

ORSAM WATER BULLETIN

Weekly Bulletin by ORSAM Water Research Programme

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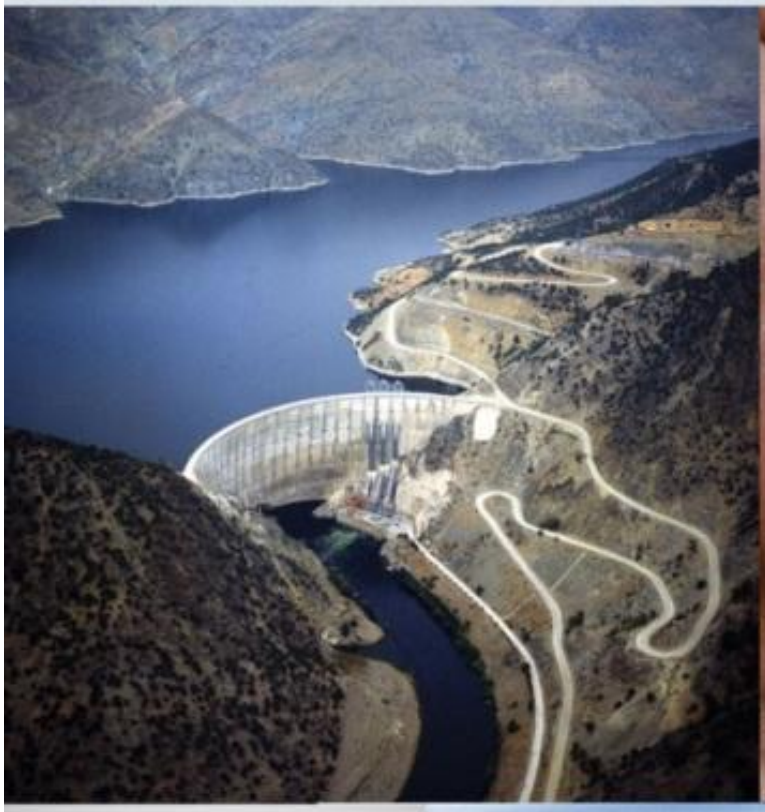



Issue 213

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- **Abu Dhabi summit to discuss water security challenges**
- **Abu Dhabi Sustainability Week To Highlight Growth In Solar-Powered Water Desalination**
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❖ No privatizations ahead in major dams, says Turkish energy minister

Turkey will not include the largest hydropower plants in the privatization plan, even though investors have offered up to $20 billion to buy one of them, said Energy Minister Taner Yıldız Dec. 30.

"We are not privatizing the country's major dams, including the Atatürk, Keban and Karakaya dams in eastern Anatolia. We will not privatize a number of other dams on the rivers of the Euphrates, Tigris and Kızılırmak, the longest of the country," he said at the annual assessment meeting.

Turkey will not privatize these huge dams even though some investors offered to pay $20 billion for the Atatürk dam and $10 billion for the Keban dam, he said.

"Almost all gas-powered plants will be privatized in the coming two years," he added.

Yıldız also said Turkey might talk on what stakes the country will take for the facilities that are planned to be constructed in Thrace for the Turkish Stream project.

"This issue matters a lot to us. Around a 250 km-long pipeline and the complementary facilities will be built there. After the pipeline enters into the Turkish border, we will talk about the nature of Turkey's partnership in the pipeline," he said.

Russian President Vladimir Putin said on Dec. 1 that the South Stream pipeline project is closed, and he gave the signal for another pipeline through Turkey to Europe, which has since been called the "Turkish Stream" in several media outlets.

Yıldız said Turkey's natural gas consumption in 2014 increased to 48 billion cubic meters (bcm), adding that in 2015 this figure is expected to reach 51 bcm.

He noted Turkey continued to pay the highest to Iranian gas in 2014.

"Everybody knows this from all market players, to European countries and arbitrators. It is quite normal to ask to lower this price to more reasonable levels. … We are now waiting for the announcement of the independent arbitration board's decision on the behalf of Turkey," he said.

Turkey is trying to increase power production from coal instead of natural gas – no incentives will be available for new natural gas thermal plants, he said.

"Turkey has to increase its power generation from coal like Germany and other industrialized countries have done; therefore, we will shift incentives available for the gas plants to new coal plants," he said.

Turkey will start drilling in the Black Sea with oil corporation Shell in the first months of the new year, he said.

Turkey will also drill for hydrocarbons in different parts of Turkey using unconventional drilling methods in cooperation with the American multinational corporation Halliburton, he added.

The minister said a total of $1.1 billion was being invested in oil-and-gas exploration in Turkey.

"The Turkish Mining Directorate's three dimensional seismic ship will be launched within the first days of the new year and it will be in operation in the second half of 2015," he said. He added that the seismic ship was produced domestically.

About Iraq, the minister said Turkey desired stability in Iraq and added that the dispute between the Kurdistan Regional Government (KRG) and Baghdad administration was resolved.

The export of KRG oil through the Turkish port of Ceyhan without the consent of the federal Iraqi government had strained ties between Arbil and Baghdad, triggering a legal wrestle in international courts that included the U.S. and Paris-based arbitration courts.

He said 32.2 million barrels of oil were loaded from the Ceyhan port and around $2.5 billion income was generated.

He also added that 3.2 million barrels of oil from the Oil Marketing Company of Iraq was sold via Ceyhan port, of which 520,000 barrels was bought by Tüpraş.

"No privatizations ahead in major dams, says Turkish energy minister", 31/12/2014, online at: http://www.hurriyetdailynews.com/no-privatizations-ahead-in-major-dams-says-turkish-energy-minister.aspx?pageID=238&nID=76305&NewsCatID=344

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❖ Water levels in İstanbul reservoirs increases to 60 pct

The reserve level in İstanbul's reservoirs increased to 60 percent in December, a promising development for İstanbul residents hoping to avoid problems with strange smells in their tap water.

According to data provided by the İstanbul Waterworks Authority (İSKİ), the water level in İstanbul's 10 reservoirs in December is 60 percent full, promising a better summer for residents compared to 2014. At this time last year, the reserve level was at 38.1 percent.

There are now 518 million cubic meters of water in İstanbul's reservoirs, with some of them at 100 percent capacity.

While the water levels in the Istrancalar, Pabuçdere and Kazandere resevoirs are at 100 percent capacity, the water levels in Terkos and Alibeyköy are 85 and 83 percent, respectively, and Ömerli and Büyükçekmece are 62 and 35 percent full, respectively.

The nationwide water reserve level fell over the course of 2014, in part due to very little precipitation. Levels in reservoirs in İstanbul had fallen to under 20 percent capacity by the end of July. İSKİ implemented temporary water cuts in various districts of the city in the summer, and while İSKİ said the cuts were for the purpose of pipeline maintenance, many İstanbul residents believe that they were due to the falling levels of water in the city's reservoirs.

Due to low water levels in the reservoirs last summer, İSKİ faced complaints about odors in the tap water. Although İSKİ refuted claims, saying no problem had been found in terms of the water's potability during tests conducted by the authority. However, some officials reportedly claimed that as the water level decreased, the odor could be stem from the moss at the bottoms of reservoirs.

According to a report provided by the World Wide Fund for Nature (WWF), Turkey will face irredeemable water shortages, especially after 2050, if it continues to consume from its available water sources at the current speed. Because Turkey is not a water-rich country, and has an annual per

capita water supply of only 1,430 cubic meters, Turkish water resources will be used to full capacity by 2030, according to the report.

"Water levels in İstanbul reservoirs increases to 60 pct", 31/12/2014, online at: http://en.cihan.com.tr/news/Water-levels-in-Istanbul-reservoirs-increases-to-60-pct_8361-CHMTYzODM2MS8yMDA3

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❖ Abadi's visit to Turkey

Iraqi Prime Minister Haider al-Abadi visited Ankara on Dec. 25-26 accompanied by six ministers. If the reciprocal good will expressed during this visit is sustained, a new era may open up in the bilateral relations between Turkey and Iraq.

A High Level Strategic Cooperation Council had been established between the two countries in 2008 but has since remained dormant. The meetings of the council have now resumed under the incumbent prime ministers.

The subjects discussed during this council meeting include:

Security

In the field of security, both sides agreed to cooperate, primarily in fighting the Islamic State of Iraq and the Levant (ISIL). Intelligence sharing with Iraq and the training of peshmerga fighters to be provided by Turkey was already agreed to during Prime Minister Ahmet Davutoglu's recent visit to Baghdad on Nov. 20. During Abadi's visit to Ankara, Davutoglu reiterated this position. "Turkey will continue to provide all kinds of support to Iraq in the fight against the terrorist groups in the region. Our countries share the same approach against these groups, including ISIL and the Kurdistan Workers' Party [PKK]," he said. Each country's defense ministries will continue to discuss this subject.

Davutoğlu alluded to previous Iraqi Prime Minister Nouri al-Maliki's policy of alienating Iraqi Sunnis as the main reason for the emergence of ISIL. The Iraqi delegation felt uncomfortable with the remark as the Abadi regime disagrees with such an assessment.

Sunni groups held a meeting in Iraq on Dec. 18 with Usama al-Nujayfi, the Sunni vice president of Iraq, and issued a statement asking the Baghdad authorities to support them in the formation of combat units to fight ISIL and to declare a general amnesty for Sunni political prisoners in Iraq. Baghdad authorities believe that Turkey was behind these statements, which came immediately before Abadi's visit to Ankara. According to the news leaked from the meetings, when Turkey raised the question of giving more rights to Sunnis, Abadi made a short comment by pointing out that new steps were taken to give Sunnis their rights, refraining from further elaboration.

Energy

Abadi emphasized his eagerness to develop Iraq's ties with Turkey in economic, political, commercial, security and military fields while "respecting the sovereignty of both countries." This reference to sovereignty is an allusion to the Iraqi concern about the deal between Turkey and the Kurdistan Regional Government (KRG) of Iraq for the export of oil produced in northern Iraq.

Despite this sensitivity, Abadi also said that Iraq wants to export its oil to world markets through Turkey. If this is a genuine wish, it may lead to the revival of the old Basra-Baghdad-Ceyhan oil pipeline, which will provide an additional route for southern Iraqi oil to Western markets.

The Maliki government had previously cancelled the permits issued to the state-owned Turkish Petroleum Corporation (TPAO), but there was no direct reference to this question at the press conference after the meeting of the two prime ministers. It is possible that normalization may be expected on this subject under Abadi's government.

Economic relations

Turkish-Iraqi economic relations were negatively affected by Maliki's decision to exclude Turkish companies from $500 billion worth of infrastructure works to be constructed in Iraq. Turkey expects that this ban will be lifted by Abadi.

Transboundary waters

An area where the two countries do not see eye-to-eye were the transboundary waters. Iraq is trying to obtain a promise for a guaranteed quantity of water to be released by Turkey in the River Tigris. The international practice in this field is to use water in an "equitable and reasonable" manner, but the parties could not agree on what constitutes "equitable and reasonable."

Abadi's visit will be followed by the visit of the Iraqi President Fuad Masum to Ankara. President Masum's visit may further consolidate Turkish-Iraqi relations, but some scars may remain after the recent difficulties in bilateral relations.

"Abadi's visit to Turkey",31/12/2014, online at: http://www.todayszaman.com/columnist/yasar-yakis/abadis-visit-to-turkey_368486.html

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❖ Iraq's Peshmerga desperate for US arms in fight against ISIS

MOSUL, Iraq – Under a gloomy late November sky that dumped cold rain on their frontline fighting position overlooking Mosul Dam, some 16 Peshmerga fighters mustered around a small hut – the only visible means of protection from enemy fire – while others hovered around a small campfire for warmth.

Just hours earlier, the road leading into the Kurdish army's base was hit by artillery from Islamic State – or "Daesh" as it is known in the Middle East, forcing some closures. But the fighters were calm and collected – sharing jokes and cigarettes ahead of another long and cold night protecting their cherished land in the northern part of this embattled land.

"Now we know their key points and from where they try to attack us. It's weather like now – the fog – over them that allows them not to be seen by the planes," one high-ranking Kurdish Regional Government (KRG) official, who left an office job to fight on the frontlines with the Peshmerga, told FoxNews.com in reference to the war against the jihadist army. "When it is raining, it is a good time for them to start attacking. At the beginning, the villages in Iraq were communicating and helping them attack, they shot at us front and back. But the villagers soon realized that these people were not good. They were not human."

The Peshmerga fighters don a mishmash of camouflage clothes, and wield whatever guns they can get their hands on. Their formal training is limited, and their best attributes are instinct and will.

"We have principles. We were brought up on those principles and an innate drive to serve. We treat Kurdistan like our second mother," explains the official, who is a high-value target and thus asked to remain unnamed. "If you do something day after day you learn and we learn how to fight very fast."

The Peshmerga – whose name literally translates to "those who face death" – began as something of a mountain militia in the 1920s when the push for Kurdish independence began. In recent decades, they faced unrelenting persecution from the Ba'ath loyalists of former Iraqi dictator Saddam Hussein. One Peshmerga fighter told FoxNews.com they don't suffer from "psychological issues" pertaining to combat because they have grown up around fighting and have developed an early understanding that it is "just what we have to do." While the issue of possible PTSD garners little – if any –

mainstream attention, one daughter of a retired Peshmerger fighter said at least in her experience growing up, she witnessed the mental anguishes of battle.

The Peshmerga soldiers range from around 18 to over 70 years old, with many coming out of retirement in the quest to defeat the ISIS threat. During days of intense conflict, the Peshmerga are lucky to return to their base for two or three hours of sleep and a quick bite to eat, before returning to their fighting locus. As it stands, a majority of fighters are not soldiers but what they call "security advisors." They don't take a salary and have volunteered simply out of devotion.

"There is a Special Forces that has been arranged for these people that have come in, they don't register their names and don't sign contracts. They just want to serve Kurdistan," the official said.

Due to a limited supply of weapons, volunteers often have to bring their own firearms – usually a basic AK-47 – with the M4 and M16 rifles, BKC—an Iraqi clone of the Soviet PKM machine gun – and the DshK heavy machine gun, called the "doshka" in Iraq, being the staple weapons used in the battle against much better equipped opponents.

Despite their lack of advanced technology, the Peshmerga remain acutely aware of precisely how many Islamic State fighters they take out each night at battle, and exactly where in the close vicinity those dead bodies lay even days after the fact – subject to the elements and hungry wild dogs. Although they are outgunned, the Kurdish fighters keep their wits about them, a tactical advantage over the enemy. One Peshmerga soldier explained how Islamic State commanders often drug young fighters with "special tablets" that leave them disoriented and shooting wildly, sometimes taking several rounds before they go down.

"For those who survive, when they realize what they have done they sometime regret," acknowledged the official.

The Peshmerga also rely on a growing intelligence-gathering network that supplies logistical support to those who battle in the field.

"We have secret service inside ISIS-controlled villages in Mosul and other places passing information, some are even living with ISIS and they don't know," the official said.

U.S. airstrikes are said to have helped Kurdish and Iraqi government forces seize control of the critical Mosul Dam in late August after Islamic State seized the area weeks earlier. Before Islamic State, the Tigris River dam was operated and controlled by around 1,200 Iraqi families. Just more than half have since returned, amid fears the almost two-mile long dam could be deliberately blown up to flood Mosul, some 30 miles downstream, and even Baghdad.

Built exclusively for Hussein in the early 1980s, the dam, according to a 2006 U.S. Army Corps of Engineers report is particularly dangerous and "constructed on a very poor foundation," and U.S. authorities subsequently spent tens of millions on interim fixes.

Much of the Kurdish population now view the United States of America as their only dependable ally in the ongoing war against the terrorist organization – and their desperation to be supplied with American equipment and weapons remains the eclipsing message.

"The airstrikes are good, but we need weapons," stressed the official, dismissing the notion that U.S. ground troops are the ultimate answer. "We already have military on the ground, but we're fighting an enemy that has acquired all the sophisticated U.S. weapons that went to the Iraqis and now ISIS has them. This isn't a balanced fight."

Due to internal conflict over oil exports between the semi-autonomous KRG and the Iraqi Central Government, the Kurds have not received the billions of dollars in military supplies since the 2003 U.S. invasion. The Kurdish region is legally entitled to 17.5 percent of the Baghdad budget, but for almost a year, it has not received its portion. Kurds do not control their air space and not allowed to purchase their own weapons and supplies without approval from the Central Government.

"We tried to buy weapons from the outside, from places like Russia and America but the Foreign Ministry wouldn't allow it," the official explained. "The Iraqi government hasn't even given us one single bullet."

Earlier this fall, an agreement between the two Iraq-based governments was announced, stating that the KRG should send 250,000 barrels of oil per day to the central government and in turn receive its budgetary share as part of the Iraqi defense system, but according to one official very close to KRG President Masoud Barzani, funds have not been disbursed.

Western powers view the Kurds as a crucial safeguard against further Islamic State advances, but in order to take the offensive, the Peshmerga say they need more help.

"The United States really needs to think about the message it is sending," added the KRG official. "If ISIS is an existential threat as the Iraqis claim; and if it really threatens U.S. interests abroad and its security at home then more must be done to arm the Peshmerga."

"Iraq's Peshmerga desperate for US arms in fight against ISIS", 03/01/2014, online at: http://www.foxnews.com/world/2015/01/03/iraq-peshmerga-desperate-for-us-arms-in-fight-against-isis/

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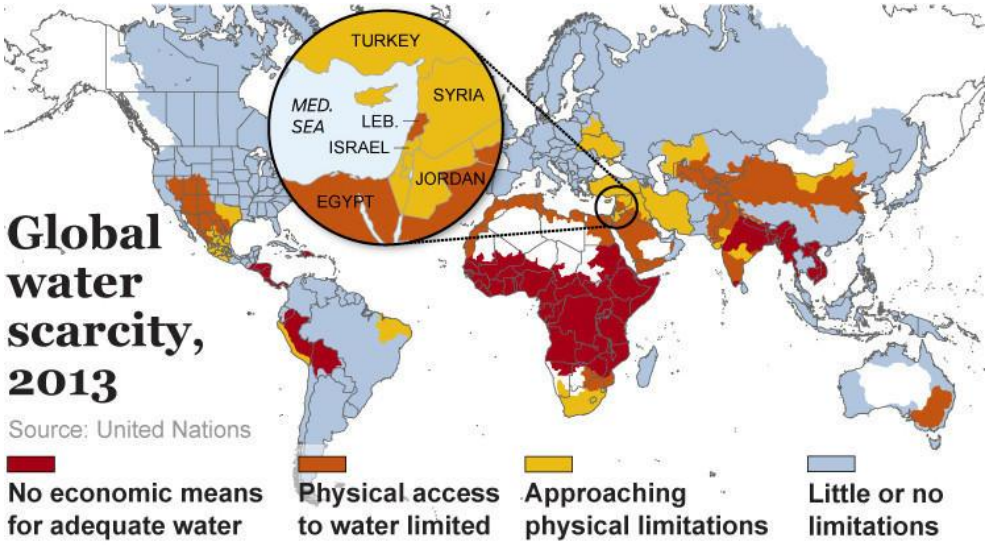
❖ For water's sake, Chicago researchers reach across the seas to Israel

The Arava desert, a salty wasteland dotted with tufts of scrub, gets only about an inch of rain each year. And yet cows lazily low at dairy farms that collectively produce nearly 8 million gallons of milk annually. Orange bell peppers flourish in a long swath of greenhouses that skirts the Jordanian border. Kibbutzim with vineyards somehow manage to churn out shiraz and sauvignon blanc, unfazed by the desert sun.

The clusters of farms and wineries in the Arava are a testament to Israel's acumen in water technology. One of the most parched places on Earth has found a way to beat water woes once so severe that Israel's national mood rose and fell with the changing level of the Sea of Galilee, one of their most critical water sources.

That expertise helps explain why the University of Chicago sought out Israel's Ben-Gurion University to help tackle one of the world's most worrisome problems — water scarcity.



In decades past, oil used to be the commodity that shaped geopolitics, and at times, ignited wars. In coming years, water will be the commodity with that kind of clout.

Water scarcity is no longer a problem buried in think tank monographs. It's a crisis that has begun to have palpable, disturbing implications for much of the globe. By 2030, nearly half of the world's population will be living in regions saddled with severe water stress, the UN projects. Over the last

decade, the number of violent confrontations over water issues has risen fourfold, according to the Pacific Institute, a California-based think tank that studies global water scarcity.

The University of Chicago is tackling water scarcity because it believes it has a novel approach to the problem — relying on engineering at a molecular level to produce breakthroughs. The university opened its Institute of Molecular Engineering in 2011, and within a year talk began of putting water scarcity at the top of the institute's agenda.

"There are shortages of water from the First World to the Third World," said Steve Sibener, one of the University of Chicago scientists leading the research. "If you look at California, it has been a particularly dry year, and you can see how the whole West and Southwest can have boom and bust cycles that are likely to get worse. If you move onto the Middle East and Africa, you understand that water is precious — it's like gold.

"It's the issue of the day," Sibener said. "Hundreds of millions of people are at risk of (not) having enough water."

In laboratories in Chicago and the Israeli desert, scientists are crafting radical new approaches that may one day rejuvenate the world's water-starved regions. One project uses a common inkjet printer to apply layers of chemicals to a water filter to repel bacteria and keep the filter clog-free. Another turns radioactive isotopes into tracking devices to trace water movement through aquifers, a development that could lead to the discovery of vast new strata of groundwater. Still another effort strives to create filtering membranes that operate on a molecular level, using electrically charged, cilia-like hairs to repel filter-fouling microbes. The goal is to complete research by the latter part of 2015.

Every experiment has representation from both the University of Chicago and Ben-Gurion. The University of Chicago brings to the collaboration its expertise in molecular engineering, while Ben-Gurion brings its experience of transforming water research into real-life applications in a water-starved nation.

For both universities, the collaboration represents an opportunity to parlay their top-shelf know-how into potential solutions for one of mankind's most pressing priorities.

But for Chicago, the partnership could provide a cornerstone in the city's bid to dramatically ramp up its global profile. When Mayor Rahm Emanuel traveled to Israel in June 2013 to announce the two universities' collaboration, he spoke of the partnership as a steppingstone to Chicago's eventual evolution into a water technology hub.

"He said he would like to see Chicago grow into a center for water technology," said Moshe Gottlieb, Ben-Gurion's lead scientist for the collaboration, who joined Emanuel at the signing ceremony marking the collaboration. "I think this is a remarkable idea."

If Chicago is serious, it will have to contend with Milwaukee, which has already forged a strong identity as a globally known magnet for water technology enterprise and research. The Milwaukee region is home to 150 water technology companies, as well as the nation's first university-level freshwater sciences department, at the University of Wisconsin at Milwaukee. Last year, the city christened the Global Water Center, an incubator that links water technology start-ups with larger corporations and academia.

"They're exporting the creativity and solutions that those companies have to the rest of the world," said Josh Ellis, a water policy expert at Chicago's Metropolitan Planning Council. "They want to be this borderless global hub for ideas and innovation."

Not safe to drink

Three quarters of the world is covered by water, but less than 3 percent is fresh water. More than 3.4 million people die each year of diseases related to lack of safe drinking water such as diarrhea — nine out of 10 of those deaths occur in developing countries. Water scarcity affects at least 700 million people in 43 countries, according to the UN. By 2025, the number of people living in areas without enough water will rise to 1.8 billion people, the UN states. Areas with annual water supplies below 1,000 cubic meters per person are regarded as water-scarce, according to the UN.

The quest to ensure reliable sources of drinking water has stoked discord among nations for millenia — and still does today.

In the Nile Valley, tension has ramped up over a dam the Ethiopians are building that would dramatically cut back the amount of water Egypt gets from the Nile for irrigation and drinking water purposes. In South Asia, the Pakistani government for years has accused India of building hydroelectric dams in the Indus Valley that rob Pakistan of water it needs for farm fields and human consumption.

Shortages can also spark violence. In the Bolivian city of Cochabamba in 2000, a 17-year-old teenager was killed and hundreds of people injured when the army stepped in to quell large protests over massive increases in water fees.

Water crises aren't limited to Asia and Africa. In Brazil's largest city, Sao Paulo, more than half of residents said last fall that they had been hit with water shortages, and more than three-fourths of those affected said their water shut offs lasted more than six hours. The drought currently gripping Western U.S. states has robbed that region of 63 trillion gallons of water. The crisis is severe enough that Los Angeles Mayor Eric Garcetti in October set a city goal of reducing water use by 20 percent within the next two and a half years, and has warned that water restrictions will follow if the goal isn't met.

The point man for the University of Chicago is Matthew Tirrell, a professor and founding director of the Institute for Molecular Engineering, who in 2012 approached Gottlieb, a longtime friend at Ben-Gurion, about collaborating on water research. Ben-Gurion was a logical choice, Tirrell said, because of the Israeli university's reputation as a pioneer in water purification and desalination techniques "that are now really changing the water landscape of the country."

From the start, the goal has been to nurture breakthroughs that can be global in scale.

"We need to look for things that are game-changers," Gottlieb said. "We want to attack the issue at the molecular level. We want to take our expertise in nanotechnology, and put it to use in water-related problems."

A water-starved place

Israel is the ideal place to turn to for water research expertise. Since its independence in 1948, Israel has had to find ways to build its society and economy in one of the most water-starved places on the planet. Its game plan for surmounting water scarcity had several pillars. It built a water supply line known as the National Water Carrier that transported water from the Sea of Galilee to the rest of the country, including the barren wastelands of the Negev and Arava deserts. It ingrained water conservation deep in the population's mindset — for years, Israelis rationed their water use, and even as young children, they were taught to conserve.

"From the age of 3, we learned to shut off the faucet while brushing our teeth," said Udi Tirosh, business development director at IDE Technologies, an Israeli corporation that builds and operates desalination plants in Israel and around the world. "There was big demand control in Israel."

The most significant initiative was Israel's embracing of desalination technology. Israel built its first plant at Ashkelon on the Mediterranean coast in 2005 and now has five plants. Together, the plants produce 500 million cubic meters of water each year, about half of the country's drinking water needs. In desalination, water is drawn out of the sea and then pumped through a series of filters to separate the brine and yield fresh water. Once desalinated, the water tastes like ordinary tap water.

"Desalination gives you the power to control your supply," Tirosh said. "Up until a few decades ago, you were waiting for rain or digging a well. Now that you can desalinate, it's game-changing. You can produce efficient water from the sea, which is important because rivers can dry out, and lakes and aquifers can dry out. This is what happened in Israel."

There are now more than 17,000 desalination plants in 150 countries, and expanded use of the technology could drastically ratchet up water supplies for water-starved nations. But desalination isn't problem-free. The bane of desalination plants is biofouling, the buildup of microbes on filter surfaces. It makes an already costly approach to creating drinking water even costlier.

A portion of the Ben-Gurion/University of Chicago research targets the world's increasing reliance on desalination. The goal, Tirrell said, is to create new technology that solves the problem of bio-fouling, and in doing so, make desalination more practical across the globe. To that end, Tirrell and his Israeli counterparts are creating new strandlike molecules less than one-10,000th of the diameter

of a human hair, and attaching those strands to the surface of a desalination filter. The strands are electrically charged both positively and negatively, and that combination repels bacteria. "No one really knows why," Tirrell said.

"It's important to have widespread use of desalination, so it's important to bring the cost down," Tirrell said. "The potential of this research is to have very long-lasting membranes where the cost of the membranes comes down by a factor of two."

Ben-Gurion's role in Tirrell's project is to find a way to ramp up the scale of production of the strand-covered filters. Tirrell's team can only make "on a good day, a square centimeter. (But) you have to make it in square meters. That's why Israel has been brought in."

At Ben-Gurion's Sede Boker campus in the heart of the Negev desert, biological chemist Christopher Arnusch is relying on an everyday office mainstay — the inkjet printer — to help improve water filtration. Arnusch has found a way to use the printers to apply anti-bacterial coatings to filters, a breakthrough that allows scientists to economically affix the right mix of chemicals to sheets of filters a meter wide.

"When you get this slimy, bacterial material on membranes, it makes them ineffective and reduces their shelf life," Arnusch said. "And it costs more energy to run the systems."

Arnusch and Tirrell focus on water purification. Another Ben-Gurion scientist, Eilon Adar, has a very different mission — finding new sources of water.

With technology developed at Argonne National Laboratory outside Chicago, Adar and his team use naturally occurring radioactive isotopes to track the movement of groundwater through aquifers as deep a mile below the surface, relying on a special laser device to detect the number of krypton isotopes in a water sample. Krypton isotopes are used because they begin to decay once they move from surface water to underground strata. The number of isotopes found tells scientists how long the water has been underground. With that information, they can plot the oldest to youngest samples on a map and determine the water's flow through the aquifer, and ultimately the aquifer's size and characteristics.

Adar says the research has an intriguing practical application — finding water in the bedrock beneath the world's deserts.

"You cannot sustain a growing population with diminishing amounts of water," Adar says. "So we move into arid and semi-arid basins. … And we all know that, under deserts around the world, there are huge groundwater reservoirs."

"(Moammar) Gadhafi, no matter how crazy he was, he drilled for oil but also found water under the Sahara," says Adar, referring to Libya's longtime former leader. "He was the first one to divert water from the desert to the coastal plain of the Mediterranean. He called it at the time the 'Grand Manmade River.' He was crazy but he did something very logical. It is brackish, somewhat saline, but by one order of magnitude fresher than sea water. Why treat sea water if you can treat brackish groundwater? And Libya didn't suffer from lack of energy, so it made sense."

A wellspring of research

Adar's research can also help in Israel, where desert enterprises — from dairy farms to wineries to fish hatcheries — distill their struggles into a single, common plight: lack of water.

Israel's evolution as a wellspring for water technology know-how explains why farms in the Arava thrive. Israel is the birthplace of drip irrigation technology, which conserves by delivering a trickle of water directly to plant roots. Israeli researchers also have fine-tuned how much pure water needs to be added to brackish water drawn from Arava aquifers in order for a given plant species to thrive.

Today, farmers in the Arava grow almost everything found in the nation's grocery store produce sections: mangoes, pomegranates, grapes, watermelons, tomatoes, potatoes, corn, bell peppers and eggplants.

At a kibbutz farm in Samar, the challenge is to keep from overheating dairy cows, livestock that normally would not survive in a desert climate. The solution — showers, seven times a day during summer months, and three or four times a day during the rest of the year.

The wineries of the Arava and Negev face their own daunting obstacles: water and soil that's too saline, a desert sun that bakes vines with temperatures above 110 degrees during harvest time.

And yet, at Kibbutz Neot Semadar, a winery in the southern end of the Arava desert, an oasis blooms. Gardens of lavender line pools filled with large goldfish. Orchards yield apricots, almonds, apples and plums. And despite the climate, the shirazes, merlots and chardonnays hold up well, locals say.

"Over time, Israel's farmers have become extremely efficient at using water," says Jack Gilron, a leading scientist at Ben-Gurion's Zuckerberg Institute for Water Research in Sede Boker. "For them, water's scarcity became the spur for how to do water more efficiently. Drip irrigation is now a leading export, and it comes out of this concern about how do make sure water is used to the utmost efficiency."

That resourcefulness, said Sibener, makes Israel the ideal partner for a collaboration that tackles a global dilemma as weighty as water scarcity.

"They are a natural partner," he said. "Water is scarce, and a lot of the politics are complicated. Out of necessity, they have had to develop as a national initiative the ability to be independent in their water consumption. And they've achieved that goal. Now they're sharing that technology with the rest of the world."

"For water's sake, Chicago researchers reach across the seas to Israel", 02/01/2014, online at: http://www.chicagotribune.com/news/ct-u-of-c-israel-water-scarcity-global-cities-0104-20150102-story.html#page=3

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❖ President Mahama And Partners Inspect Water Project

Israeli Ambassador, Sharon Bar-li, with the Deputy Head of Mission of the Embassy of The Netherlands; Caecilia Wijger, joined President John Dramani Mahama, to inspect the completion of Accra Tema Metropolitan Area Rural Rehabilitation Project.

Israel provided $19 million, while The Netherlands contributed € 41 million, to support the project, designed and built by Israeli engineering, design and construction firm; TAHAL Group.

Mr Seth Owusu-Mante Jnr., Public Diplomacy Coordinator of the Embassy of Israel, announced this in a statement, copied to the Ghana News Agency, yesterday.

The project is expected to produce a daily supply of 46,000m³, equivalent to 9 million gallons of potable water to serve an estimated population of 250,000 inhabitants.

The statement said the Rural Rehabilitation Project had been equipped with additional facilities to produce 56,000m³ water daily in future.

It quoted the Ambassador of Israel, Sharon Bar-li, as saying: "Coming from Israel, a country that has scarce water resources, we know that water equals life, therefore, we are proud to take part in a project that connects so many Ghanaians to potable water and elevates their standard of living."

The executing company, TAHAL, is one of the oldest Israeli companies working in Ghana since independence.

The statement said General Manager of TAHAL Ghana, Ehud Avny, expressed satisfaction with the work done.

The statement said he expressed delight over the completion of the work on schedule, as the Tahal Group marked 50 years of work and cooperation in Ghana.

The statement said the TAHAL Group would continue to offer sustainable integrated solutions in the water and agricultural sectors in Ghana towards transforming the challenging situations to benefit both the urban and rural populations.

The Project has improved water supply to Michel Camp, Afienya, Kpone, Prampram, Old Ningo, New Ningo, Ayitepa, Kponguno, Omankope, Kodiabe, Doyumu, Agomeda, Adumanya, Menyum, Dodowa, Odese, Nganompian, Bawalashie, Oyibi, Amanfro, Latehman, Ashiyie, Fafraha, Abominya, Ayikuma, Abokobi, Pantang and Ayi Mensah areas, all in the Greater Accra Region.

The rest are Akorley, Abonse, Aperade, Adukrom, Awukugua, Dawu, Abiriw, Akropong, Mamfe, Amanokrom, Tutu, Obosomase, Ahwerase, Aburi, Gyankama, Kitase, Peduase, Berekuso, Akwamufie, Mangoasi, Atimpoku, New Senchi, Akrade, Senchi, Domeabra, Lolonyo, Agomanya, Manya Kponwono, Odumasi, Menekpo, Sra, Sawe and Ogome, also in Eastern Region.

"President Mahama And Partners Inspect Water Project", 02/01/2015, online at: http://www.ghana.gov.gh/index.php/news-slider/6947-president-mahama-and-partners-inspect-water-project

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❖ Palestine's proposal to be presented at 'right time' in UN

United Nations : The Palestinian representation at the UN has included several amendments to a draft resolution announced two weeks ago and the text will be presented in the Security Council "at the right time", official sources said.

The Palestinians, supported by the Arab group at the UN, have for months been demanding that the UN Security Council adopt a resolution to set a deadline for the withdrawal of Israel from Palestinian territories.

The US, Israel's main ally, had already anticipated Monday's move by the Palestinians and on the terms that were previously announced, will veto it, so it has little prospect of being approved.

The Palestinians continue to insist on the need to vote on the text in the Security Council and are confident of it being achieved before the end of the year, a possibility that appears to be increasingly more difficult.

The issue was discussed at a two-hour meeting held Monday in the UN headquarters with Arab representatives, where they discussed the amendments recommended by the Palestinians, Jordanian Ambassador Dina Kawar told journalists.

The diplomat, whose country holds a non-permanent seat in the Council, has not specified in which direction the amendments would be made, but said that they refer to the status of Jerusalem, the prisoners and water rights.

Among the applied changes, the amended proposal establishes that the negotiations should lead to a fair solution on the status of Jerusalem as the capital of two states, according to the text leaked by Arab sources.

The version released two weeks ago said that Jerusalem should be the "shared capital" between Palestinians and Israelis.

The latest amendments also require the issue of the prisoners to be solved in a fair manner, while earlier only the distribution of water was mentioned.

Kawar said that representatives of the Arab group would have private consultations to define "what is the best time to vote" on the proposal.

The draft of the proposal, which was announced Dec 17 requires Israel to withdraw from the Palestinian territories before the end of 2017, something that remains in the text as amended in the last hours.

The draft proposes that within the period of one year from the approval of the proposal, there should be a peaceful solution to the conflict between Israelis and Palestinians that is "fair, lasting and complete".

The US, which has the power to veto in the council, has already said that it was not in accordance with the initiative, according to the text that was announced two weeks ago.

“Palestine's proposal to be presented at 'right time' in UN”,30/12/2014, online at: http://twocircles.net/2014dec30/1419956799.html#.VKuzaSusVz8

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❖ Liquid asset: The Israeli startup that turns air into water

A drab building in Rishon Letzion's industrial zone hides one of Israel's most surprising and innovative enterprises. The offices of this startup company are stashed away at the back corner of the second floor, and the lack of any signs showing the way doesn't make it any easier to find it. Not far away, in a dilapidated industrial building between a row of workshops is the company's showroom. It is hard to believe that this spot, as far as possible in terms of geography and buzz from Silicon Valley, is the home of some of the most fascinating technology of our time: Manufacturing water from air.

Since founding Water-Gen in 2009, Arye Kohavi has preferred to operate from Israel with a very low profile. He does not avoid the media limelight, but it has come mostly from the public relations side of his biggest customer: The Israel Defense Forces. Unlike Israel's most innovative high-tech entrepreneurs, Kohavi has stayed well under the radar even after the magazine Fast Company named Water-Gen one of its 50 most innovative companies in 2014. Water-Gen also received the European Technology Innovation Leadership Award for 2014 from market research firm Frost & Sullivan.

But one week in November everything changed. Foreign Policy magazine chose Kohavi as one of its 100 Leading Global Thinkers of 2014. "It was a bit of a shock," he says.

'Global Thinker of 2014'

A few days earlier Kohavi received a no less important show of support for the future of Water-Gen with Mikhael Mirilashvil investing tens of millions of dollars in Water-Gen via his Be'er Isaac Energy firm. The Jewish Georgian billionaire now owns half the company.

Kohavi looks askance at publicity, pointing to the fall of the alternative energy entrepreneur Shai Agassi and his failed Better Place startup. "I'm not interested in it, and I don't need it for my ego. Look at the case of Shai Agassi. Everyone loved to raise him up and then enjoyed knocking him down. I didn't want to play that game. In addition, we didn't have a business interest here. But now two things have happened, this prize, which was too big to be kept under [media] control, and Mikhael's joining the company."

The more you hear about Water-Gen, the more it captivates you. The equipment it has developed manufactures clean drinking water from the air and from polluted water quickly, efficiently and cheaply in almost any climate and with a minimal use of energy and electricity. The company originally aimed its products at the military market, but its technology could one day solve one of the greatest threats facing mankind: A growing shortage of water.

Some 80% of the world's population lives in regions with inadequate supplies of water. Water pollution and the diseases it transmits are the single largest cause of death in the world, based on data published in the scientific journal Nature. Many experts predict that the worsening water shortage, especially in Africa and Asia, will lead to violent conflicts in arid regions. Even in the developed world and places where water is abundant, global demand for water for industrial and home use will grow rapidly between now and 2050, forecasts the Organization for Economic Cooperation and Development.

The process by which air is turned into water is not new — it's one of the ways air conditioners and dryers work. But Water-Gen has succeeded where no one else has in making the process of extracting water from air efficient enough to allow new and unprecedented uses.

More water for your money

"We provide 10 times more water for the same kilowatt unit, and five times more than any similar device that ever existed," says Kohavi. It's the efficiency factor that makes it a real solution to the world's water problems, he says.

Water-Gen manufactures devices that rely on condensation of water from the air. "The energy can come from a dedicated generator or electrical energy from any source. I think there's huge potential for civilian uses," says Prof. Daniel Rosenfeld of the Institute of Earth Sciences at The Hebrew University in Jerusalem. "If Water-Gen knows how to lead the way into the world market then it has a great future. For now it seems it is moving in the right direction."

A soldier's idea

Kohavi came up with the idea of producing water from the air while he was still a soldier: "When I was a company commander in a reconnaissance unit in the Israel Defense Forces, the issue of supplying water to front line forces interested me a lot. You're in Lebanon or Gaza and you have no water, so they have to supply you with it by convoys or by helicopter. The problem weighed on me for over 20 years until a solution started to take shape."

After finishing his studies in economics and business administration, Kohavi was the CEO of Meitav Underwriting, chairman of e-learning company Composica, a director of a number of firms and worked in mergers and acquisitions.

One of these M&A deals led to the founding of Water-Gen in 2009 with Avi Peretz, a friend from the army who became his partner and co-CEO. He had arranged the acquisition of the air conditioning division of Electra by a company named Orris, and approached the buyer with his idea. They sent him to an engineer, Eli Meir, who is now the chief engineer at Water-Gen. Orris built the first prototypes in return for a small stake in the company.

Kohavi managed all this without any engineering training — and very quickly. The first contract with the U.S. military was signed less than two years after the company was founded. Kohavi is grateful to the Israeli government, saying it would not have been possible without its help, citing the Defense Ministry in particular.

"There are a lot of things I don't know, in the area of engineering, too, but I do know how to think clearly and out of the box, to define what I want well and cause things to happen," says Kohavi. "The company hired some of the best engineers in the world."

Seven armies use the products

Water-Gen works with some of the world's biggest consumer product companies, none of whom Kohavi will name because of confidentiality agreements he has signed with them. "We sell our devices to seven armies, without a competitor in the world, and much of that is to the credit of our engineers."

Kohavi is keeping the financial details secret, too. "We made a decision not to release numbers. I can tell you there are 15 engineers and developers working here. Sales to the military are in the range of millions of dollars and we expect to move to sales of tens of millions of dollars [in 2015]."

Water-Gen has three main product lines designed for both military and civilian use: Large machines for condensing water out of the air, devices for producing water from industrial air conditioners such as in buses and trains, and a mobile unit for purifying water that can be carried by a person on his or her back.

The Gen-350G, the first product the company developed, looks a bit like a cross between an industrial air conditioner and a water cooler. Used by a numer of armies, its internal generator can produce 450 liters of water a day. The process is rather simple and energy efficient. The device condenses water taken out of humid air, filters it and then adds minerals. The water is cooled, giving troops in the field a constant supply of cold water to drink.

A similar unit is designed to be mounted on tanks and other combat vehicles in conflict zones, providing them with water and eliminating the need for supply convoys.

The smaller Water Treatment Unit filters water released by air conditioners, using software that manages the operation of the air conditioner so that it provides maximum water production under changing weather conditions.

The third device, called the Spring, was developed together with Israel's Ministry of Defense. Designed to be carried on a soldier's back, it weighs 12 kilograms and uses the same battery as a military radio. It can purify any water source in the field to excellent quality, including water poisoned with chemicals such as cyanide. The device can purify 200 liters of water, providing weeks of water supply for troops operating behind enemy lines or for emergency teams responding to a major disaster.

Disaster relief, too

The IDF's disaster relief team took a Spring with them to the Philippines after an earthquake a year ago to help provide water to the local population, showing the possibilities for civilian use, notes Kohavi.

"If soldiers are conducting an operation out in the field that takes 24 or 48 hours, they're limited by how much weight they can carry. We want to make them independent; it's better for the supply chain and logistics," Maj. Alisa Zevin, head of the IDF's facilities and specialized-equipment department in the Logistics Directorate, told the magazine Fast Company.

"Water-Gen weighs 33 pounds and can be carried on the back, but soldiers have said that's a lot. So we're trying to make it weigh less. Two 12-volts purify about 200 liters. The quantity is fine, but we want to make the battery last longer so a soldier doesn't have to carry other batteries. But the quality of the water was good; the taste was good. None of the soldiers complained about that."

After signing a number of military contracts, Kohavi has his sights set on the civilian market, where he thinks the products have enormous potential. India, with its more than one billion people, is the ideal country for the company's next big moves, he says. The climate is hot and humid all year round, and the country's poor water structure is decrepit. Most drinking water is polluted.

"Liquid asset: The Israeli startup that turns air into water", 02/01/2015, online at: http://mideastenvironment.apps01.yorku.ca/2015/01/liquid-asset-the-israeli-startup-that-turns-air-into-water-haaretz/

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❖ Egypt, Ethiopia to settle dispute over Nile dam

An Ethiopian Water and Energy Ministry official revealed on Monday that his country had resolved its differences with Egypt over a study commissioned to assess the likely impact of a multibillion-dollar hydroelectric dam now being built by Ethiopia on the Nile River.

Accordingly, a three-party committee on the dam – made up of Ethiopia, Egypt and Sudan – will soon resume discussions, Bizuneh Tolcha, head of public relations at the ministry, told The Anadolu Agency.

The project, dubbed the "Grand Renaissance Dam," has strained relations between Ethiopia and Egypt for several months.

Water-poor Egypt says the project - that is now 30 percent complete - will negatively affect its share of water from the Nile – its only source of water – while Ethiopia says the project is indispensible to its own national development and the economic welfare of its growing population.

Tolcha said that, now that the dispute between Ethiopia and Egypt over the project study had been resolved, Egypt, Ethiopia and Sudan would select a consultancy firm to conduct the survey.

The study will aim to assess the social, economic and environmental impact of the $4.8-bn project, a sizeable portion of which has already been completed.

The committee, known as the Tripartite National Committee, consists of four experts from each of the three countries.

It should have convened for the third time in Sudanese capital Khartoum between 4 and 6 December, but the meeting was called off due to differences between Ethiopia and Egypt over the schedule of the studies.

Egypt says the studies should not take more than five or six months, but Ethiopia – which is actively working on the project – says the studies could take as long as 18 months to complete.

Tolcha declined to provide further details about the nature of the agreement reached between Egypt and Ethiopia on the timeframe of the dam studies.

The tripartite committee held a series of meetings in the Ethiopian capital between August and September.

A meeting was also held in Cairo, during which the three states agreed on a shortlist of seven international firms to conduct the studies.

Egypt and Ethiopia reportedly signed a deal in June regarding the controversial dam as part of an African Union summit in Malabo, capital of Equatorial Guinea.

The agreement saw both sides agree to "abide by the principles of international law", according to the text published in al-Dostor al-Asly.

"Egypt, Ethiopia to settle dispute over Nile dam",30/12/2014, online at: http://www.middleeasteye.net/news/egypt-ethiopia-settle-dispute-over-nile-dam-677531603

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❖ The Egypt-Ethiopia dispute over the Nile basin can evolve into a strategic partnership

This article by: Goitom Gebreluel

The content of this [report/study/article/publication…] does not reflect the official opinion of the DIPLOMAT NEWS NETWORK.

The views expressed in this article are the author's own.

- Ethiopia and Egypt have successfully managed to end their millennia-long rivalry over the river Nile. Ethiopia's announcement in 2011 of its intention to construct Africa's largest hydropower plant on its share of the Blue Nile led to developments that radically changed bilateral relations and hydro-politics in the Nile basin.

Since 2011, Cairo had claimed that Ethiopia's Grand Renaissance Dam (GERD) would constitute a critical threat to its water security. The dispute reached its peak in 2013 when former Egyptian President Mohamed Morsi's subtle threats of military action against the dam had war clouds looming over northeastern Africa.

But by by mid-2014, Egypt had effectively changed its centuries-old hydro-policy – which by and large consisted of retaining a near monopoly on the utilisation of the Nile waters. It no longer considered the building of any dam on Ethiopia's share of the Blue Nile as an unacceptable compromise of its water security. Instead, Egypt now accepts Ethiopia's right to develop its hydropower resources – as long as it doesn't cause significant harm to its own water supply.

Emerging cooperation

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Sudan was instrumental in tipping the diplomatic balance in favour of Ethiopia. Khartoum, which had coordinated its Nile policy together with Egypt for decades, changed its alliance in December 2013, and voiced its support for GERD.

Ethiopia had also simultaneously been actively signalling its desire for a "win-win" solution to all parties – in a bid to ease downstream insecurity.

By early 2014, around 30 percent of the dam construction had already been completed, and Egypt's inability to prevent the construction of GERD, both through military or diplomatic means, had become increasingly apparent. All of which played into Egypt's new diplomacy on the Nile.

The diplomatic turning point followed Egypt's change of government in 2014. On June 26, the newly sworn-in President Abdel Fattah el-Sisi and his Ethiopian counterpart PM Hailemariam Desalegn agreed at the AU summit held in Malabo, Equatorial Guinea, to find a mutually acceptable solution to the dispute over GERD, and to look into other possible areas of cooperation by resuming their stalled Joint Ministerial Commission.

On November 3, the old rivals, Ethiopia and Egypt, were busy signing cooperation agreements and MOUs in trade, education and health sectors. This had been preceded by regular mutual visits by government ministers from both countries.

In the third tripartite negotiations between Ethiopia, Sudan and Egypt held in August, the parties agreed to commission an international consultancy company to conduct a social, economical and environmental impact assessment of GERD. Technicalities relating to the timeframe for filling up the

reservoir can possibly stall the dialogue, however, a reversal of the reconciliation process is highly unlikely – albeit not impossible.

Overlapping interests

The possibilities and implications of cooperation between the two regional giants, Ethiopia and Egypt, have until now, not received serious attention. The conflict over the Nile had overshadowed the fact that their regimes might be rather politically compatible and their economies complementary.

The hydropower sector – ironically the source of the historical rivalry – is the best example of overlapping interests. Egypt currently generates 90 percent of its electricity supply from fossil fuels, and has already reached the limits of its hydropower production capacity. More than half of its domestic natural gas consumption is used for electricity generation, and an increase in electricity demand means that there is a risk it will have to begin utilising even more expensive fuels.

Ethiopia's potential hydropower production capacity is estimated to be 45GWh, that is, double that of Egypt's current total demand. In its effort to jumpstart the integration process, Ethiopia has begun exporting electricity to Sudan, Djibouti and Kenya at one of the cheapest market prices, and has indicated its desire to do the same to Egypt. The absence of grids connecting Egypt and Sudan is, however, according to Ethiopian MFA official, Zerihun Aebebe, a practical problem that needs to be overcome before this can be realised.

The different stages of development of these two economies makes integration in broader terms also complementary. The Egyptian economy is far more developed than the Ethiopian; it has more

financial capital, and is substantially more industrialised than Ethiopia, which is to a large extent still an agriculture-dominated economy.

Investments would lead to long-term integration that could build trust among peoples, not only governments. The Egyptian Minister of Industry and Foreign Trade, Mounir Fakhry Abdel Nour, announced on a recent visit to Addis Ababa that the possibilities of establishing an Ethiopian-Egyptian industrial zone in Ethiopia was being studied, and that they aspire to increase trade between both states from $165m to $500m annually.

Despite economic and strategic rationales for integration, initiating such a process in the context of mutual insecurity and historically rooted animosity is to some extent dependent on having somewhat like-minded groups at the helm in both countries. Sisi's anti-Islamist and statist political regime has a foreign policy orientation that is more compatible with the secular Ethiopian Peoples Revolutionary Democratic Front (EPRDF). Both governments face the consequences of instability and conflict in their neighbourhood.

The Ethiopian-Egyptian rivalry has historically been an important factor sustaining regional disorder. Ethiopia's rapprochement with the continental diplomatic powerhouse, Egypt, can give momentum to regional peacemaking efforts in what has arguably been the most conflict-prone corner of the continent.

"The Egypt-Ethiopia dispute over the Nile basin can evolve into a strategic partnership", 30/12/2014, online at: http://diplomat.so/2014/12/30/the-egypt-ethiopia-dispute-over-the-nile-basin-can-evolve-into-a-strategic-partnership/

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❖ Ethiopia dam project could start power generation by June – official

Jan 1 (Reuters) - A much-delayed $1.8 billion dam project under construction along Ethiopia's Omo river could begin generating power by June and be fully operational by early 2016, an official said on Thursday.

Gilgel Gibe 3 will nearly double the country's energy output, helping to resolve chronic power outages and sustain a booming economy. Work started in 2008 and was due to be completed around three years later, but the project has faced funding shortages over concerns about its environmental impact.

"88 percent of the work for the Gibe 3 hydropower project has already been completed," Azeb Asnake, chief executive officer of the Ethiopian Electric Power Corporation, told Reuters.

Two of ten units would be ready by June, Azeb said, while one additional unit would come on line each month after that. Upon completion the project will generate 1,870 MW of power.

Ethiopia plans to spend a total of $12 billion to tap the rivers that cascade down its craggy highlands over the next two decades in a bid to beat energy shortages and become Africa's biggest power exporter.

The country's economy is expanding by 9 percent a year, and the dam is part of an infrastructure plan aimed at sustaining that growth. A bigger project, the 6,000 MW Grand Renaissance Dam, is being developed along the Nile.

Power outages are common in this country of over 90 million, where a majority still rely on subsistence agriculture. Addis Ababa's nascent manufacturing sector is also attracting firms from China, Turkey and India to produce clothes, shoes and other basic goods, but frequent blackouts hamper economic activity.

Ethiopia already exports power to neighbouring Kenya, Sudan and Djibouti, and it has signed agreements with Tanzania, Rwanda and South Sudan, as well as Yemen.

Critics of Gilgel Gibe 3 say it will reduce water flow and devastate the fisheries of Lake Turkana, which is fed by the Omo. Ethiopian officials admit criticism led the European Investment Bank and the African Development Bank to turn down a request to disburse funds.

The Industrial and Commercial Bank of China stepped in four years ago with a loan of $500 million to pay for turbines.

Azeb dismissed the concerns, saying Ethiopia's research suggests regulating river flow will stabilise fluctuating water levels. "If they read these studies, they would not continue with their arguments," she said. (Editing by Edith Honan and Susan Thomas)

"Ethiopia dam project could start power generation by June – official",01/01/2014, online at: http://www.reuters.com/article/2015/01/01/idUSL6N0UG08620150101

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❖ South Africa Faces Looming Water Crisis, Star Says

South Africans use 235 liters (62 gallons) of water a day compared with the international average of 173 liters, and this is pushing the country into a water crisis, the Johannesburg-based Star newspaper reported, citing an Institute for Security Studies report.

Jakkie Cilliers, co-author of the report entitled "Parched Prospects: The Emerging Water Crisis in**South Africa**," said 60 percent of the 223 river ecosystems are threatened and 25 percent are critical.

"If we don't start dealing with the water problem, we are going to get into a situation where the margins are going to get really tight and water restrictions will be severe," he said. Cilliers said water management needed to be prioritized.

"South Africa Faces Looming Water Crisis, Star Says", 05/01/2014, online at: http://www.bloomberg.com/news/2015-01-05/south-africa-faces-looming-water-crisis-star-says.html?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=94844cb514-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_c1265b6ed7-94844cb514-250657169

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❖ The Juba White Nile River and the Land's Garbage Tragedy

The natural resources in South Sudan (S.S.) have been defiled, so stop singing the "virgin land" song, like "a baby nation" clause in the mouths of S.S. corrupted officials. In our times when we were kids, way before 2nd civil war kicked in between South and North Sudan; over 30 years ago: There were rare cases of sickness and natural death, though we were drinking right direct from the rivers and rain waters and still remain healthy than a kid living on the same today, but those days were true in their own style than these days! **So what happen? What has changed? To answer this question, you may have your own answer but let's read through here below:**

You heard of the climate change; the religion of the 21st century. That everything we use has an effect and limitation, even the sun and the waters of the Seas. The air, soil and water are being polluted by human activities globally and here is looking through S.S. windows. The picture here below, shows trash being incinerated (burnt) in the stream that leads into the Nile River and not far away from the main river. The streams greenly far left have water that is use for irrigating crops planted by the River bank.

The land of South Sudan is not virgin and the loss is being continued. Some of the land destructions are natural, whereas most of the impacts are man-made. Burning fires and waste dumping are playing a part. If the pacific, Indian and Atlantic Oceans could be polluted by a coal power plant running in India, China, or elsewhere, then you know, River Nile is nothing to escape the change. No land is immune of hazardous emissions (the deposit of dangerous waste and exhaust gas). Some recent past research by the scientists had shown that people in the US State of Alaska have been contaminated by eating fish caught in the Pacific Ocean with mercury contaminants in its body. Some heavy metal like mercury are found to might have migrated to the US from Indian's coal power plant operated in India; through smoke that is containing mercury. The smoke mixed in and formed a cloud and the cloud came down in the form of rains, falling into the Ocean, where fish live as home and feed in. The fish is contaminated and when eaten by a person, then the person get the mercury toxic contaminants known for destroying human nervous system, causing major illness or permanent disability in human. When pregnant woman eat the fish with a level of toxicity in it, the fetus may be harmed, which could lead to death before and after birth or a child born with deformities (life disabilities). The mercury for example, is found in plastic bags and water bottles. The picture here is

of the River Nile tributary, not far from Juba airport and passers have used it as a dumping ground. See water bottles …

Juba Trash in Tragedy

You heard of people disappearing in cities like Juba. There are those being taken by crocodile, hippopotamus or other unnamed dangerous aquatic life. These are accidents, but there are people who disappeared without trace of being attacked by the wild lives in the Nile River or elsewhere. Other disappearances are blamed on the killers, who kill people and throw them into the river. There is nothing good in human eating human. Those who drink and bath from the White Nile River may be eating other humans in the form of water usage, because of those dead bodies being thrown into the Nile. When the body degraded into waters of the White Nile; the water is contaminated, making it unclean for human purposes, including domestic animals, since they do not feed on human flesh. That is pollution. And this is one of the reasons why people are getting sick more frequently than in the past.

Mid-Night Dumping (Illegal Dumping).

Passing in down town Juba, you will see files of trash as high as 5 to 6 feet high by and above some complex fences in Juba town. The trash is not getting dumped to where it is supposed to go. The stagnant garbage filed up close to some offices, homes and traffic routes, will carry its pollutants around in town and people will catch it and get sick later. Some midnight dumped garbage is found on the Juba – Nimule High way, on the road side, right before you cross the bridge and this is in Kony-Konya area of Juba. Besides, the trash could be seen dumped at less than 200 feet from Juba – Nimule High in the Nasitu area by the road side. I had seen some solid waste sitting by the river bank, next to the crops planted by the Nile River bank in Juba. Some garbage, by the streams that run into the Nile River when the rains fall, during the wet season. The trash on the road side which many travelers had seen on numerous occasions, would get flown onto the neighboring homes and public areas, when the wind blow, while the trash by Nile bank goes into the river, where fish could be contaminated with hazardous waste (**e.g. medical waste**) deposited into the River. When the contaminated fish is consume by human, people get sick and start seeking medical care. You might have seen people doing the same that are done in Juba being carried out all over the country South

Sudan. People are washing cars into the Nile as well as washing their bodies and clothes during the bath with soaps. This activity must be considered illegal and dangerous to do so. The use of soap and other related agents into the Nile River is unhealthy because of the nature of toxicity in them. So why wash dirt and chemicals into the pure water of the Nile to contaminate it. There are ways for people to designate areas for washing and bathing. Cars have aerosols – some hazardous chemicals from car's parts and fuel apparatus are considered contaminants. Garbage should be dumped at a faraway landfill from homes, low laying grounds and away from waterways.

Water Bottles and Cans

Water bottles, plastic bags and soda cans are being thrown anywhere, anyhow in Juba and other towns. Water bottles and soda cans look like cattle egrets behind fences and in open spaces in Juba town. This is not a good start for modernization or industrialization. And you do not tell me "baby nation is still waiting to crawl. "A day is more than a month" according to South Sudanese saying and the country existed as Free State for more than 10 years!! Can we control our waste to protect our environment? Kony-konya's town ground is covered with water bottles and soda cans deposit over the past years. **Could this be cleaned?**

The danger of mismanaging bottles and cans is that they don't biodegrade, per an organization known as "Water Project". According this same report, water bottles and soda cans do not break down and if they do decay, it took 1000 years for bottles and cans to break down and mix with soil. Long time indeed, no one would want to wait that long, but the right waste disposal and management would do.

What are the ministry of environmental services, health and other educated South Sudanese residing in Juba, Nimule, Wau, Malakal, Bor, , and other localities, are doing to protect their natural resources, their environment (the water, land and people) from being polluted from imported goods?? All kind of batteries from Automobile and electronics equipment's carry toxic chemicals like mercury and cadmium among other toxicity ingredients.

Forest Combustion during the Dry Season

Burning the forest or few bushes is welcome by many cultures as forest "renewal and change" - with fire considered as "nature's housekeeper" but this practice could be disastrous. The fire can clear the forest for passage; get rid of old parts and plants, but it takes away the most fertile part of the land – the top soil is burnt to ashes: Fires killed humus and other nutritional top soil ingredients. When the top soil that is rich with dead plants and animals is gone; the land is not productive for agriculture, grass growth for cattle grazing and this could make the burned land or forest incapable of replenishing itself. Fires destroy wild animal's homes and lives – no country with responsible leaders and scholars would want to see their wildlife gone forever. This could lead to wildlife extirpation, or extinction. No one would be willing to see the wild animals in his/her home areas getting all killed or displaced to neighboring countries, where they will never return when they find peace there. Most of the South Sudanese burn their regions' forests and grassland down, during the spring and summer seasons. The smoke from fires carries exhausted gases, hindering oxygen flow to all kinds of people and blocking sun light from hitting the earth. In this case, people with asthma and children have their breathing airways made so hard for them to breathe well, due to forests fires' smoke, and fine particles floating in the air. The way to prevent this harmful practice is to make forest combustion illegal, unless it is absolutely necessary to burn the forest. South Sudan forest management must act now in regard nature integrity and protection.

The few details expressed here are not the only impacts to South Sudan environment, but a few of enormous environmental issues of concern. Healthy environment mean healthy people. This picture shows how the Nile is utilized as well as abusing it.

Please, Keep Nile River Safe and Clean. If the Nile waters are polluted, the fish, land and the crops would too be polluted, among other natural resources, since it is the same Nile waters that serve the land and its production, either by the rain, irrigation, or flood.

"The Juba White Nile River and the Land's Garbage Tragedy", 02/01/2015, online at: http://www.borglobe.com/25.html?m7:post=the-juba-white-nile-river-and-the-lands-garbage-tragedy

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❖ Bt55.9 bn approved for flood and water management Project

CABINET YESTERDAY approved a Bt55.9-billion budget for part of next year's projects under the flood and water management scheme.

The projects are part of long-term measures in the overall scheme, which will begin next year and end in 2026. The Bt55,958-million budget consists of a leftover amount earmarked in the 2014 allocation of Bt1.7 billion, and the budget for 2015.

Prime Minister General Prayut Chan-o-cha said spending under the scheme would be monitored closely by the public and private sectors, together with anti-corruption bodies, while the military's ruling National Council for Peace and Order would set up a committee to check for any graft.

Irrigation Department chief Lertviroj Kowattana, as secretary-general of the newly set-up Thai National Committee on Irrigation and Drainage (THAICID), said the Bt55.9 billion would be spent on 4,227 projects. It was part of a total sum of Bt108.23 billion that would be needed.

He said THAICID had also proposed to Cabinet that another management branch be set up, increasing the number of branches to six, with the management of water for consumption separated from management of irrigation. The latter would include better restoration of watershed forests, the prevention of landslides or land erosion, mitigation of disasters, and flood prevention.

The upgraded management of irrigation, if or when implemented, would oversee the restoration of 147,000 rai (23,520 hectares) of deteriorating forests, and try to prevent land erosion in 675,000 rai, while providing water for consumption to 3,941 villages and waterworks service to 481 urban areas.

Speaking after chairing yesterday's Cabinet meeting, Prayut said ministers also discussed a strategy on cooperation with foreign countries, which were divided into six groups - Asean members and neighbouring countries; Japan and China; European countries; other Western countries; island countries; and those in the Middle East.

Thailand will play the role of provider of educational and academic assistance for some states.

"Bt55.9 bn approved for flood and water management Project"31/12/2014, online at: http://www.nationmultimedia.com/national/Bt55-9-bn-approved-for-flood-and-water-management--30251013.html

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❖ China hands out record fine to six polluters: Xinhua

(Reuters) - A Chinese court on Tuesday fined six companies in eastern Jiangsu province a total of 160 million yuan ($26 million) for releasing chemical waste into rivers, said state news agency Xinhua, the biggest fine of its kind ever handed out in China.

The firms in Taizhou city had discharged 25,000 tonnes of waste acid into two rivers, Xinhua reported late Tuesday, without identifying the companies.

The Jiangsu Provincial Higher People's Court ordered the polluters to pay the fines into an environmental protection fund within 30 days.

Decades of rapid economic growth with little environmental oversight have brought major pollution problems for China's air, soil and water. The government says around 70 percent of the nation's rivers and lakes are polluted.

The court ruling comes just two days before a new environmental protection law enters into force that will give local authorities more power to punish violators.

Under the new law, penalty levels will be raised and polluters will risk prison for violating laws. They will also increase the number of institutions that can file lawsuits against polluters.

Over the past couple of years, Beijing has introduced a number of policies to halt the problem. But efforts to curb pollution are often ineffective because local environmental protection agencies lack the authority to implement rules and standards while maximum levels for environmental fines are low.

Investors are closely watching out for the impact of the new law on the steel and aluminum sectors, among the country's biggest industrial polluters.

"China hands out record fine to six polluters: Xinhua",30/12/2014, online at: http://www.reuters.com/article/2014/12/31/us-china-pollution-fine-idUSKBN0K902X20141231?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=8efcceaa40-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_c1265b6ed7-8efcceaa40-250657169

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❖ Hyflux forecasts end to Middle East desalination doldrums

Following its recent landing of its first major Middle Eastern municipal water contract in five years, Singapore water treatment firm Hyflux said it anticipated demand in the region to accelerate.

Hyflux has indicated that it expected the intense political uncertainty that has stymied water treatment growth in the region to succumb to the power of demand. "Pent-up demand in the Middle East and Africa is driving the revival of water infrastructure projects," said Hyflux's executive chairman and group chief executive, Olivia Lum, according to the Nikkei Asian Review.

Lum highlighted an increase in the number of projects coming up for tender in the second half of 2014, and said Hyflux was eager to bid for new opportunities.

Hyflux in December 2014 secured the rights to develop and operate a seawater desalination plant in Qurayyat, near Oman's capital, Muscat in a US$ 250 million deal. Hyflux will design, build and run a 200 Ml/d reverse-osmosis seawater desalination facility for public supply through the Oman Power and Water Procurement Company for 20 years. It is scheduled to start up in May 2017.

"Hyflux forecasts end to Middle East desalination doldrums", 30/12/2014, online at: http://www.desalination.biz/news/news_story.asp?id=7873&channel=0&title=Hyflux+forecasts+end+to+Middle+East+desalination+doldrums

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❖ Water desalination in Taiz

This is a two part piece about the water crisis in the city of Taiz and the feasibility of water desalination in Yemen. Part one is below, part two will run on Thursday.

Yemen is quickly becoming one of the driest places on earth, and, according to some estimates, might be the world's first country to run out of water. Some parts of Yemen have suffered more from water scarcity then others, foremost among them the city of Taiz, located off the Red Sea coast in the country's southwest corner. Rampant population growth, increased urbanization and a systematic draining of surrounding ground wells and aquifers, means the city might soon be the world's first to run out of water.

The crisis in Taiz, along with the rest of the country, has prompted many Yemenis to begin looking into ways to utilize non-conventional water resources as a means of making up for shortfalls in production. Among these alternative methods are plans to utilize the country's 2,200 kilometer coastline along the Red Sea and the Gulf of Aden, and begin experimenting with the desalination of seawater.

Compared to their full potential, desalinization schemes have until now made little headway in Yemen and other developing nations suffering from water scarcity, due to their perceived high costs compared to more traditional means of water extraction, primarily from natural springs and ground aquifers. Small plants have previously been built in Aden and recently in 2007 on the small Socotran island of Abdul Kuri. Despite the country's current crisis, however, Yemen's government has failed to implement a serious plan to desalinate seawater despite the fact that much of the country's per capita consumption of water has decreased significantly in recent years.

But this is not for lack of trying. According to Towfiq Al-Sharjabi, deputy minister of the Ministry of Water and Environment, in 2008 the Yemeni government began looking into the possibility of constructing a water desalination plant in the coastal city of Mokha, 94 kilometers west of the water scarce city of Taiz. According to Al-Sharjabi, at full capacity the plant would be able to pump a total of 100,000 cubic meters (100,000m/3) of water per day, more than enough to meet the daily needs of Taiz city, which he estimated to be 55,000m/3. However, Al-Sharjabi said that if the plant was

constructed, it would be several years before it would be able to operate at this rate and meet the city's water consumption needs. Located along the Mokha coastline, the plant would be connected to a pipeline running from Mokha to Taiz and then later to Ibb city, serving all small towns and villages located along the way.

In 2010, the Yemeni government hired JFA Consulting, a British firm specializing in the oil, gas and environmental sectors, to assess the viability of the project and the extent to which seawater desalination could be a feasible solution to Taiz's water crisis. Led by its CEO, James Firebrace, JFA Consulting conducted two field studies—first in 2010 and later again in 2013—of both the site of the plant in Mokha and a comprehensive study of the social and economic effects of water scarcity in Taiz.

The studies concluded that with proper management, not only would construction of the plant help fill the ever widening gap in the city's dwindling water supply, but that it would also be able to provide consumers with high purity water at cheaper rates than consumers were currently spending. Despite this positive feedback, construction of the plant has still not begun, and the government is currently struggling to find financiers to put money into the project.

Numbers

Despite Mr. Firebrace's claims, many within the Yemeni government have dragged their feet with regards to water desalination due to its perceived high cost compared to extraction of ground water from the country's various aquifers. A report put together by Yemen's Social Fund for Development (SFD)--the Yemeni government's official social and development body chaired by the prime minister--was presented at the Yemen National Water Conference in Sana'a held on Jan. 15, 2011. In this report, the case for desalination is shot down due to its apparent high cost.

"Desalination is a non-rainfall dependent water source, therefore it's expected to be the most sophisticated and costly option," the report reads. "The cost of 1m3 of desalinated water is anywhere between $0.6/m3 and $1.2/m3, a number that increases to anywhere between $0.9m/3 and $1.8m/3 after transport and administrative costs are factored in. The cost of extracting groundwater

meanwhile runs at just $0.26m/3."

"For poor governorates such as Taiz, building water desalination plants is always a last resort," says Al-Sharjabi. "Yet, at the same time, the city is in desperate need of a sustainable water source," he added.

The same report claims that 19 out of Yemen's 21 fresh water basins and aquifers are over exploited, as consumption rates outpace the rate of natural replenishment, a phenomenon that's expected to increase and compound with the expansion of global warming.

"Annual consumption exceeds over two billion cubic meters, while natural replenishment hovers around one billion," according to Al-Sharjabi.

Such scarcity, combined with population growth, means that the amount of water actually received by residents through government run water utilities—which is administered in Taiz through the Taiz Water and Sanitation Local Corporation (TWSLC) and operated by Taiz governorate—has decreased significantly in recent years, forcing citizens to supplement public utility water with other, more expensive options in order to meet their daily needs. That being said, while harvesting groundwater may be cheaper for the state than undergoing desalination, Yemen's citizens get left behind, and end up paying more.

"From 1996 to 2013, Taiz witnessed a youth bulge that pushed its population from 320,000 to roughly 840,000," Firebrace told the Yemen Times. "During this same period, the percentage of residents being served by the TWSLC decreased from 72 percent to 46 percent. Meanwhile those who are served have watched as the amount of time they're required to wait in order to receive public utility water for the local corporation has increased on average from two to three weeks, to anywhere between four and 12 weeks."

Abdullah Saleh is the former head of the National Water Resource Authority (NWRA) within the Ministry of Water and Environment, and currently works with the World Bank in helping to implement its Water Sector Support Project (WSSP) in Sana'a for sustainable water use and

development. Saleh worked with Firebrace and JFA when the latter were conducting their field studies regarding the feasibility of the desalination project in Mokha.

"The problem comes down to poor management," Saleh said. "Those hired to work within the TWLSC don't have the technical expertise to manage water networks. A lot of water gets wasted and lost due to degraded infrastructure, broken pipes and a lack of proper equipment."

Saleh said that apathy within the TWLSC and the federal government to better manage Taiz's public water utility network is exacerbated by the fact that the corporation often fails to collect public utility bills.

"The TWLSC is like the spoiled child of the water sector," he said. "Many Taiz residents avoid paying their bills for the water they consume through utilities. However as long as officials are given their yearly budget and salaries, they cease to care much about anything else."

Every year, the TWSLC incurs a loss according to Saleh, and cannot effectively balance its books. "That being said, there's little incentive on behalf of the local or federal government to pump additional money or invest further into the corporation. This prevents the TWLSC from being able to keep up with increasing demand for water as the city's population grows."

Such a situation has pushed locals to begin searching for secondary methods for obtaining water, including purchasing water extracted through private wells operated by local businessmen, and then sold either via water tanker trucks, or in what are known as 'kawthers'. Kawthers are local water purification stations that sell purified water to citizens in what are known as 'dabbas', or containers, usually varying in size, between five to 20 liters.

The use of kawathers has become increasingly common in Taiz over the last ten years, with roughly 85 percent of the city's households purchasing kawther water in 2013, up from roughly 5 percent in 1996. Water purchased through kawthers on the whole have higher purity levels than water purchased from tankers, a fact reflected in the difference in cost between the two.

"By 2013, citizens were paying more than $4.5m/3 for tanker water, and $23m/3 for kawther water," according to Firebrace. As overall water scarcity has increased with the draining of groundwater aquifers, the price of both types of water has also increased.

"By breakdown, Yemenis in Taiz today will spend on average YR50 ($.23) for a 10 liter dabba of kawther water, compared to YR15 ($.07) in 1996. During this same time period, the retail price of 3m3 of tanker water increased from YR650 ($3.00)to as much as YR4000 ($18.6), depending on the location."

Yet, regardless of which water source citizens choose to purchase, both are significantly more costly than the price paid by the TWLSC to pump water into local homes, or the hypothetical costs of desalination schemes if the government were to construct a desalination plant in Mokha.

"Locals are being squeezed," Firebrace said.

Admittedly, implementing a desalination scheme would require a restructuring not just of the TWLSC itself, but also of the city's public utility water distribution network, including the construction of new filing stations connected to a main pipeline, and a means to effectively and cheaply transport desalinated water to residents' homes, measures that would put a further strain on the state's already stretched budget.

"This is a good chance for those within the TWLSC and the public water sector to make a good decision and sponsor an initiative that would benefit consumers in the long run," according to Saleh. "Such a project could reduce the price of water and improve management. Whether it'll actually get built or not is a matter of politics."

"Water desalination in Taiz",30/12/2014, online at: http://www.yementimes.com/en/1846/health/4744/water-desalination-in-taiz.htm

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❖ Illegal wells to invite legal action in Oman

Muscat: Civic authorities have warned of legal action against those found digging wells as a source of free water supply without obtaining proper approval.

"Many residents have unlicensed wells inside their houses," said a reliable source at the Ministry of Regional Municipalities and Water Resources (MRMWR).

He said if the ministry receives any information about such an unlicensed well, a team will visit the house and inspect the well. If the well is found as having been dug without obtaining the necessary approval, the violator would be questioned.

Article two of the Water Protection Law, promulgated by Royal Decree No. 29/2000, states that each new or substitute well constructed after July 1990 should have a legal permit and should be inventoried and registered, otherwise it shall be considered illegal.

"Constructing a new well, increasing the capacity of an existing well, repairing a well, substituting an existing well with a new one or selling the water pumped from the well, are all illegal actions unless carried out after obtaining an approval from the MRMWR," said the source.

He explained that in some cases, residents have suffered the ill effects of poisoning since they had constructed wells near an area where sewage water used to collect. "The well water was mixed with the sewage water, consequently leading to poisoning many residents," said the source.

He added that many people who construct illegal wells try to sell the water to earn some money. "It is totally illegal and such violators will face fines and might be put behind bars in some cases," said the source. He added that both the well owner and the contractor, would have to face legal action.

Article 39 in the violations chapter of the Water Protection Law states that whoever digs a new or a substitute well without a valid permit shall be punished with imprisonment for a period of not less

than two weeks and a fine not exceeding OMR1,000 or either of the two penalties. He shall also be compelled to fill back the well at his own expense.

A Mabila resident, who refused to be identified, said that in some cases, residents find no way but to dig a well even without a valid permit. "I live in an area where there is no water supply by the government and water tankers are the only source," said the resident. He added that paying around OMR80 to OMR100 every month was beyond his means.

"I found it difficult to meet my big family's demands as I was paying almost a quarter of my salary for the water tankers," said the resident. He said many of his neighbours, who have dug illegal wells, advised him to do likewise. "After listening to many of neighbours, I have decided to dig a well without seeking a valid permit," said the resident. He added that the concerned authority should consider such situations and include them in the approved cases to issue a permit for a new well.

The ministry source said that there many cases in which the ministry issues a permit for a new well. Once there is no other water source, the ministry issues permits for applicants.

"The distance from nearest water source should not be less than one kilometre in order to receive a permit from the ministry," said the source. The number of beneficiaries shall not be less than five people in order to obtain a permit. "The well water should be restricted for drinking purposes and for domestic use only," he added.

"Illegal wells to invite legal action in Oman",27/12/2014, online at: http://www.timesofoman.com/News/44905/Article-Illegal-wells-to-invite-legal-action-in-Oman?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=7bfb1c4a4e-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_c1265b6ed7-7bfb1c4a4e-250657169

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❖ Abu Dhabi summit to discuss water security challenges

More than 32,000 global leaders from 170 countries representing government, industry, investment and research to Abu Dhabi, will provide an upfront look at affordable technologies to enable sustainable water resource management to help meet the Middle East's rising demand for water.

Hosted by Masdar, Abu Dhabi's renewable energy company, ADSW is a yearly platform that addresses the interconnected challenges of energy and water security, climate risk and sustainable development.

Running from January 17 to 24, ADSW includes the World Future Energy Summit (WFES), the world's foremost event dedicated to the advancement of renewable energy, energy efficiency and clean technology; and the International Water Summit (IWS), which provides a business approach to addressing water scarcity, sustainable growth and economic development in arid regions.

"The Mena region is in a truly unique position to solve the challenge of water security," remarked Raed Bkayrat, vice president of development for Saudi Arabia at First Solar, which is participating in WFES.

"While the region is quite arid, it also has one of the highest solar irradiances of any region in the world, and much of the population has ready access to seawater. Accordingly, solar photovoltaic projects are proving to be sustainable means of powering water desalination in the region, ensuring that the supply of clean water will keep up with the region's increasing demand for it," he noted.

Masdar took a major step by launching a pilot project to test energy-efficient desalination technologies – such as reverse osmosis and forward osmosis – powered by renewable energy.

The company awarded contracts to Abengoa, Degremont, Sidem/Veolia and Trevi Systems to build the desalination plants, which are expected to enable the implementation of cost-competitive desalination plants powered by renewable energy in the UAE and abroad.

"Engaging different sectors of the industry is really crucial to bring forward innovative solutions, as well as pilot projects that demonstrate to governments the value of new integrated systems," Bkayrat added.

Both WFES and IWS will offer numerous keynote addresses, panel discussions and workshops as well as exhibitors introducing affordable technologies to enable sustainable water resource management.

Along with WFES and IWS, ADSW will include the second EcoWaste and the seventh Zayed Future Energy Prize Award Ceremony; it also coincides with the Fifth General Assembly of the International Renewable Energy Agency.-**TradeArabia News Service**

"Abu Dhabi summit to discuss water security challenges",02/01/2015, online at:
http://www.tradearabia.com/news/CONS_272603.html

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❖ Abu Dhabi Sustainability Week To Highlight Growth In Solar-Powered Water Desalination

The upcoming Abu Dhabi Sustainability Week (ADSW), which will bring together some 32,000 global leaders from 170 countries representing government, industry, investment and research to Abu Dhabi, will provide an upfront look at affordable technologies to enable sustainable water resource management to help meet the Middle East's rising demand for water.

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"Abu Dhabi Sustainability Week To Highlight Growth In Solar-Powered Water Desalination",04/01/2015, online at: http://www.abudhabicityguide.com/news/news-details.asp?newsid=17747&newstype=Local%20News

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❖ Dam safety: Repair, decommission or mitigate risk?

Should systems within aging hydroelectric facilities be repaired, decommissioned or something in between? Site-specific proceduresmitigate dam safety issues at two hydroelectric power plant facilities in the Pacific Northwest, 23.2-MW Leaburg-Walterville on the McKenzie River in Eugene, Ore., and 175-MW Jordan River on Vancouver Island in British Columbia.

For the Jordan River facility, owned and operated by BC Hydro and Power Authority (BC Hydro), the dam's age and site location compound the difficulty in addressing its functionality.

The 103-year-old Jordan River Diversion Dam is on the Cascadia Subduction Zone (CSZ), the most active seismic region in the Pacific Northwest.

According to the Pacific Northwest Seismic Network, "The CSZ 'megathrust' fault is a 1,000 kilometer long dipping fault that stretches from Northern Vancouver Island to Cape Mendocino, California."

According to Tim Walsh, chief hazard geologist at the U.S. Department of Natural Resources, "It used to be thought that Cascadia was not an active fault. Not only has Cascadia been found to be an active fault, it has a 10% chance that it will cause an earthquake in the next 50 years."

Walsh made the comments in October while discussing preventative measures he and other researches were putting in place to help structures withstand a tsunami should activity at the CSZ cause a tsunami to strike the Pacific Northwest coastline.

"It [an earthquake on the CSZ] is more than 10 times more likely than the chance you will be killed in a traffic accident," Walsh said.

According to BC Hydro's Seismic Study and Action Plan, released Dec. 5, "the expected ground motion at Jordan River in an extreme event -- an 8 to 9 magnitude earthquake -- is much greater than previously thought due to its proximity (about 40 km) to the CSZ."

Fortifying or repairing the Jordan River facility to survive an 8 to 9 magnitude seismic event is neither possible nor economically feasible, according to BC Hydro. Additionally, decommissioning the dam or lowering the level of the impoundment reservoir are not viable options because the system produces about 35% of hydroelectricity generated on the island.

Age factors and location required BC Hydro to seek alternatives to repair or decommissioning; in this case, they chose risk mitigation.

BC Hydro is working with the province's Capital Regional District "to improve emergency preparedness and awareness of seismic risks, including the potential to restrict future residential development and overnight camping" in the inundation zone that would be affected by a catastrophic dam failure.

The company is also advising permanent residents to develop plans to evacuate should a high-magnitude earthquake compromise the dam.

Leaburg-Walterville facility

It is less catastrophic, but major circumstances opposite to dam failure are among the issues before the Eugene Water & Electric Board, which operates the 73-year-old Leaburg-Walterville facility on the McKenzie River.

Cylindrical steel gates that roll or rotate, up and down, regulate the flow of the river at Leaburg Dam. Three floodgates, each 16 feet tall and 100 feet wide, regulate how much water the releases, but two of the floodgates are inoperable.

On Dec. 23, a malfunction at one of the floodgates left the structure with one functioning roll gate. Prior to this year's pre-Christmas floodgate failure, in January 2012, the middle roll gate experienced a failure that is being repaired.

EWEB has decided to repair both floodgates at the facility because if left uncontrolled, seasonal rains can cause problems.

The dam is a run-of-river project about 27 miles east of Eugene. Water is diverted at Leaburg Dam into a power canal that is used to generate electricity at a powerhouse 4 miles downstream. The amount of released water determines how much power is generated, but, more importantly, the facility reduces instances of flooding in the area downstream.

"Repairs to the middle roll gate should be completed by mid-January," said EWEB in a press release.

In both instances, dam owners had to make decisions on what to do with regard to aged facilities. Government and private companies that own and operate hydropower facilities will continue to make similar tough decisions as equipment breaks or new information on the safety conditions at dam sites becomes available.

"Dam safety: Repair, decommission or mitigate risk?", 31/12/2014, online at: http://www.hydroworld.com/articles/2014/12/dam-safety-repair-decommission-or-mitigate-risk.html

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❖ The history (and politics) of clean drinking water

On January 9, 2014, American Water warned 300,000 customers in and around Charleston, West Virginia, that local tap water was no longer safe. Ten thousand gallons of 4-Methylcyclohexane Methanol (MCHM), a chemical used to clean coal, had leaked from a rusty holding tank into the Elk River, upstream of the water treatment facility. State officials warned that exposure to the licorice-scented solvent could cause "burning in throat, severe eye irritation, non-stop vomiting, trouble breathing or severe skin irritation such as skin blistering." Given the paucity of information on MCHM's effect on the human body, no one could predict the long-term consequences of exposure.

Within 24 hours, a mayor's convention was cancelled, restaurants were shut down, and public schools were closed. Traffic clogged around the South Charleston Recreation Center, where the fire department distributed free cases of water, limited to one per vehicle. Its cache was depleted within hours. Bottled water supplies vanished. The National Guard delivered tanks of potable water and FEMA promised additional truckloads. When water shipments arrived at a local Wal-Mart, demand was so high that nervous employees called the cops, requesting guards to stand by while they restocked shelves.

It's no surprise that the West Virginia leak, the more recent Duke Energy coal ash spill, or the newest BP oil rupture rile consumers. Hydration isn't a luxury; it's a necessity. Providing access to clean water is a fundamental measure of effective government. When water goes bad, so do political relations. After the MCHM spilled, West Virginia officials made a series of conflicting statements. Two days after Governor Earl Ray Tomblin began lifting the do-not-use order on local taps, the U.S. Center for Disease Control advised that pregnant women continue to avoid Charleston water. In response, Gov. Tomblin back-pedaled: "It's a very complicated issue," he said. "I'm not a scientist."

Most Americans take cheap, safe drinking water for granted.Globally, one out of 10 people can't access clean water. Some 1,400 children die *each day* from water-related diseases. Unless there's a spill or equipment failure, these numbers exclude U.S. residents. Across the 50 states, 155,000 public water systems treat, filter, and deliver 100 gallons *per person per day*, all for the low cost of 20 cents per gallon.

Contaminant-free drinking water hasn't always been part of the American experience. Until the early 1900s, shared public cups accompanied most drinking fountains. Cholera, typhoid fever, dysentery, and food poisoning from coliform bacteria — all potentially fatal — spread from mouth to cup and back again. Diarrhea was rampant. Not until l889, when Kohler Water Works invented the Bubbler, which pumped a continuous flow of water an inch into the air, did a spout replace the cup. To partake, drinkers stooped over the copper basin and slurped. What wasn't sucked up dripped down the nozzle. Clean water mingled with saliva. Though an improvement over the public cup, bacteria still flourished.

Humans weren't the only creatures to suffer waterborne illness. In the late 19th century, 100,000 horses populated New York City's streets, producing 26,000 gallons of urine daily. Concerned with dehydration, early chapters of the American Society for the Prevention of Cruelty to Animals advocated for the erection of "fountains for man and beast," with large, street-side basins for horses, sidewalk basins for "the sons of men," and low spouts for dogs. Glanders, an equine disease now eradicated in North America, proliferated. Lesions formed in the infected horses' respiratory tracts, causing fevers; coughing; and, ultimately, septicemia (an inflammation of the blood). Within days of exposure, horses died. On occasion, the bacterium crossed species' lines, taking the lives of cats, dogs, goats, and men.

Despite health hazards, drinking fountains became a fashionable social project. Prominent citizens appealed to city governments to build fountains "for the convenience of street passengers," and the growing temperance movement boosted the cause. In 1859, a doctor named A. K. Gardner warned the Common Council of New York City that, "Men, and women, too [...] resort to drinking saloons and bar-rooms where they must 'take a little something' for the sake of a glass of water." A *New York Times* editorial from the same year argued, "intemperance should be arrested [...] by putting fresh, good water freely within the reach of the wayfarer." Water and sewerage boards, church temperance clubs, men's associations, and tree planting societies took up the cause by writing letters, holding meetings, and raising money.

The ensuing fountains ranged from purely functional to "handsome bronze and marble affair[s]" designed more to flaunt wealth and memorialize family names than to quench public thirst. Rich

patrons bequeathed fountains in their wills, and young people collected change to support upkeep. Newspapers supported this fetishization, printing the locales of new fountains alongside lists of prestigious attendees at inaugural festivities.

In 1892, when the Chicago World's Fair coincided with a devastating typhoid outbreak, clean water became a matter of national safety. In the two years prior, Chicago suffered more typhoid-related deaths than any other city in the world. To protect the fair's 27 million guests from infection, engineers designed plumbing that extended four miles into Lake Michigan where they hoped the water was contagion-free. Additional supplies were piped in from Waukesha, Wisconsin, and sold for a penny per glass. The innovations worked. When the fair opened to the public in 1893, infection rates dropped and the outbreak receded.

By 1900, germ theory — the belief that microscopic pathogens travel through air and water — took hold. New sanitation methods promised to eliminate these invisible threats. Redesigned Bubblers included arc projection, separating clean water from run-off, and the first disinfectant, a continuous dilute solution of chloride of lime, was added to the Boonton Reservoir in 1908, providing sterile, disease-free water to Jersey City. Nationwide, municipal treatment centers followed suit. Though gastroenteritis and norovirus infections occasionally broke out, germ-free water became the norm.

As tap water became safer, drinking fountains provided a staging ground for white Americans to act out fears of racial contamination. The rhetoric of sanitation — maintaining purity against an insidious threat — was used to justify Jim Crow laws. From 1876-1965, alongside hospitals, trains, lunch counters, voting booths, and highway passing lanes, drinking fountains became sites of Black exclusion. "White Only," "Colored Only," or simply "Colored" signs directed traffic. A 1963 pro-segregation speech titled "The Message from Mississippi" argued that separate fountains protected white citizens from "exposure" to bad morals, poor education, and improper hygiene: "There are many Negroes, of course, who have reached plateaus of citizenship. They are personally clean, have high morals and are educated. However, they are still in the minority." In 1964, the Civil Rights Act mandated "equal enjoyment [...] of public accommodation," ending segregated fountains and setting precedent for the 1990 Americans with Disabilities Act, which legislated spout height and knee clearance to enable wheelchair access.

Although public water fountains have become more inclusive, they've also grown less desirable. Bottled water, the fastest-growing drink product in the U.S., is now the preferred way to hydrate. The anthropologist Martha Kaplan suggests that this "bottlemania" reflects post-9/11 skepticism of federally-protected water supplies. Participants in her study of American water consumption cited unclean pipes, pollution, unsavory smells, bad tastes, and fluoridation as reasons for preferring the corporate-produced, single-serve water bottle. In the Great Recession, Kaplan notes, "Bottled water [was] the only luxury people [could] still afford."

Besides portability, bottled water offers few advantages over the fountain.

Many popular brands — including Aquafina and Dasani — simply fill bottles with tap water. The difference in taste, when there is a difference, is most often caused by the disinfection process. Public treatment plants use chlorine while bottled water companies tend to adopt more costly methods: ultra violet light or ozonation. Not only is single-serve bottled water more expensive than gasoline — averaging $7.50 a gallon — the petroleum used to create the plastic of the bottle and the carbon released during its shipment incur environmental costs. Student organizations such as "Tap That" at Vassar College and "Take Back The Tap" at the University of Nevada attempt to reduce plastic bottle consumption. So far, over ninety colleges have restricted bottled water sales. Last March, San Francisco became the first city to create policy on the topic by banning distribution of single-serve, single-use bottled water on public properties.

Bottled water backlash has renewed enthusiasm for old-fashioned drinking fountains. Since 2013, the EPA has partnered with mayors to "reinvigorat[e] our nation's supply" of these "iconic symbols of public health and welfare in our communities." Companies have taken note. Both Elkay EZ and Halsey Taylor sell affordable retrofits: no-touch, sensor-activated spigots that turn neglected fountains into "HydroBoost" stations where passersby can top off reusable bottles. While consumers pause for their refill, electronic counters track how many plastic bottles they've diverted from landfills. Watching the display uptick feels good, akin to the sensation produced by a Facebook like or a favorited tweet.

Hydration is an easy cause to get behind. Water helps maintain body temperature, blood volume, and body volume. It removes waste from the body, lubricates joints, and protects tissues. Without it, we

suffer headaches, constipation, urinary tract infections, bed-wetting, and even death. In contrast with juice and soda, water helps prevent diabetes and obesity. Pediatricians blame dehydration for misbehavior in schools and geriatricians caution elderly patients that sense of thirst diminishes with age. Health advocates including the Centers for Disease Control and Prevention (CDC) and Michelle Obama promote water as a preventative health measure. Their efforts are working: since 2008, water has beaten soda for the title of number one beverage in America.

Unlike oil, water is a renewable resource, replenished by rain and snowmelt. Even so, environmentalists warn that we're tapping out our supply. Agriculture, industry, and household use deplete ecosystems faster than they can replenish. Many of the world's biggest rivers — including the Indus, the Ganges, and the Colorado — often dry to sand before reaching the ocean. The Baltic Sea, central Lake Erie, the lower Mississippi River, and portions of the Gulf of Mexico are so polluted by fertilizers and sewage that they've become oxygen-deprived and are unable to support life.

As we near peak water, hydroclimatologist Peter Gleick warns that skirmishes over resources will intensify. "Water can be — and often is — a source of cooperation rather than conflict," Gleick notes, "but conflicts over water are real." Already Gleick's organization, the Pacific Institute, has created a 5000-year timeline of water-related conflict. Highlights include Assyrians poisoning enemy wells with rye ergot in the 6th century B.C., the World War II targeting and destruction of Soviet hydroelectric dams, the U.S. bombing of North Vietnamese irrigation canals in the 1960s, and riots in Cape Town, South Africa in 2012 sparked by insufficient water supplies. By 2025, scientists predict that one in five humans will live in regions suffering from water scarcity, areas with insufficient resources to meet water usage demands.

The pressure is on to find new sources of drinking water. Overuse, new weather patterns, depleting aquifers, toxic spills, and shrinking glaciers have destabilized historically-reliable flows. These influences are contravened by an expanding array of methods for purifying and obtaining water. In California, Governor Jerry Brown has proposed a $25 billion solution to his state's water shortage: two tunnels, each longer than the English-French Chunnel, would transport mountain snowmelt *beneath* the Sacramento-San Joaquin Delta to Southern California's drought-ridden desert cities. Desalinization plants in the Middle East evaporate saltwater into fresh water. Ceramic barrels

in Vietnam collect rain from monsoons. Hikers carry iodine tablets. On foggy islands and remote mountaintops, water prospectors hoist what look like volleyball nets. When low clouds roll past, condensation forms on the nylon threads and drips into an open half-pipe that slants to a plastic cistern with a spigot on the side. Anyone can stop by to fill up a jug.

After Freedom Industries spilled MCHM in Charleston's Elk River, many West Virginia residents sent licorice-scented bills to American Water, charging the utility company for work hours lost, gas mileage, and, of course, bottled water. Others looked to God for answers. In a televised mass from the nearby St. Joseph Cathedral, Bishop Michael Bransfield prayed for "the Lord to have this burden lifted quickly [...] for those who do not have access to water."

Divine intervention has long been associated with water. Before engineers, cloud-harvesters, and astronauts, ancient Mesopotamians worshipped Enki, god of freshwater, wisdom, and magic. Ancient Romans placated Neptune, building tree-branch shelters in his honor when summer was hottest and rivers were low. Ancient Egyptians praised Isis for flooding the Nile each spring with her tears, shed for her late husband, Osiris. Water was the difference between rich harvests and fallow fields, feast-times and famine, sickness and health. Though technology has since developed, the stakes remain the same. Water enables civilization. It is the magic stuff of life.

"The history (and politics) of clean drinking water", 02/01/2015, online at: http://mashable.com/2015/01/02/drinking-water/

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