrated in three regions — the southern Murray-Darling Basin, the northern Murray-Darling Basin, and the territory outside the Basin's boundaries — and these markets differ in one fundamental way from U.S. stock markets: buyers and sellers negotiate the transaction price themselves, the markets just facilitate transactions and track prices. In remote areas, however, a water-rights trading transaction can happen between two individuals, with no traditional market involved, much like one farmer independently selling livestock to another.



In the Murray-Darling's northern region, markets allow private users to trade water from the same river, but not between rivers, according to Morison.

In the southern Murray-Darling's so-called "connected" trading region, prices are tracked and water rights are exchanged between different rivers and across state borders. As a result, trading in the southern Murray-Darling, according to a <u>2011 National Water Commission report</u>, accounts for 90



percent of activity in Australia's water markets. Still, the connected trading region does not cover the entire southern Murray-Darling Basin, because some areas have water flows that are too irregular.

Every Drop Accounted For

The federal government has spent billions of dollars to buy permanent water rights, primarily in the Murray-Darling Basin, to protect the environment. The other half of the total available water in any Australian basin is divided into individual, useable entitlements.

As author Charles Fishman put it in his 2012 book, *The Big Thirst*, every drop of water in the Murray-Darling Basin and others like it is owned, either by the government or by individual users. Once the government owns water, individual users cannot purchase it back. Furthermore, metering is strictly enforced, meaning that unauthorized extractions are rare, according to Young.

So, thanks to Australia's accounting framework — which Young called "robust" in an interview with Circle of Blue — users looking for more water in a catchment area cannot just take it from the environment. Rather, any user seeking access to a larger volume of naturally occurring water, whether from an aquifer or a river, must convince someone else to sell some allocations for use this year or entitlement shares for use this year and every year hereafter.

"That's what sustainability is about," Young said.

The key, however, is finding the right price. Some users may decide it is most economical to buy or sell water shares, while others decide to manage their own shares more efficiently. Still others look for outside sources, like purchasing water from a desalinator or importer, since state-enforced limits only apply to naturally occurring water.

"Proper pricing means [water] is properly valued and goes to where it's needed most," said Peggy Wong, Australia's minister for finance and deregulation, when she served on a panel in August at the Brookings Institution in Washington, D.C.

Pricing Is Key

Three kinds of recurring water rights are sold in Australia's markets:



- **High-security Rights**: Farms with permanent plantings like vineyards and orchards tend to hold high-security rights, which promise a full supply of promised water 95 percent of the time.
- General Rights: Annual crop farmers growers of cotton, rice, and similar seasonal crops
 — tend to purchase general-security supplies, which vary from 30 to 80 percent reliability,
 depending on the river that is supplying the water.
- **Low-security Rights**: These are only available to irrigators when river levels are abnormally high, whether from flooding or unusual rainfall.

Entitlement turnovers across Australia average \$US 2 billion per year, or triple the total annual turnover from five to six years ago, Morison told Circle of Blue. High-security entitlements, the most expensive, ranged in price from \$US 1,000 per 1,000 cubic meters to \$US 3,000 per 1,000 cubic meters (about \$US 380 per 100,000 gallons to \$1,150 per 100,000 gallons) during that period.

Today, however, prices for one-time purchases, or allocations, fluctuate dramatically in the Murray-Darling Basin.

"That's a function of how much water is available and whether or not it's expected to rain," said Young, who can remember prices as low as \$US 10 per 1,000 cubic meters to as high as \$US 1,200 per 1,000 cubic meters (\$US3.80 per 100,000 gallons to \$450 per 100,000 gallons) in the late 2000s, the peak of ten-year drought known as *The Big Dry*.

Agriculture and the Water Market

Already running low on water, farmers are still fighting back against the federal government's waterrights purchases for the environment, despite the fact that the Australian government passed a permanent plan for the Murray-Darling in November.

The problem is not so much that the federal government buys water for the environment — that model spawned the Murray-Darling's rights-trading market system and has successfully mitigated serious water stress in the Basin by reclaiming more than 100 million cubic meters (26 billion gallons) of water in the past 5 years (see Murray-Darling sidebar).



More troublesome is who the government buys water from, how much is purchased, and when the water is purchased, according to Wes Strickland, a California-based lawyer who focuses on water resources and infrastructure issues. Strickland follows Australia's market system closely.

For instance, whenever the government bought a large volume of water at once, Strickland told Circle of Blue, people in the agricultural industry complained. Why? Because those government purchases immediately spiked demand for sales of water rights, since less was now available for irrigation, and that increased demand drove costs up — potentially too high for farmers to buy the water that they needed.

"The government seems to be learning how to spread its purchases out over time and get rid of that, to some extent," Strickland said.

But there is broader resistance in the agricultural community, according to Strickland, because the majority of government buy-backs come out of that sector.

"The ag community, in general, does feel threatened by the whole enterprise," Strickland said.

Morison of Blue Sky Investments sees a broad trend emerging in Australian agriculture — a shift away from seasonal farms growing crops like grains and cotton toward permanent, high-end farming operations like vineyards. This is not surprising, since the market system gives permanent croppers the ability to bid water rights away from their seasonal counterparts.

In other words, despite that permanent croppers pay more for high-security rights that are in the most expensive bracket, their returns are higher than those of seasonal farmers who opt for less expensive general rights. Irrigators who grow pastures to feed beef cattle or sheep for slaughter might derive a return of only \$US 100 per 1,000 cubic meters (\$US 38 per 100,000 gallons), Morison said. But permanent agriculture and horticulture see returns closer to \$US 1000 per 1,000 cubic meters (\$380 per 100,000 gallons), making their business model more viable in Australia's water-trading environment.

The trend first emerged during *The Big Dry*, from 2001 to 2010, when water was traded very actively within and across state borders.



"That allowed permanent agriculture to survive, while annual crops like cotton and rice declined massively," Morison said.

Mining Adapts To Limits

Farmers are not alone in their dependence on water, vulnerability to scarcity, and close ties to governmental involvement in the water market. Australia's mining industry is heavily dependent on the country's water resources. And that fact makes operators apprehensive about the next few decades, even though business is currently booming.

Australia is the world's top coal and fourth-largest liquefied natural gas exporter, mostly to neighboring Asian countries like Japan, South Korea, Taiwan, and now increasingly to China and India, as well.

Demand from Asia is projected to increase in the coming years, which should mean more business for Australia. But freshwater supplies will limit that potential growth, according to Wong, currently Australia's minister for finance and deregulation who served as minister for climate change and water during *The Big Dry*.

For instance, the coal seam gas (CSG) industry could pump between two and nine times more water in the next 25 to 35 years than the entire mining industry currently uses in Queensland and New South Wales — notably the Australian states where the new CSG industry is now booming.

Two major industrial companies operating in Australia today, BHP Billiton and Santos, are exemplary water managers, Young told Circle of Blue. Each uses water-saving practices that other companies could learn from in the coming years, as water demand from the mining industry outpaces water supply.

BHP Billiton, a company with more than 100 years of operating history in Australia, has focused on desalination to reach beyond their entitlement limits. Meanwhile, Young said that Santos, founded in Australia in 1954, uses relatively small water volumes and emphasizes careful water management in their <u>2011 sustainability report</u>.



But best practices designed independently by companies will only go so far. Looking into the future, Young said, regulation will be important in determining how well Australia's water-rights trading market balances growing mining demands with agricultural and municipal needs.

State and federal market regulations will need to protect environmental flows, make sure entitlement holders use only the volumes they are permitted to use, and facilitate the actual movement of water between traders without squashing the market's overall activity, according to the <u>2011 National</u> Water Commission report.

However, a March 2012 report from the National Water Commission found that mining operations <u>were not yet fully integrated</u> into water-planning processes and markets. The hurdles preventing full market integration include unsteady water supplies, different laws between the mining industry, the supervising state governments, national water regulations, and the complete lack of water markets in some mining areas.

Foreign Investment Worries

Added to the tectonic shifts in farming and mining caused by limited water supplies and domestic policies are foreign investors. One flashpoint — the 2012 sale of Cubbie Station, Australia's largest cotton farm to a Chinese textile group — illustrates how non-Australian water purchasers are changing in-country resource rights and business culture (see Cubbie sidebar).

Politicians from Queensland and New South Wales, as well as residents living near Cubbie Station, have expressed concerns that the foreign owners <u>may change how business is done in the local cotton</u> <u>industry</u>that is the region's lifeblood, the Australian Broadcast Company reported.

Over the past few years, <u>large-scale agricultural land investments</u> around the world have increased dramatically as private investors and governments look to secure food supplies and cash in on high global commodity prices. Many of these so-called "land grabs" have occurred in Africa, but they have also become a contentious issue in Australia, fostering fears about food and water security.

According to a recent government study, those fears are overblown.



As of December 2010, only 11.3 percent of Australia's agricultural land was wholly or partly owned by foreigners. Of that, about half had majority Australian ownership. Moreover, the study found that 91 percent of water entitlements were fully owned by Australians.

The authors concluded that foreign investment was critical for further developing the country's agricultural sector and that foreign involvement would be more likely to improve food security than to reduce it.

The United Nations Food and Agriculture Organization (FAO) would agree. The agency, in a joint conference with the European Bank for Reconstruction and Development (EBRD) in September 2012, stated that <u>private-sector investment is key</u>to fighting hunger and food insecurity.

Nonetheless, the Cubbie Station sale highlights yet another dimension of the important tug-of-war over who should own the agricultural sector's water in Australia and in what proportions: the government or private users, both foreign and domestic.

Will It Work?

The viability of Australia's entire water management system met its latest and most substantial test in November when the federal government — after years of debate — passed the Murray-Darling Basin Plan.

The plan is an authoritative set of water-use regulations that determine how much water in the Murray-Darling will be reserved for the environment. <u>Now, two months into the life of the young</u> law, some Basin states are already contesting elements of the federal plan.

Yet, despite the divisive, unresolved issues, Young believes that pricing within Australia's waterrights trading system will play a major role in managing the nation's water resources as agriculture shifts, mining expands, and foreign investment continues.

"I think it's the way of the future," Young said, adding his thoughts of market-based programs. "I know of no other way of doing it."



WATER RESEARCH PROGRAMME -Weekly Bulletin-

"Australia's Water Markets Succeeding, Yet Severe Challenges Loom", 20/02/2013, online at: http://www.circleofblue.org/waternews/2013/world/australias-water-markets-succeeding-yet-severe-challenges-loom/

BACK TO TOP

WWW.ORSAM.ORG.TR

Mithat Paşa Caddesi 46/4 Kızılay-Ankara TURKEY Tel: +90(312)4302609 Fax: +90(312)4303948 orsam@orsam.org.tr



* Bill targets bottled water in Maine governments

AUGUSTA, Maine (AP) - A bill up for legislative review would ban public agencies in Maine from purchasing bottled water.

The proposal, which is scheduled for a public hearing Monday afternoon, would apply to state government or any political subdivision, governmental agency or public benefit corporation of the state.

Bottled water has a number of critics, including environmentalists who say it creates up to 1.5 million tons of plastic waste per year.

The bottled water industry is active in Maine and employs hundreds of people.

"Bill targets bottled water in Maine governments", 24/02/2013, online at: http://www.wcsh6.com/news/article/232514/314/Bill-targets-bottled-water-in-Mainegovernments?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=62fd81f08a-RSS_EMAIL_CAMPAIGN&utm_medium=email

BACK TO TOP