

ORSAM WATER BULLETIN

Weekly Bulletin by ORSAM Water Research Programme

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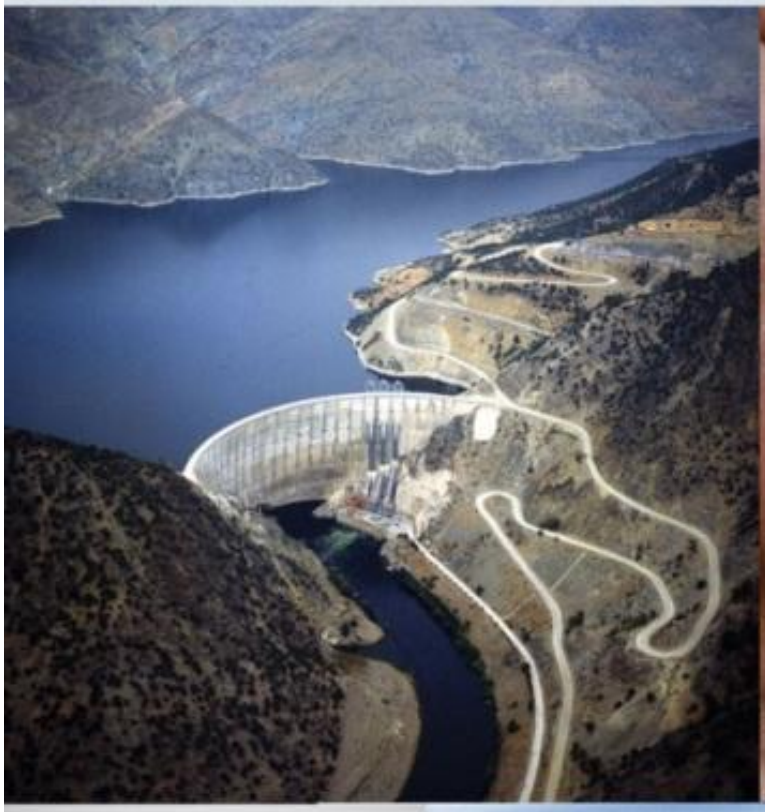



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❖ Iranian Firms to Study Strategies for Activity in Iraq's Water, Electricity Projects

TEHRAN (Tasnim) – The Iranian private companies working in the area of water and electricity industries plan to hold a session to study strategies for cooperating in development projects of neighboring Iraq.

The meeting is slated to be held on Sunday with Iranian Deputy Energy Minister Sattar Mahmoudi in attendance.

Speaking to the Tasnim News Agency, the deputy minister said that currently, the Iranian companies are exporting their technical services in the area of water and electricity industries to 40 countries, including Iraq.

According to the Iranian experts, Iraq with an investment capacity of $25 to $30 billion per year in the power sector, is considered as a highly profitable market for technical services in this area.

Earlier in mid-February, high-ranking Iranian and Iraqi officials signed seven memorandums of understanding (MoUs) in Iraq, as part of efforts to boost mutual cooperation between the two neighboring countries in a whole range of areas.

The documents were signed during a meeting on February 16 between visiting Iranian First Vice-President Eshaq Jahangiri and Iraqi Prime Minister Haider al-Abadi.

The agreements feature Tehran-Baghdad economic cooperation in different fields, including road and air transportation, tourism, geology, mineral resources, joint exhibitions, as well as animal health and veterinary.

"Iranian Firms to Study Strategies for Activity in Iraq's Water, Electricity Projects", 07/03/2015, online at: http://www.tasnimnews.com/english/Home/Single/677661

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❖ Iran forms water crisis HQs as supplies subside

Iran said on Saturday that it had formed special headquarters to deal with what is feared to be an impending water crisis in the country.

Iran's Energy Minister Hamid Chitchian said the High Water Council has authorized the establishment of "drought crisis headquarters" across the country, adding that their priority is to look for ways to provide the drinking water in all provinces.

Chitchian said President Hassan Rouhani has approved allocating Rials 12 trillion ($430 million) to the same effect, and that the money will be used to avert a potential water crisis in the country in summer.

He further said several cities including capital Tehran, Kerman, Bandar Abbas, Hamedan and Isfahan are already in dire conditions with regards to adequate supplies of water. Therefore, the minister said, emergency actions are required to prevent crisis in those cities.

Presently, Iran faces several key challenges in the water sector that include rising water demand and shortage, declining groundwater levels, deteriorating water quality, and increasing ecosystem losses.

The country's Energy Ministry - which is in charge of regulating the water sector - announced also on Saturday that about 60 percent of the reservoirs of major dams are already empty. The Ministry further said there has been a decrease of 16 percent in inflow of water into dam reservoirs from the start of autumn.

Officials blame Iran's water crisis on the changing climate and frequent droughts. However, they have also warned that careless consumption is already deteriorating the situation.

Experts believe that a proper management of water supplies is what Iran needs to end its water crisis. For example, an efficient mechanism is required to reduce consumption of water resources in agricultural sector – which stands at about 90 percent of total water supplies – and instead allocate a larger share to residential and even industrial sectors.

"Iran forms water crisis HQs as supplies subside", 07/03/2015, online at:
http://www.presstv.ir/Detail/2015/03/07/400718/Iran-forms-HQs-to-confront-water-crisis

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❖ Palestinian housing project waits for water

Entrepreneur Bashar Masri has lost $25m in revenue due to Israeli regime's manoeuvring

Rawabi, West Bank: The billion-dollar, five-year gamble to build a new middle-class Palestinian city on a West Bank mountaintop was just about to welcome its first residents when the Israeli regime decided last month to withhold a basic necessity: running water.

Before granting water access to the planned city of Rawabi, the Israel regime — which controls the area that the water pipe would run through — wants Palestinian National Authority (PNA) officials to return to an Israeli-Palestinian Joint Water Committee. The Palestinians abandoned the group in 2010 because they don't want to approve water projects to illegal Jewish colonies in the occupied West Bank, which are built on land that Palestinians want for a future state — and which still get plenty of water.

The man-made water crisis at Rawabi represents a blow to the middle-class Palestinian community, which hoped to enjoy the city's outdoor mall, restaurants, boutiques, sports club, swimming pool, multiplex theatre and school system.

Builders were ready to hand over the keys to 450 buyers almost a year ago, when the permission to turn on the tap was withheld, a delay they thought would be temporary but now appears indefinite. But the finished apartments remain vacant, and a 12,000-seat Romanesque amphitheatre sits empty; a downsized construction crew works on a slashed budget.

"Palestinian housing project waits for water", 07/03/2015, online at:
http://gulfnews.com/news/region/palestine/palestinian-housing-project-waits-for-water-1.1464544

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❖ New Bio-filters Purify Surface Runoff Water for Reuse

"When rainwater flows through the city streets it picks up a variety of toxic substances. This water goes to waste and actually causes damage...This innovative initiative allows us to transform a nuisance into a valuable resource."
Two new bio-filter facilities established by KKL-JNF in Ramla and Bat Yam demonstrated their efficiency during Israel's recent rainstorms. They are designed to enable surface runoff water to be collected, purified via environmentally friendly physical and biological methods, and then channeled into the aquifers as clean water. These new bio-filters join an older one that has been operating successfully in Kfar Sava for a number of years.

Two hundred million cubic meters of rainwater go to waste in Israel every year. They are washed down to the coast, where they pollute the beaches, the sea and marine life. The innovative bio-filter project is designed to allow this rainwater to be utilized in order to avoid pollution and prevent groundwater levels from dropping further.

The technology was developed in Australia, and KKL-JNF promotes its use in Israel with the support of Friends of JNF Australia. The new facilities in Ramla and Bat Yam were installed with the help ofBlue Box donors and members of the JNF Australia Gold Club.

"When rainwater flows through the city streets it picks up a variety of toxic substances," explained KKL-JNF Central Region Director **Haim Messing**. "This water goes to waste and actually causes damage by polluting the rivers, the groundwater and the sea. This innovative initiative allows us to transform a nuisance into a valuable resource."

The monitoring systems installed in the three bio-filters show that the technology is operating extremely well: the polluted runoff water that enters the facility leaves it purified almost to the point of being fit for drinking. This treated water can then be injected into the groundwater or else used to irrigate gardens and crops of all types.

The data show that 99.99% of the pollutants are removed from the water by the bio-filter treatment.

Even a non-scientist can tell the difference; a glance at the jars of water collected in Ramla and Bat Yam during the rainstorm a few days ago is enough: the water collected prior to its entering the system was cloudy and yellowish, while the treated water was clean and clear.

Haim Messing explained how the technology works. The bio-filter installation contains a number of layers of sand and vegetation. The top layer is covered with special plants that help to purify the water. The lower layers, which are not aerated, provide a habitat for a colony of bacteria that flourish in an oxygen-poor environment and have a large appetite for pollutants. These bacteria encourage processes that purify the water.

This integrated system efficiently removes a variety of pollutants, including heavy metal particles, organic matter and oils. The treated water is injected into the groundwater by means of wells dug nearby.

Each bio-filter has a capacity of around 100 cubic meters. During the last rainfall episode, which continued for several days, each of the facilities filled up and emptied three times, purifying a total of around 300 cubic meters of water. Over the course of a single year, this could amount to thousands of cubic meters, depending on the quantity of precipitation.

But what happens in the summer, when no rain falls? In the dry season water can be pumped from contaminated wells, purified, and, once clean, either restored to the same well or added to the groundwater. This process has been described as dialysis of the aquifer.

The water and plants in the bio-filter help to reduce temperatures in summer, and in our hot dry country this is a great advantage.

“Apart from utilizing the rainwater and protecting water sources and beaches from contamination, the bio-filters in Ramla and Bat Yam have another important contribution to make,” said Messing. “In the past, when rainfall was heavy, roads and even apartments in some of the older neighborhoods would become flooded. But during this last episode of rainfall things were much better, because a large proportion of the surface runoff water flowed into the bio-filters and so there was less of a strain on the municipal drainage system.”

The bio-filter in Kfar Sava was installed in close proximity to a new residential neighborhood and formed an integral part of the plan for the area. The projects in Ramla and Bat Yam, however, show that long-established neighborhoods, too, can benefit greatly from this initiative.

Visitors to the bio-filter who expect to be confronted with a dismal-looking purification plant are in for a pleasant surprise, as the facility consists of attractive plant-filled pools surrounded by footpaths and bicycle trails. "This is a fringe benefit of the bio-filter project: it creates attractive green neighborhood gardens that the local people can enjoy," added Messing.

And, indeed, a visit to the installations reveals pleasant green oases within the city and along its main roads. In Bat Yam an attractive promenade built along the length of the bio-filter offers a strip of grass between footpaths and cycle trails.

The Ramla bio-filter is situated right at the entrance to the city, adjacent to the intercity highway. The promenade, the seats and the well cared for garden around the facility all help to beautify the approach to the city.

The new bio-filters were built with the cooperation of the community, and they have been warmly received by local residents, who were quick to realize the many advantages the project would bring. "We're already being approached by people from other neighborhoods who want to have a bio-filter installed in their part of the city, too," said Messing.

This innovative project is defined as an experimental pilot, and researchers are still investigating various aspects of its functioning: bio-filters of different sizes, different types of vegetation and the quality of the water after purification – all these are being monitored and examined. This work is being carried out under the auspices of a center for research into water-sensitive cities in Israel, which was established jointly by KKL-JNF Israel, JNF Australia and four academic institutions: The Technion (Haifa) The Hebrew University of Jerusalem, Ben Gurion University of the Negev (Beersheba) and Monash University of Melbourne, Australia.

Planning for water-sensitive cities is based upon optimum use of limited water resources in a world beset by uncertainty in the wake of climate change and mankind's changing needs. Water-sensitive cities are characterized by their use of sustainable solutions, appropriate technologies and activities designed to raise public awareness.

The research underway today is expected to continue for a number of years yet, but the initial data collected from the three bio-filters are very encouraging. "The first bio-filters show how the principle works, and we want them to be very much more than just a successful experiment: in the future we would like to see them become the norm throughout Israel," said Messing. "Many other cities could benefit from similar facilities and help to bring about a significant change in the country's water economy."

"New Bio-filters Purify Surface Runoff Water for Reuse", 04/03/2015, online at: http://www.kkl.org.il/eng/about-kkl-jnf/green-israel-news/march-2015/biofilters-ramle-bat-yam/

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❖ Red-Dead pipeline is the wrong answer, politically and environmentally

Pumping Red Sea water into the Dead Sea to save it from drying up ignores environmental consequences, experts warn. Rights groups decry the plan as an 'attempt to force the Palestinian population to consent to their own dispossession.'

Israel and Jordan last Thursday signed a historic agreement to cooperate over their shared bodies of water, in a move to protect the shrinking Dead Sea and to address the looming potable water crisis in the two countries. A pipeline from the Red Sea to the Dead Sea is proposed to refill water in the salt lake, and desalinization plants to be built in Jordan. The Palestinian Authority, a party to the Memorandum of Understanding on replenishing the Dead Sea in December 2013, was not a party to this agreement. The World Bank sponsored this long-awaited plan, hailed as an initiative to promote peace in the region through economic and environmental cooperation, on the understanding that environmental problems have no borders.

The Red-Dead conveyance, however, is far from a perfect plan. Environmental groups have argued that the World Bank environmental impact study does not adequately address serious concerns about the effect on ecosystems in both the Red and Dead seas, nor did it consider alternative proposed plans. Palestinian human rights groups have maintained that the plan is part of a continuum of violations of Palestinian rights to water. MK Silvan Shalom implied the plan was another element to realization of the Zionist dream, saying, "today we realize the vision of Binyamin Ze'ev [Theodore] Herzl, the visionary of the state, who already at the end of the 19th century understood the need to revive the Dead Sea."

Palestinian rights groups state that the World Bank's feasibility study and Environmental and Social Assessment study lack transparency, or a mandate given to them by a credible consultative and participatory process. They allege that key concerns brought up by Palestinians on Israeli violations of water rights were deliberately ignored.

The Dead Sea is not actually a sea, but a hypersaline lake, naturally replenished by water flowing into it from the Jordan River. The Jordan, however, has been overexploited, polluted, and diverted, with large parts of the lower river in serious danger of drying up. An estimated 98 percent of the trans-

boundary Jordan River has been diverted by Israel, Jordan and Syria for public use before it can ever reach the Dead Sea.

Largely as a result of this, and of the unsustainable mineral extraction activities by Jordan and Israel, the water level of the Dead Sea has dropped dramatically at an average of one meter per year, and the salt lake has split into two separate pools. The receding coastline has led to the formation of dangerous sinkholes in the area. The Red Sea-Dead Sea conveyance project does not address any of these causal factors, instead planning to pipe water from the Red Sea, 180 kilometres away, into the Dead Sea.

Environmental scientists have questioned the reasoning for this, given that this plan does nothing to reverse the damage done to the Jordan River. Additionally, the waters of the two seas are entirely different from each other and the impact of this mix is yet unknown. The introduction of Red Sea water risks layering the waters, leading to the growth of gypsum crystals and algae in the Dead Sea. This could have devastating consequences for Dead Sea preservation and the region's ecosystem, affecting the health benefits of this heritage site and, consequently, the tourist industry. Another issue is the impact the pipeline may have on the ecosystem of the Red Sea, as coral reefs are highly sensitive to a change in currents, which the pipeline redirection may cause.

Chairman and Jordanian director of Eco-Peace Middle East Munqeth Mehyer noted that the current plan is very different from its original incarnation, and is now more of a desalination project than Dead Sea conservation. To pump "100 million cubic meters of water is an insignificant amount to the actual needs of the Dead Sea," he said, "especially when there are indications that increasing that much brine will create environmental problems. It is not worth the risk of laying that pipeline and all that money [estimated at $900 million] for such a small amount of water." It would be more advisable, he explained, to redirect the enormous sum of money to cleaning up the Jordan River, the original source of water to the Dead Sea: "We should not play with nature in this way. The Red Sea is not the right source."

A feted accomplishment of the agreement between Israel and Jordan is the desalination plant to be constructed in Aqaba, Jordan, a possible solution to water shortages and job creation. This involves a plan to sell desalinated water to the Palestinians, although this would be part of a separate agreement

with the Palestinian Authority. In a joint statement in October 2013, Palestinian NGOs expressed their emphatic rejection of the Red-Dead plan as "an unacceptable attempt to force the Palestinian population to consent to their own dispossession." Israel controls most of the water sources in the Jordan Valley, and Palestinian access to water is restricted and inadequate. Given that the plan does nothing to address the damage to the Jordan River, or to the rapidly depleting Eastern Aquifer, one of the only water sources on which West Bank Palestinians can depend, Palestinian rights groups view the Red-Dead project as an endorsement of the status quo and persistent impunity that accompanies Israel's inequitable control of water sources in the West Bank.

"Red-Dead pipeline is the wrong answer, politically and environmentally", 06/03/2015, online at: http://972mag.com/red-dead-pipeline-the-wrong-answer-politically-and-environmentally/103812/

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❖ 'Israel's decision to double water supplies to Gaza is an improvement but still inadequate'

While water experts and environmental activists are widely praising Israel's decision, many argue the increase is simply not enough.

By SHARON UDASIN , 06/03/2015
Israel's decision to double its water allocations to Gaza is a positive step forward, environmental experts said Thursday, but agreed that it is still far from sufficient to satisfy the territory's needs.

Coordinator of Government Activities in the Territories Maj.-Gen. Yoav Mordechai announced to the Jerusalem-based daily Al-Quds on Wednesday that Gaza would soon receive 10 million cubic meters of water per year instead of the current 5 million. The additional quantity is expected to begin flowing within the next week, a spokeswoman subsequently told The Jerusalem Post.

While water experts and environmental activists are widely praising Israel's decision, many argue the increase is simply not enough.

"We congratulate the Israeli authorities for this important decision to double the supply of water to Gaza and call on them to complement this important move by further enlarging the quantity of water to Gaza by an additional 10 m.cu.m., to match the full capacity of their existing infrastructure," said Gidon Bromberg, Israeli director of the regional environmental organization EcoPeace Middle East (formerly Friends of the Earth Middle East).

Doubling the amount of water flowing to Gaza is "an important step that will help the 1.8 million Palestinian residents of Gaza to overcome the severe shortage of potable water," but much more can be done, the organization argued. Also critical, Bromberg said, is treating the sewage that is currently running raw into the groundwater.

Israel has the capability to provide 8.5 m.cu.m. annually by means of existing infrastructure – through which it has supplied the 5 m.cu.m.

until now – as well as an additional 12 m.cu.m. using the new connection built in Nahal Oz, according to EcoPeace information, which cited data from the Water Authority.

In Gaza, the average annual natural addition of water – through rainfall – amounts to about 60 m.cu.m., after rain penetrates into the soil and accumulates in the groundwater, explained Prof. Uri Shani, former commissioner of the Israel Water Authority and an expert in soil and water sciences.

While Israel estimates that Gazans consume about 120 m.cu.m. of water annually, Gazan authorities report that usage at about 150 m.cu.m., Shani explained.

"The point is that they use much more than what they have," he told the Post on Thursday.

Shani also serves as the chairman of the Israeli government's steering committee for the historic water agreement signed between Israel and Jordan last week, involving the swapping of water resources and the conveyance of concentrated brine from desalinated Red Sea water to the Dead Sea.

Gazans are able to "use much more than what they have" because, in the shortterm, they are exploiting the reserve water quantities in the coastal aquifer, Shani said. However, this over-exploitation has led to a situation in which the water table is depleting. When the water table is depleted enough, as in the current situation, seawater begins to enter, he explained.

"Then it becomes saline," Shani said. "Slowly, slowly, over the years, the seawater goes inside the aquifer."

Meanwhile, another "source" of water feeding into the aquifer is raw effluent leaking from the Gazan sewage system, he added.

Because the soil is sandy and the sewage treatment infrastructure in Gaza is poor, the sewage enters the soil fairly easily, Shani explained.

In order to cope with the poor quality of their water, most households in Gaza have desalination instruments to make their water potable, according to Shani.

"Practically, you can say they solved the water problem," he said. "But actually, what happens there is that when you perform desalination, the brine goes back into the groundwater, so it makes the salinization process faster."

Shani also confirmed that the increased quantity is insufficient for the territory's needs.

"Of course it's not enough," he said. "Ten is much more than zero, but it doesn't solve the problem."

What is necessary to solve the water shortage crisis in Gaza, he said, is the construction of a sizable desalination plant there, or the purchase of large quantities of desalinated water from Israel.

In early October, EcoPeace's Bromberg, along with Michal Milner from his own organization and Dr. Oded Eran, a senior research fellow at the Institute for National Security Studies, released a detailed report titled "The Water, Sanitation and Energy Crises in Gaza," which the authors had prepared during the summer.

The authors described "a serious humanitarian crisis in Gaza" that revolves around water, arguing that insufficient electricity supplies bar them from treating or pumping sewage, thereby causing risks of pandemic diseases.

A second report by B'Tselem last year found that 90 percent of the water in the Gaza Strip was "unfit for drinking."

The European Union estimates that as much as 95% of the resource is unsuitable for human consumption.

While the World Bank has completed construction of a sewage treatment facility in Gaza near Beit Lahiya, it requires three megawatts of electricity to operate, Bromberg explained. The Palestinian Authority has a NIS 1.9 billion debt to Israel Electric Corporation, but the World Bank has committed to provide the funds for this specific three megawatts of electricity, according to Bromberg.

"There's no additional cost to Israel and it could be [an electricity] line that is dedicated to the wastewater treatment plant," he said.

As raw sewage continues to spill into the coastal aquifer and into the Mediterranean Sea, the Northern Gaza Emergency Sewage Treatment Facility stands idle, Bromberg explained.

"It could not only improve the water quality of Gaza but could also improve the quality of our beaches this summer," he said.

In the mid- to long-term, EcoPeace is calling upon the Israeli government to facilitate Palestinian efforts to develop the Gaza marine natural-gas field, as well as assist the Palestinian Water Authority and international community members in building a large desalination plant in Gaza. However, in the short-term, the organization sees the wastewater treatment plant's connection as critical.

"It's ready to go," Bromberg said. "It's sitting there like a white elephant."

"'Israel's decision to double water supplies to Gaza is an improvement but still inadequate'" , Jerusalem Post, 06/03/2015, online at: http://mideastenvironment.apps01.yorku.ca/2015/03/israels-decision-to-double-water-supplies-to-gaza-is-an-improvement-but-still-inadequate-jerusalem-post/

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❖ Tiberias wastewater heads to new treatment plant, curbing raw sewage flow in Jordan River

Conveyance of the sewage by means of the new pipeline was part of a NIS 40m. scheme.

As part of an ongoing project to rehabilitate the once heavily contaminated Jordan River, Tiberias sewage will soon flow to a new treatment facility, the Water Authority announced on Sunday.

Construction of both a pumping station and a 12-kilometer, 710-millimeter wide pipeline has concluded, allowing for the conveyance of wastewater from Tiberias to the new Bitanya treatment plant at the southernmost tip of Lake Kinneret (the Sea of Galilee), the Water Authority said. Involving a wide range of partners, the NIS 120 million project brings an end to a situation in which raw sewage was endangering the vitality of the Jordan River.

"This is one of the key projects in the water sector in the last decade, a project that combines supply of quality water to agriculture and nature with the advantages of rehabilitating and protecting the environment," a statement from the Water Authority said.

The many advantages of the Bitanya wastewater treatment plant and the new pipeline from Tiberias, according to the authority, involve the prevention of raw sewage flow, provision of desalinated brackish water and treated wastewater for regional agriculture, and increasing supplies of clean water to restore the flow of the Jordan River. Gradually, the authority plans to bring the discharge of water into the Jordan River up to 30 million cubic meters per year, through a combination of Kinneret water, saline water, and treated wastewater.

Conveyance of the sewage by the new pipeline is part of a NIS 40m. scheme that included the diversion of brackish water springs, as well as the transmission and disposal of brine, brackish water, and sewage to a collection point along the Kinneret's western basin. These new systems upgrade and replace the small, open canal that previously had collected rainwater and sewage around the western portion of the lake, the Water Authority explained.

With the connection of the new pipeline, the Tiberias pumping station began operating in a trial phase, which will conclude in about three months, the Water Authority said. The pumping station

was constructed by Mei Rakat Tiberias, which received an approximately NIS 12m. grant – equivalent to about 40% of the station's construction costs – from the Water Authority.

The opening of the Bitanya wastewater purification plant allows for the closure of an obsolete sewage treatment facility next to the Kinneret, which operated poorly and enabled the flow of sewage and effluents into the Jordan River, the Water Authority said. The Bitanya plant was established at a cost of NIS 72m. by Mei Rakat Tiberias in cooperation with the Jordan Valley Regional Council.

While at the moment, the Bitanya plant is only purifying sewage at a secondary level, by January 2016 the facility should be operating at a tertiary level, the Water Authority said. At the current stage, the facility is releasing treated wastewater to the Jordan River, and is thereby significantly improving the quality of water that has been previously discharged into the river, according to the Water Authority.

The Bitanya wastewater treatment plant can handle approximately 16,000 cubic meters of sewage per day, but is currently receiving about 9,000 cubic meters, including the amount added with the connection of the new pipeline from Tiberias, the authority said.

Although the treated wastewater is currently being released to the Jordan River, the larger regional rehabilitation plan calls for nearly all the treated effluents produced by the Bitanya plant to be distributed for agricultural use via the Jordan Valley Water Association, the Water Authority explained. At this point, however, the infrastructure in place for such a transfer is not yet suitable, a spokesman for the authority explained.

In addition, the Tiberias hot springs and other brackish water sources – water saltier than freshwater but less salty than seawater – are supposed to be diverted to a separate transmission route, in order to enable their use at the fish breeding ponds in the southern part of Emek Hama'ayanot.

This water will flow to points further down the Jordan River in accordance with determined Fishery Water Output Regulations, the Water Authority said.

Replacing much of the treated wastewater flow once this source is redirected to agriculture, the remaining brackish water will be combined with Lake Kinneret water to send down the Jordan River and increase its flow, according to the Water Authority.

The amount of water being released down the Jordan River will increase from today's 10 m.cu.m. annually to 20 m.cu.m. upon the completion of a new desalination plant in the region. Eventually, a total of 30 m.cu.m. of water total will be released down the Jordan River annually.

The Water Authority announced the completion of this portion of the project just three days after Israel and Jordan signed a bilateral agreement for the exchange of water, in which Israel will buy water from a future desalination plant in Aqaba and Jordan will purchase more water from Lake Kinneret. In addition, the two countries will be constructing a 200-kilometer pipeline to convey concentrated brine – the salty byproduct of the desalination process – to the Dead Sea, whose basin is dangerously dwindling.

Environmentalists have long argued, however, that the restoration of flow to the Jordan River is the most vital mechanism toward saving both the Dead Sea and the river itself.

"We congratulate the relevant authorities in continuing to move forward another important component in getting the various pollutants out of the Jordan river as a necessary step towards the river's rehabilitation," said Gidon Bromberg, the Israel director for EcoPeace: Friends of the Earth Middle East.

A regional environmental organization with offices in Israel, Jordan and the Palestinian Authority, EcoPeace has long been fighting to remove pollutants from and restore clean water flow to the Jordan River.

While expressing praise for the Water Authority's advancements, Bromberg stressed that the currently proposed 30 m.cu.m. of annual discharge sets "an important precedent" but neither reflects "the needs of the river ecosystem, nor the level of effort and investment made by local municipal and water authorities in Israel."

"A timeline for much larger quantities of water to be released from the Kinneret to the river needs to be developed if the environment and local communities are to see a real return on investment in line with Jordan river regional master planning efforts," Bromberg said.

"Tiberias wastewater heads to new treatment plant, curbing raw sewage flow in Jordan River ", Jerusalem Post, 01/03/2015, online at: http://mideastenvironment.apps01.yorku.ca/2015/03/tiberias-wastewater-heads-to-new-treatment-plant-curbing-raw-sewage-flow-in-jordan-river-jerusalem-post/

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❖ Battle for water won by entrepeneur of first Palestinian planned city

A political battle to install a water pipeline for the first planned Palestinian city of Rawabi is now over, with Palestinian American entrepeneur finally able to reach his goal of establishing a beautiful city in area A of the West Bank.

Smadar Peri
Published: 03.04.15

Bashar al-Masri, a Palestinian American entrepreneur, has finally followed-through with his vision to fully plan a Palestinian city from its initiation, in the city of Rawabi – located in area A in the West Bank.

Seven years after announcing his plan to build the first Palestinian planned city, five years after gathering enough investments from princesses in Qatar and hundreds of workers dug its foundations and two years after thousands of apartments were sold on the Palestinian hill that overlooks Ramallah, al-Masri's dream finally came true.

"I'm satisfied," al-Masri said in an interview with Yedioth Ahronoth, "and I'm not crying over the political and bureaucratic milk that was spilled during the long journey."

With the declaration of the development of the first Palestinian planned city, al-Masri was the subject of much criticism from both the Israelis and the Palestinians.

The Palestinians blamed al-Masri for "normalization" when they found out he was purchasing pavement from an Israeli company, Akerstein, and materials such as electrical equipment from Israel.

On the Israeli side, right-wing members claimed he was "invading" Israeli territory and that Rawabi would be used as a base for terrorists.

But ultimately, against all odds, al-Masri was able to see his vision through.

Last Thursday, al-Masri was notified by Israeli media that Israel would be lifting its long held opposition and would approve the transfer of a water pipe to Rawabi. In doing so, Israel has lifted the last block on the way to populating the city.

"I immediately called Yoav (coordinator of government activities in the territories) and he said to me: 'Mabrouk, you have water,'" said al-Masri.

"I ask if all the opposition was lifted from the Israeli ministers and he said: 'This is Prime Minister Netanyahu's decision and no one can object it any longer.'"

The US government and the leaders of US Jewish organizations, who have visited Rawabi in the past, blessed Netanyahu's decision to lift the ban against the water pipe that delayed the populating of the city.

"We are now beginning to set up the pipe and the first group of residents will begin to settle there in May," said al-Masri. "There is still a lot of work to be done in the field. Because of the political and economic situation in the territories, it does not seem fit to us to carry out a celebration for the groundbreaking of the city. In the middle of May will carry out a special event, and whoever wants to come is invited – including Israelis.

In the first phase, 639 Palestinian families who bought apartments as part of the project will move in – they received apology letters for the delays which were caused by problems with the road leading to the city, political opposition from the Israeli side and problems dealing with the water pipe.

"I'm really happy that everything is already behind me," said al-Masri. "I certainly invited Israelis to visit Rawabi to see how a Palestinian city is built and how high-level housing is offered. We also deserve to live in a beautiful city like the cities I've seen in Israel, no?"

http://www.ynetnews.com/articles/0,7340,L-4633454,00.html

Palestinian city plan to move forward after Israel agrees to water deal – YNET

State-of-the-art Palestinian city's development stuck amid conflict over connection to water, however its developer now says Israel has agreed to connect new city to grid, despite past conflict with settlers.

AP, Ynet
Published: 03.01.15

The builder of the first planned Palestinian city in the West Bank says Israel has agreed to connect Rawabi to its water grid, ending months of costly delays.

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Rawabi, a state-of-the-art city, is to have 6,000 apartments, a mall and an amphitheater. It is the West Bank's largest private investment project, totaling more than $1 billion, and is seen as a symbol of Palestinian state building.

Developer Bashar Masri said Sunday that the wrangling over the water had put off potential buyers and forced him to slow construction. Masri says he now hopes to hand over 650 apartments by early summer.

Related stories:

Rawabi's dried-up pipe could land Israel in deep water
Israel, PA at odds over water supply for new Palestinian city
Building a Palestinian state, one city at a time

Israel has said it has an interest in seeing Rawabi being built, but has caused repeated delays, prompting intervention by senior Western officials in the city's behalf.

Nahum Barnea, Ynet's print publication senior correspondent, reported two weeks ago that the first stage of the project was completed last May. The buyers were supposed to receive the keys, but the keys were not delivered because the construction company couldn't house the buyers because there was no water flowing because Israel refused to connect them to the joint pipe.

Israel refused to connect them because its government is involved in a conflict with the Palestinian Authority.

According to Barena, each side in this conflict has principles: The PA won't sign on water supply to the settlements; the Israeli government won't approve water for the Palestinians as long as the PA won't sign.

In the meantime, the city's construction work has been halted. The marketing has been stopped too. The project, which was partly funded by Qatari money and partly by the buyers' money, is stuck.

Barnea reported that Major-General Yoav Mordechai, the coordinator of government activities in the territories, has made a huge effort in recent month to push the problem off the agenda. He used his connections in the PA to pave the way to a compromise. When he realized salvation will not come from there, he convinced Defense Minister Moshe Ya'alon to support a one-sided connection of the city. That's how quite a few settlements were connected to a water supply system.

Ya'alon mulled over the issue quite a lot, Barnea claimed, adding that the defense minister eventually decided that the pipe should be connected. According to rumors, Prime Minister Benjamin Netanyahu is also in favor of connecting the pipe. He realizes that Rawabi is a ticking bomb, both from the PR and legal aspects.

Until the matter reached Silvan Shalom's desk. Shalom is the minister of energy and water. When it comes to the West Bank area, the authority belongs to the Central Command chief, and in fact to the defense minister. The defense minister is in charge of the pipe, but the water minister is in charge of the water. Mekorot, Israel's national water company, will not supply water without the Water Authority's approval, and the Water Authority will not give the approval if the water minister refuses.

The upper middle class Palestinian families who bought apartments in Rawabi say they have been informed by the project's managers that work still remains on connections to the water and road networks, and the first residents are expected to move in at the beginning of 2015.

The prices paid for the apartments range from $65,000 to $110,000 – far above average in the Palestinian market but still less than in Israel. Purchasers include a high percentage of singles, and many also bought apartments there as an investment. To date, Rawabi is considered the largest and most important project in the Palestinian Authority.

Some 6,000 families are ultimately expected to live in Rawabi; therefore continuing to populate the city will requires a far larger supply of water. As such, there is a need for a water pipeline that would partially pass through Area C of the West Bank – which is under Israeli control. This plan is opposed by the settlers.

Connecting Rawabi to the water network has been a bone of contention between Israeli and Palestinian representatives on the Joint Water Committee, which has not met in a long time due to disputes between the two sides.

"Battle for water won by entrepeneur of first Palestinian planned city" , YNET, 06/03/2015, online at: http://mideastenvironment.apps01.yorku.ca/2015/03/battle-for-water-won-by-entrepeneur-of-first-palestinian-planned-city-ynet/

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❖ Israel helps relieve water crisis in Gaza Strip by doubling supply

Israel plans to double the amount of water it sells to the Gaza Strip to help relieve the water crisis there and ease the burden on the overtaxed coastal aquifer. It is the latest in a series of gestures Israel has made recently to the Palestinians there and in the West Bank.

In an interview to the Jerusalem- based daily *Al-Quds*on Wednesday, Coordinator of Government Activities in the Territories Maj.-Gen. Yoav Mordechai announced that Gaza would receive 10 million cubic meters of water a year instead of the current 5 million. The additional quantity is expected to begin flowing within the next week, a COGAT spokeswoman told *The Jerusalem Post.*

Most of Gaza's water now comes from the coastal aquifer. However, the 1.8 million Palestinians there are drawing it out faster than it can be replenished. As a result, seawater from the Mediterranean is seeping in, creating a saline level beyond World Health Organization guidelines for safe drinking water, according to a report last year by the NGO EcoPeace: Friends of the Earth Middle East.

A second report by B'Tselem last year found that 90 percent of the water in the Gaza Strip was "unfit for drinking." The European Union estimates that as much as 95% cannot be consumed by humans.

"The needs in Gaza for fresh water are huge. Nearly 95% of water in Gaza is considered unfit for human consumption. Enormous efforts are needed to ensure that Gazans can access fresh water. This is both a fundamental human right and an urgent humanitarian need for Gaza's population," EU representative John Gatt-Rutter said last week.

The military conflict between Israel and Hamas last summer made the problem even more acute.

The issue was foreseen decades ago, and Israel pledged to increase its water sales to Gaza in the 1990s under the Oslo Accords. New infrastructure was needed, and the construction of larger water pipes was not completed until just a few years ago. Still, it needed the approval of the Israeli-Palestinian Joint Water Committee, which stopped meeting in 2010.

Recently, Mordechai circumvented the committee and approved a number of projects, including water for the new Palestinian city of Rawabi in the West Bank. He made a similar move with the Gaza project, and approved it out of concern for the well-being of the people in Gaza, as well as the environmental impact on the aquifer, security sources said.

Mordechai told Al-Quds he hoped Hamas "does not steal water from civilians as it steals construction material for rebuilding homes in the Strip."

As far as the roles of the Water Authority and Mekorot national water company as conveyors of the water, a Water Authority spokesman told the Post that the additional infrastructure necessary to carry the increased amount of water has been ready for quite some time.

"We are a professional body, and what is requested of us we do," the spokesman said. "From the Water Authority's point of view, all of the infrastructure demanded and supposed to be [in place] was done already."

Separately, work is under way with the help of the EU and UNICEF to build a desalination plant in the Gaza Strip to provide drinking water for as many as 75,000 people.

"Israel helps relieve water crisis in Gaza Strip by doubling supply", 05/03/2015, online at: http://www.jpost.com/Arab-Israeli-Conflict/Israel-helps-relieve-water-crisis-in-Gaza-Strip-by-doubling-supply-392976

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❖ The Israeli tech start-up saving Australian water

An Israeli water technology start-up has picked up a slew of Australian contracts, after it saved Yarra Valley Water thousands of megalitres of water and millions of dollars by installing software that identifies and tracks leaks in real time.

TaKaDu, founded in 2009 by tech entrepreneur Amir Peleg, uses algorithms to analyse data from smart sensors in the water systems to identify bugs in the water meters, leaks and faults in other equipment.

Yarra Valley Water was the first to adopt the technology in Australia, but now Sydney Water, Unitywater on the Sunshine Coast and Queensland Urban Utilities in Brisbane have also started using it.

Mr Peleg said the complex process was based on the simple idea that water usage occurred in patterns.

"There are patterns of water flow in your neighbourhood ... they depend on the time of the day, the day of the week and seasonality," he told *The Australian Financial Review*.

"When you have a pattern you can model it statistically. You learn what the right pattern is for a Tuesday in February in a certain neighbourhood ... the computer tracks these patterns and then you can see if there is a leak, or a burst, or if there's abnormal consumption going on."

Yarra Valley Water managing director Patrick McCafferty said the technology had saved the company millions of dollars and thousands of megalitres since its implementation.

SAVED

"In the last three years we've saved about 2700 megalitres of water, which is about 1100 Olympic swimming pools of water ... which has worked out to be about $5000 a day in water savings," Mr McCafferty said.

"Yarra Valley Water has reduced from about 14 per cent to 10.8 per cent its water loss, and leakage is by far the most material element of this."

Mr Peleg said he started TaKaDu because of the size of the water industry, the access to venture capital for clean-tech ventures in 2008 and the drought in Israel.

"I sold my previous venture [YaData] to Microsoft in early 2008. In Israel that year we had a draught ... we weren't allowed to wash cars, we weren't allowed to water gardens and I thought to myself it was a bit ridiculous when I was willing to pay for water," he said.

"But then I learned some utilities were losing 20 to 30 per cent of their water ... If you look at other countries the problem was even worse."

He spent the next few months going to trade shows and learning about what technology was being developed in the industry.

"When you go to trade shows, the trick of an entrepreneur is not to see what is there, but to see what is not," he said. "There was this trend that they were lacking good software systems ... but I realised some of the utilities were accumulating a lot of data."

Tony Kelly, former managing director of Yarra Valley Water, said when the company began in 1995 leakage had been close to 20 per cent.

"I really do believe all utilities will have to have a system like this eventually," he said.

TaKaDu has attracted more than $20 million in investment from venture capital firms such as 3M and ABB. Its software is being used in eight countries.

Mr Peleg said he would consider taking TaKaDu to an initial public offeringin the future, rather than selling it.

"It doesn't make sense to sell. We should aim for a big IPO and to make a statement - this is it, we're here to stay and we want to go into gas and into sewerage," he said.

"It would be a loss of opportunity if we sold it ... but then again, everything has a price."

"The Israeli tech start-up saving Australian water", 02/03/2015, online at: http://www.afr.com/p/technology/the_israeli_tech_start_up_saving_mRrbJ9PMc9x6U8s3C3oTFN

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❖ Israel to Double Water Supplies to Gaza Strip Amid Tensions

Israel will double the amount of water provided to the **Gaza** Strip, despite a bloody war last summer against the territory's **Hamas** rulers, defense officials said Wednesday.

Maj. Gen. Yoav Mordechai, the commander of Cogat, the defense agency that deals with Gazan civilian affairs, said in published remarks that Israel would increase water supplies from 5 to 10 million cubic meters (1.3 to 2.6 billion gallons) per year to relieve what he called a "severe water problem due to excessive overuse of groundwater resources."

Gaza suffers from chronic water shortages, making tap water undrinkable and forcing the territory to send large quantities of raw sewage into the Mediterranean.

Mordechai said he hopes Hamas "would not steal water from civilians as they steal construction materials intended for the reconstruction of houses."

Rebhi el-Shiekh, director of the Palestinian Water Authority in Gaza, said he had not received official notification of the Israeli announcement.

The water, if delivered, represents just a fraction of Gaza's water needs. But the water would provide some relief since it is of drinking quality and does not have to be treated.

Gaza gets some 200 million cubic meters (53 billion gallons) from a local aquifer. The water is very salty and can be drunk only if it is filtered.

If Israel delivers the water, el-Shiekh said Gaza does not have the capacity to receive it all because a major water tank was destroyed in last summer's fighting. He said Gaza could handle roughly half the water until the tank is rebuilt later this year.

Israel captured Gaza in the 1967 Mideast war and occupied the territory until withdrawing in 2005. Two years later, Hamas militants seized control of Gaza from the Western-backed Palestinian Authority.

Israel maintains a blockade of the territory, and controls its airspace and coastline. It says the blockade is needed to contain Hamas, which has fired thousands of rockets into Israel and fought Israel in three wars since taking control of Gaza.

The blockade pressures both Hamas and Gaza's 1.8 million residents.

"Israel to Double Water Supplies to Gaza Strip Amid Tensions", 04/03/2015, online at:
http://abcnews.go.com/International/wireStory/abbas-israel-stripped-government-authority-29377153

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❖ Israel now gets 40 pct of its water from the sea

The world's largest and lowest-cost desalination plant[has fully ramped up in Israel](#).

The $500 million facility, developed by Israel Desalination Technology, produces 627 million cubic metres of water daily. The conventional reverse osmosis plant is located on a beach 10 miles south of Tel Aviv.

The plant utilized two key technologies to lower costs: osmosis occurs in piping that is 16 inches in diameter rather than the standard 8 inch. Larger piping reduces material costs. The pumps are also much more energy efficient. The plant sells the water profitably to the Israeli public for 58 cents per cubic meter.

With the Sorek plant now operating, Israel now has four large desalination plants that cumulatively provide 40 pct of Israel's water needs. By 2016 more plants are expected to come online and Israel will then get half of its water from the sea.

"Israel now gets 40 pct of its water from the sea", 04/03/2015, online at: http://www.mining.com/israel-now-gets-40-pct-water-sea-26689/

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❖ Israel to double water quota to Gaza

JERUSALEM, March 4 (Xinhua) -- Israel announced Wednesday it will double the drinking water quota to the Gaza Strip, amid spiraling water crisis in the Palestinian enclave.

The annual water quantity will be increased from five million cubes to 10 million cubes, Israel's Coordinator of Government Activities in the Territories, Major General Yoav Mordechai, said in a statement.

"The decision was made following the increased need to improve the water supply to the Gaza Strip," said Mordechai. "There is a serious water problem there due to excessive use of groundwater in the coastal basin," he added.

The move came two days after UN envoy to the Middle East Robert Serry urged world countries to speed up the rehabilitation of Gaza following last summer's 50-day fighting between Israel and Hamas.

"I urgently call on all stakeholders, including the (Palestinian) Government of National Consensus, Palestinian factions, Israel, Egypt and the international community to change their failed policies," Serry said during his visit to the war-ravaged enclave.

"Six months after the ceasefire, I am deeply concerned that not enough progress is being made to address Gaza's underlying issues," he added.

According to a recent UN assessment, Israel's massive shelling left Gaza in ruins and affected more than 600,000 people, many of them still lack access to the municipal water network.

Israel and Egypt imposed a blockade over the Gaza Strip since the Islamist movement Hamas took over the control of Gaza in 2007.

Since then, Israel has employed a restricted permits policy, allowing people to leave the region only in rare humanitarian cases.

"Israel to double water quota to Gaza", 04/03/2015, online at: http://news.xinhuanet.com/english/2015-03/04/c_134038043.htm

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❖ Rawabi finally gets water pipeline

The Israeli government has approved the connection of the new Palestinian city, Rawabi, to the water grid after more than a year of delays.

The decision will allow the company building Rawabi, which is designed to house 40,000, to finally hand over the keys to the first new flats.

Israel's security establishment had recommended the supply of water to Rawabi but pressure from Israeli settler councils, which claimed that the new town could pose a security risk along with Israeli anger at the Palestinian Authority's unilateral policy, caused a delay in the decision.

In addition, the government decided last week to use some of the Palestinian tax funds Israel has withheld for the last three months to partially defray the Palestinian unpaid debt to the Israeli Electric Corporation.

The debt, which currently stands at nearly NIS 2 billion (£325 million), has accumulated over the last two years and for the first time, IEC cut off the power to a number of Palestinian cities for an hour, twice last month, as a warning.

At this stage, NIS 300 million (£49 million) of the frozen tax funds will be used to pay part of the electricity bill. The tax duties which Israel collects on behalf of the Palestinian Authority were frozen three months ago in retaliation at the Palestinians' decision to refer Israel to the International Criminal Court for alleged war crimes.

"Rawabi finally gets water pipeline",05/03/2015, online at: http://www.thejc.com/news/world-news/130901/rawabi-finally-gets-water-pipeline

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❖ Akron-Israel water project deal will mean jobs, mayor says

AKRON, Ohio -- A partnership between the city of Akron and Israel's water industry will create new jobs and investment as well as place Akron on the forefront of water innovation and technology, according to Mayor Don Plusquellic.

Plusquellic announced Monday that Akron will be the exclusive North American government partner with Israel's water industry, academia and private enterprises.

The project is an effort to bring cutting-edge water technologies to the U.S. marketplace through an "Advanced Waste Water Treatment Demonstration Project."

"This Project will create new jobs and investment through business attraction, further our water initiative, and place Akron in the forefront of water innovation and technology," said Plusquellic.

"We chose Akron because of its water industry experience, its successful business activities, its collaborative and cooperative spirit with Israel, and for the establishment of the Akron Global Water Alliance (AGWA) whose purpose is to promote innovation, knowledge sharing, and commercialization of water technologies," stated Moshe Kelner, CEO of Advanced Memtech, one of the Israeli companies leading the Project.

"We are being entrusted with an exclusive platform and pipeline for Israeli companies to demonstrate innovative technologies and new solutions for water treatment worldwide," Plusquellic said.

Plusquellic also mentioned Akron's past experience with projects in Israel including: being the first U.S. city to partner with an Israeli municipal utility in Netanya, Israel, to develop and commercialize new water technology solutions; creating a partnership with WaTech-Mekorot, the technology innovation division of Israel's national water company, to promote bi-lateral cooperation and innovation; and including the Israeli water company delegation in the Akron Global Water Alliance Launch Event last October.

Plusquellic particularly noted Akron's $500,000 investment in the Targetech Innovation Center, an Israeli incubator that nurtures science, technology, research and development, and commercializes these efforts in Israeli and the U.S. market through Akron.

"These activities have positioned Akron to be the ideal partner for this project," said Plusquellic. "This project will benefit municipal water utilities nationwide and the Industry at large. As the centralized North American location to carry out demonstration activities, we will be able to help companies commercialize solutions more efficiently and access the US market."

Plusquellic has also been a featured speaker at WaTech, one of the largest international water conferences in the world held bi-annually in Israel, speaking on topics such as innovation, smart cities and international cooperation between U.S. cities and Israel. He also was the keynote presenter at the Israeli-American Chamber of Commerce Conference in Chicago.

The parties have reached agreement on the terms and a formal contract will be finalized at a later date.

"Akron-Israel water project deal will mean jobs, mayor says", 02/03/2015, online at: http://www.wkyc.com/story/news/local/akron/2015/03/02/akron-israel-water-deal/24280097/

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❖ Norwegian firm seeks Israeli partnership in wastewater treatment, desalination barges

A Norwegian company aiming to convert secondhand oil barges into floating desalination and wastewater treatment plants is recruiting Israeli expertise to furnish the water-processing technology necessary for the ships.

According to Sigmund Larsen, the founder and CEO of EnviroNor, the floating treatment plants offer a cheaper solution to purifying the Earth's water supply, particularly in regions threatened by water scarcity and where land space for such facilities is lacking. Although, as a Norwegian firm, EnviroNor can bring to the table expertise in the maritime industry and know-how from the country's strong oil and gas industry, such as undersea pipeline infrastructure, Israeli proficiency in both desalination and wastewater technologies would be crucial to the project's development, Larsen explained.

"What we want to do is to combine those two pillars with Israeli knowledge," Larsen told *The Jerusalem Post*, during an interview in Tel Aviv interview on Tuesday. "Norway and Israel can collaborate more both on a political level and industrial level."

Larsen, in Israel for the past few days, has met with National Infrastructure, Energy and Water Minister Silvan Shalom, as well as representatives from his ministry; the Water Authority; the Economy Ministry; Mekorot national water corporation; and other water companies.

"It's cheaper to convert a ship to desalination or wastewater treatment plant than to do it onshore," he

said, noting that the planning process in most countries is significantly shorter for offshore infrastructure.

The ships, he said, can hold quite sizable facilities, capable of purifying as much as 500,000 cubic meters of wastewater daily – to accommodate about 2.5 million people – or desalinating as much as 200,000 cubic meters of seawater daily.

"The environmental advantage here is that we are reusing a vessel," he said. "A ship is like a bottle of milk – it expires after 20 to 25 years and after that we send it to the beaches of India and Bangladesh for scrapping.

When we can extend the life of a ship from 25 years to 60 years, that is quite a big contribution to the environment."

While the floating facilities require energy to operate, a portion of the activity of the wastewater treatment plants can occur through biogas power generated through the methane extracted from the wastewater purification process itself, Larsen explained.

Desalination, he acknowledged, cannot, at this point, be considered an environmentally friendly process since it requires a lot of energy from sources such as liquefied natural gas or fuel from oil sources.

In any country where EnviroNor would park one of these barges, the company would aim to bring

value back by training the local population in areas of employment related to the ship's operations, Larsen said. The country would pay a fixed daily fee for the barge's operations, as well as a charge depending on how much purified water they use, he explained.

EnviroNor is close to closing on an agreement with Mozambique to serve as a pilot site for the first of the wastewater treatment barges, Larsen said.

The first barge should be up and running by the end of 2017, he estimated.

The company has envisioned four types of barges to fit specific needs. The first, the "Reliever," treats wastewater piped to it from shore and then releases the treated wastewater into the sea according to the environmental guidelines of the given country, Larsen said. The Reliever can replace a medium-sized processing plant and can be particularly beneficial as a backup when an onshore facility is under repair.

The second barge is the "Changemaker," a more permanent installation that delivers treated wastewater back to shore for use in either agriculture or for drinking purposes when treated to a tertiary level. The Changemaker, Larsen said, is suitable when land area is limited for such treatment facilities onshore.

On this ship, biogas extracted from the wastewater treatment can be used to power about 25 to 40 percent of the process, he explained.

The "Water Factory," meanwhile, is a smaller floating unit that can produce drinking water from river water and is particularly useful in areas where drinking water is scarce, Larsen said.

The fourth unit, thus far, is the "Emergency Relief Vessel," which can convert seawater into potable water in areas hit by catastrophe and are in dire need of drinking water.

While EnviroNor has designed the floating mechanisms in which to house these processes, Israeli expertise in desalination and wastewater treatment technologies could help see the project to fruition.

"My purpose here is to see if we can have a collaboration between Norway and Israel, to have access to the best water technologies in the world," Larsen said. "If we can do that jointly, nothing will be better."

The EnviroNor project has been listed by the Norwegian DNV GL environmental infrastructure classification society as an "extraordinary innovation project," and also is receiving support from Innovasjon Norge – the Norwegian government's development instrument for Norwegian enterprises and innovations.

"Norwegian firm seeks Israeli partnership in wastewater treatment, desalination barges", 04/03/2015, online at: http://www.jpost.com/Israel-News/New-Tech/Norwegian-firm-seeks-Israeli-partnership-in-wastewater-treatment-desalination-barges-392921

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❖ Jordan opposition party slams water deal with Israel

AMMONNEWS - The Islamic Action Front (IAF), Jordan's main opposition party, on Sunday slammed a deal signed between the country and Israel to build a pipeline to link the Red Sea with the shrinking Dead Sea and combat regional water shortages.

The IAF, a political front for the Muslim Brotherhood in Jordan, criticized the agreement with what it called the "Zionist enemy," saying it links the "strategic interests [of the two countries] with regards to energy and water."

The official Petra news agency on Thursday said that the agreement signed in the Jordanian capital, Amman, would set in motion the implementation of the first phase of a long-awaited project.

It follows a letter of intent signed in Washington in December 2013 by representatives from Israel, Jordan and the Palestinian Authority that capped more than a decade of negotiations.

The agreement, signed in the presence of representatives from the United States and the World Bank, stipulates the construction of a canal to channel water from the Red Sea to the Dead Sea.

Jordanian Water Minister Hazem Nasser said that 300 million cubic meters of water would be pumped annually from the Red Sea during the first phase of the project.

In all four pipelines would be built, with the ambition of eventually pumping two billion cubic meters of water when the project is completed.

The Dead Sea, the lowest and saltiest body of water in the world, is on course to dry out by 2050.

The degradation of the Dead Sea started in the 1960s when Israel, Jordan and Syria began to divert water from the Jordan River, the Dead Sea's main supplier.

As part of the project, some of the water pumped from the Red Sea would enter the Dead Sea while

the rest would be desalinated and shared with Israel and the Palestinian Authority.

The Palestinians are expected to obtain 30 million cubic meters of potable water annually thanks to the project.

Nasser said Jordan will start drawing up documents in the next few weeks calling for international tenders.

He said the deal, signed for Israel by Energy and Water Resources Minister Silvan Shalom, safeguards Jordan's national interests.

Shalom, who is also minister of regional cooperation, hailed the agreement as a landmark deal between Israel and Jordan, which signed a peace treaty in 1994.

He said the deal will help rehabilitate the Dead Sea and provide solutions to Jordan's chronic water problems, a statement said.

Two years ago, Jordan's water ministry said that the tiny kingdom, where 92 percent of the land is desert, would need 1.6 billion cubic meters of water a year to meet its requirements by 2015.

Water is an essential and rare resource for Jordan which has a population of around seven million and growing, as the country takes in refugees from the Syria war.

However, several environmental groups have warned that the project could undermine the fragile ecosystem of the Dead Sea, which they fear could be contaminated by water from the Red Sea.

"Jordan opposition party slams water deal with Israel", 02/03/2015, online at: http://en.ammonnews.net/article.aspx?articleno=28091#.VP2gSvmsVz8

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❖ Sudan, Egypt, Ethiopia reach basis of Nile water deal

Sudanese FM says full agreement has been reached between three countries on principles of use of eastern Nile Basin, Ethiopian Renaissance Dam.

KHARTOUM - The foreign ministers of Sudan, Egypt and Ethiopia said early on Friday they had reached the basis of an agreement on the sharing of Nile waters and Ethiopia's Grand Renaissance Dam.

"A full agreement has been reached between our three countries on the principles of the use of the eastern Nile Basin and the Ethiopian Renaissance Dam," Sudanese Foreign Minister Ali Karti told reporters early on Friday morning.

The principles will be submitted to the heads of the three states for approval, Karti said at a press conference.

The talks, which started in Khartoum on Tuesday, focused on the sharing of the Nile river waters between the countries and resolving a dispute over a hydroelectric dam being built by Addis Ababa.

Egypt fears Ethiopia's Grand Renaissance Dam project would diminish its share of the river waters.

In several rounds of talks, Ethiopia has said the project will have no effect on Sudan and Egypt downstream.

Karti hailed the basis as "a new path in the relations of our three countries" but gave no further details of the document.

Egyptian Foreign Minister Sameh Shoukri said the agreed principles marked "the beginning of more cooperation between our three countries".

His Ethiopian counterpart Tedros Adhanom said the deal would open "a new chapter between the three countries".

Egypt has expressed opposition to any project that might disrupt the flow of the Nile.

But the principles agreed upon "answer the concerns" of Egypt and Sudan, Egypt's water resources minister said.

The Blue Nile joins the White Nile at Khartoum to form the Nile, which flows through Sudan and Egypt before emptying into the Mediterranean.

Ethiopia began diverting the Blue Nile in May 2013 to build the 6,000 MW dam which will be Africa's largest when completed in 2017.

Ethiopian officials have said the project to construct the 1,780-metre-long and 145-metre high dam will cost $4.2 billion (3.2 billion euros).

Egypt believes its "historic rights" to the Nile are guaranteed by two treaties from 1929 and 1959 which allow it 87 percent of the Nile's flow.

"Sudan, Egypt, Ethiopia reach basis of Nile water deal", 06/03/2015, online at: http://www.middle-east-online.com/english/?id=70446

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❖ Nile dam talks reach preliminary agreement –minister

(Reuters) - The three main countries that share the Nile River's waters have reached a preliminary agreement on a mechanism for operating the Renaissance Dam, the Egyptian water minister said on Friday.

The planned $4 billion Renaissance Dam will be Africa's biggest dam and aims to provide cheap power for countries as far away as South Africa and Morocco.

The project, being built by Italy's Salini Impregilo SpA , aims to produce 6,000 megawatts of electricity for a power-hungry region.

But it has raised concerns in Egypt, which relies almost exclusively on the Nile River for farming, industry and drinking water for a rapidly growing population.

"The principles that were agreed to are concerned with the systems and mechanism for operating the Renaissance Dam and the mechanism for cooperation on this dam," said Egyptian water minister Hossam Moghazy after talks in Khartoum.

Sudanese foreign minister, Ali Ahmed Karti, said the countries had reached agreement on "principles that govern us on how to benefit from the Eastern Nile Basin and the Renaissance Dam ... the document represents the beginning of a new page in relations between the three countries".

The deal will now be sent to the leaders of the three countries for final approval, he said, at the end of three days of tripartite meetings with the countries' foreign and water ministers.

Ethiopian foreign minister Tadros Adhanom said the principles represented a "new chapter" in relations between the three countries.

The ministers did not elaborate on specific points of the deal.

Cairo is concerned that years of filling the new dam's 74 billion cubic metre reservoir will temporarily cut the river's flow, and that surface water evaporation from the huge new lake will then reduce it permanently.

Moghazy said the name of the consultancy firm that will undertake environmental and water studies on the Dam will be announced on March 9.

"Nile dam talks reach preliminary agreement –minister", 09/03/2015, online at: http://uk.reuters.com/article/2015/03/06/sudan-nile-idUKL5N0W800Y20150306?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=1502903a64-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_c1265b6ed7-1502903a64-250676857

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❖ Why fresh water shortages will cause the next great global crisis

Last week drought in São Paulo was so bad, residents tried drilling through basement floors for groundwater. As reservoirs dry up across the world, a billion people have no access to safe drinking water. Rationing and a battle to control supplies will follow

Water is the driving force of all nature, Leonardo da Vinci claimed. Unfortunately for our planet, supplies are now running dry – at an alarming rate. The world's population continues to soar but that rise in numbers has not been matched by an accompanying increase in supplies of fresh water.

The consequences are proving to be profound. Across the globe, reports reveal huge areas in crisis today as reservoirs and aquifers dry up. More than a billion individuals – one in seven people on the planet – now lack access to safe drinking water.

Last week in the Brazilian city of São Paulo, home to 20 million people, and once known as the City of Drizzle,drought got so bad that residents began drilling through basement floors and car parks to try to reach groundwater. City officials warned last week that rationing of supplies was likely soon. Citizens might have access to water for only two days a week, they added.

In California, officials have revealed that the state has entered its fourth year of drought with January this year becoming the driest since meteorological records began. At the same time, per capita water use has continued to rise.

In the Middle East, swaths of countryside have been reduced to desert because of overuse of water. Iran is one of the most severely affected. Heavy overconsumption, coupled with poor rainfall, have ravaged its water resources and devastated its agricultural output. Similarly, the United Arab

Emirates is now investing in desalination plants and waste water treatment units because it lacks fresh water. As crown prince General Sheikh Mohammed bin Zayed al-Nahyan admitted: "For us, water is [now] more important than oil."

The global nature of the crisis is underlined in similar reports from other regions. In south Asia, for example, there have been massive losses of groundwater, which has been pumped up with reckless lack of control over the past decade. About 600 million people live on the 2,000km area that extends from eastern Pakistan, across the hot dry plains of northern India and into Bangladesh, and the land is the most intensely irrigated in the world. Up to 75% of farmers rely on pumped groundwater to water their crops and water use is intensifying – at the same time that satellite images shows supplies are shrinking alarmingly.

The nature of the problem is revealed by US Geological Survey figures, which show that the total amount of fresh water on Earth comes to about 2,551,100 cubic miles. Combined into a single droplet, this would produce a sphere with a diameter of about 170 miles. However, 99% of that sphere would be made up of groundwater, much of which is not accessible. By contrast, the total volume from lakes and rivers, humanity's main source of fresh water, produces a sphere that is a mere 35 miles in diameter. That little blue droplet sustains most of the people on Earth – and it is under increasing assault as the planet heats up.

Changing precipitation and melting snow and ice are already altering hydrological systems in many regions. Glaciers continue to shrink worldwide, affecting villages and towns downstream. The result, says the Intergovernmental Panel for Climate Change, is that the fraction of global population experiencing water scarcity is destined to increase throughout the 21st century. More and more, people and nations will have to compete for resources. An international dispute between Egypt and

Ethiopia over the latter's plans to dam the Nile has only recently been resolved. In future, far more serious conflicts are likely to erupt as the planet dries up.Even in high latitudes, the one region on Earth where rainfall is likely to intensify in coming years, climate change will still reduce water quality and pose risks due to a number of factors: rising temperatures; increased levels of sediments, nutrients, and pollutants triggered by heavy rainfall; and disruption of treatment facilities during floods. The world faces a water crisis that will touch every part of the globe, a point that has been stressed by Jean Chrétien, former Canadian prime minister and co-chair of the InterAction Council. "The future political impact of water scarcity may be devastating," he said. "Using water the way we have in the past simply will not sustain humanity in future."

"Why fresh water shortages will cause the next great global crisis", 08/03/2015, online at: http://www.theguardian.com/environment/2015/mar/08/how-water-shortages-lead-food-crises-conflicts

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❖ Water Scarcity Risks Being a Source of Conflict

The depletion of freshwater resources will inevitably lead to tension, conflict and migration among large swathes of the world's population.

Yemen, an impoverished desert country racked by years of conflict, instability and misgovernance, may soon add another dubious distinction to its unfortunate track record: At current rates, it may become the first country in the world to run out of water. With apocalyptic gloom, experts have put 2025 as the date when the country's capital, Sana'a, home to nearly 2 million residents, runs dry. The majority of Yemen's water resources are used for agricultural purposes – a staggering 40% being used to grow *khat*, a mild stimulant chewed by many Yemenis.

Yemen is not alone. Many other countries through geographic ill-fate, climate change or water mismanagement are facing looming water shortages. It is estimated that 1.2 billion people, mostly in arid and semi-arid regions of the Middle East and Africa, live in regions where water is a physical scarcity. The acute lack of water will exacerbate existing problems (poverty, food security, environmental sustainability, socioeconomic and ethnic tensions), sow instability, provide the impetus for mass migration and may eventually lead to armed conflict.

A 2012 report on Global Water Security from the United Sates Director of National Intelligence stated that the demand for water would lead to an increased risk of conflict in the future. The Pacific Institute, which tracks water-related conflicts, reiterated this pessimistic diagnosis when it reported an increase in the number of violent confrontations that have recently occurred over water.

Adapting to water scarcity can be a difficult task that places immense pressure on struggling governments in the developing world. This is why many analysts predict that if conflict does erupt

over water, it is much more likely to be localized intrastate armed conflict rather than traditional interstate one. This is all too true in Yemen, whereresearchers have found that between 70-80% of rural conflicts are the result of water-related disputes.

The future shortage of water has led to Malthusian predictions about the ability of states to combat water shortages. However, without coordinated efforts to tackle the necessary problems, the lack of water can and will lead to destabilization and violent conflict.

Deep Waters

If 71% of the earth's surface is covered by water, why is the globe suddenly facing a water crisis? For one thing, saltwater oceans make up 97.5% of the water on planet Earth. Freshwater accounts for a minuscule 2.5% of this, 68.7% of which is trapped in glaciers. That leaves 30.1% of the world's 2.5% freshwater available for human use.

Population increases, along with the accompanying rise in agricultural production necessary to support the world's 7 billion-plus peoples, have placed an enormous strain on the world's limited resources. Around 70% of global freshwater consumption, and up to 90% in the developing world, is expended on agriculture, while a sizable portion of the remaining water is used to support industrial activity and energy production. The simple fact is that in many places, water consumption has begun to exceed local water recharge. The World Bank estimates that 2.8 billion people, mostly in the developing world, live in areas afflicted by high water stress, where the demand for water surpasses the supply. This figure will continue to rise as the world's population balloons to 9 billion by 2050.

A major study by the Water Resources Group found that by 2030, the global demand for water would be 40% above today's water supply levels. Beyond population growth and its attendant stresses on

local water supplies, one of the largest drivers of water scarcity is global warming. A recently released report on the effects of climate change by the Intergovernmental Panel on Climate Change (IPCC) outlined the drastic consequences climate change will have unless preventative action is taken. Rajendra Pachauri, the chair of the IPCC, was dire in his prognosis: "Nobody on this planet is going to be untouched by the impacts of climate change."

According to the report, environmental degradation and the risk of flooding, which can destroy a season's crop or contaminate clean water supplies, are expected to increase. In coastal areas, rising sea levels may affect the salinity of fresh ground water, making it potentially unusable for practical use. The ready availability of freshwater resources may also be altered as global warming shifts climate and precipitation patterns leading to drought, desertification and subsequent overuse of existing reserves to cover deficits in the water supply. One example is Sudan, whose population, despite sizable oil reserves, remains largely agrarian. Below average rainfall, land degradation and creeping desertification has led to clashes over limited water supplies.

Inexpensive Luxury

If this weren't enough, the World Bank believes that water usage in agriculture will double by 2050. The IPCC estimatesthat crop yields in many at-risk regions will be hard hit as yields of maize, rice and wheat are all expected to decline while demand continues to grow. This, in turn, may lead to a rise in the cost of food and cause serious implications for global food security. The average cost of key staples, like grains and cooking oil, has risen almost continuously over the past decade, reaching a historic peak in August 2012. Price hikes in the cost of water, once an inexpensive luxury, could lead to subsequent increases in the price of basic foodstuffs, creating the potential for widespread conflict and displacement in the developing world.

The expanding industrial sector accounts for 20% of global freshwater withdrawals. Water-intensive industries, like high-tech manufacturing and electric power plants, which account for 39% of freshwater withdrawals in the United States, along with highly irrigated farming and animal hydration, can take a heavy toll on a country's water supply. The lack of sustainable water policies in many of the world's poorest countries has made millions of people vulnerable to the slightest disruption in the water supply. In Yemen, for instance, current water usage is five times what are considered sustainable levels.

This would be less of an issue if environmental management were a higher priority around the world. Poor governments are some of the biggest culprits, but they also lack the necessary financial resources or modern infrastructure to effectively adapt to water shortages. Nonetheless, as the recent water shortage inCalifornia has demonstrated, the developed world will also be forced to adopt new water standards as reserves begin to wane.

The potential for the contamination of freshwater is also a major issue that has been severely mismanaged in the developing world, where 760 million people lack access to clean water and 2.5 billion people live in unsanitary conditions. Unless action is taken, the Pacific Institute estimates that between 34 and 76 million people, mostly children, will die from water-related diseases by 2020. Both Brazil and India have sizable watersheds that provide freshwater, but due to poor infrastructure, a large portion of it is unsanitary and therefore cannot be used.

Water and Malthus

The UN estimates that, considering current water depletion trends, up to 700 million people may be at risk of forced migration due to water scarcity by 2025. The stark reality is that increased water use

due to population growth and climate change means that many of the world's poorest now live in regions that lack the natural resources necessary to physically support them. "Water refugees" make up just one factor among a litany of potential complications associated with future water scarcity.

The most serious threat of violence breaking out over the access to water is expected to occur at the subnational level. Existing international forums and diplomatic negotiations should enable transnational cooperation between states in regards to water-related issues. However, within poorer, weaker states, where the rule of law is limited, the possibility of localized violence over water has continued to grow.

In 2012, over a hundred people were killed in clashes between farmers and cattle herders, triggered by a dispute over local water sources and grazing rights in the Tana River delta region. The nearby Lower Ormo Valley was the site of a similar encounter in 2006, when 40 people died in clashes between pastoralists and farmers. Water was also the catalyst for violence in India between farmers in Tamil Nadu and Karnataka over the rights to the Cauvery River in a long-standing dispute.

Water, once one of the most reliable resources in the world, has become both a valuable weapon and a military objective during armed conflict. During Libya's brief civil war, Muammar Gaddafi's forces shut-off two-thirds of Tripoli's water supplies, leaving almost half the countryshort of water. Rebels in the ongoing Syrian Civil War have targeted the water system as part of their struggle against the regime of Bashar al-Assad.

Additionally, terrorists have begun to use water as a tool to sow fear and strike at their opponents. In 2012, insurgents poisoned a well near a girls' school in Afghanistan in order to punish those

receiving an education. A number of wells were poisoned during the conflict in Darfur as part of a campaign to intimidate local residents.

Despite all these difficulties, Thomas Homer-Dixon, a professor at the Balsillie School of International Affairs, claims the greatest prospect of water-related conflict will not be the result of direct hostilities over water itself, but rather it will provide the catalyst for future conflict. In such instances, environmental problems related to water scarcity will exacerbate other factors such as poverty, starvation, ethnic tension, stunted economic growth and poor governance that will escalate into violent hostilities.

One example is in Jordan, which has the third-lowest reserves of water in the world and is faced with a continuing influx of Syrian refugees to feed and care for, putting a strain on its limited resources and creating the potential for the widespread outbreak of violence.

The most salient point is not how violent encounters over water-related issues will emerge, but that they are becoming increasingly likely. Uncertainty over where conflict may break out remains, but the fact that water is an indispensible resource for human existence creates the potential for hostilities to continue and eventually worsen.

Bridges Over Troubled Waters

Bridges over these troubled waters do exist, but it will be up to the international community to prioritize water security. Shortsighted inaction needs to be replaced by the responsible management of natural resources. Good governance, environmental management, local water conservation and efficient usage of water can all help combat scarcity and reverse exploitation of exhausted local resources. Technical know-how and advanced water system knowledge needs to be disseminated to

the developing world, while sustainable green technologies should be invested in and explored elsewhere.

Freshwater, though often delineated within national boundaries, is still a collective resource that should be distributed equitably among a state's population to ensure that sufficient water supplies reach all groups within a state. It is up to both the international community and local governments to take the necessary steps to combat water scarcity before conflict becomes the norm, rather than a rarity. Water is a key to national wellbeing and a resource vital to meet basic human needs. If steps are not taken, water will intensify existing struggles while providing the catalyst for new conflicts.

"Water Scarcity Risks Being a Source of Conflict", 04/03/2015, online at:
http://www.fairobserver.com/region/middle_east_north_africa/water-scarcity-risks-being-a-source-of-conflict-28740/

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❖ Half of India Is Facing High Water Stress From Over-Usage

(Bloomberg) -- More than half of India is facing high water stress as farmers and industries compete for the resource in the world's second-most populous nation, according to the World Resources Institute.

An analysis of groundwater levels of 4,000 wells across India showed 54 percent fell over the past seven years, with 16 percent declining by more than 1 meter (3.3 feet) a year, Betsy Otto, global director of WRI's water program, said Friday. The region most at risk: the northwest, India's breadbasket.

The northwestern states of Punjab and Haryana, which grow half of India's rice and 85 percent of its wheat, are among the most water-stressed, according to WRI. India's already lost groundwater equal to more than twice the capacity of Lake Mead, the biggest U.S. reservoir, as overuse combined with a lack of replenishment shrank supplies, a NASA study has shown.

Otto spoke in New Delhi at the introduction of an online water tool built by WRI with help from Indian companies and the World Council for Sustainable Business Development that allows users to understand the quality and quantity of ground and surface water across India, Asia's third-biggest economy.

It shows almost 600 million people in India may have to counter supply disruptions as surface water from rivers and lakes declines, and that at least 100 million live in areas of poor water quality. India draws 55 cubic miles of groundwater a year, more than a quarter of the global total, according to World Bank data. Agriculture uses the most, growing about 70 percent of India's grains with it, followed by industry.

WRI's tool compiles data from various Indian government departments including the Central Ground Water Board, the India Meteorological Department and Columbia Water Center to help companies measure water risk at their locations.

A day earlier, India said it's spent 59 billion rupees ($956 million) on sewage and waste treatment to begin cleaning its threatened waterway, the Ganges River. And the Indian government, operator of the world's fourth-biggest railway network, announced plans to build more rainwater harvesting tanks and water-vending machines at stations to boost supplies.

(The initial story was corrected in 2nd paragraph to levels in 54 percent of wells fell instead of a 54 percent fall.)

"Half of India Is Facing High Water Stress From Over-Usage", 27/02/2015, online at: http://www.bloomberg.com/news/articles/2015-02-27/54-of-india-is-facing-high-water-stress-from-over-usage?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=06eb7bc70a-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_c1265b6ed7-06eb7bc70a-250676857

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❖ Windhoek faces water crisis

Windhoek - The residents of the Namibian capital Windhoek have been urged to save at least ten percent of their water due to a poor rainy season and low dam levels, the municipality announced on Wednesday.

"The level of the three dams supplying the central areas with water are very low, rating between 1.2 and 36%, and dams will run dry by the middle of 2016, if rainfalls remain poor," said municipal spokesperson Joshua Amukugo.

"We appeal to all residents of Windhoek to save at least ten percent water at all times, whether at home, at schools or at offices. We are facing a critical stage that could turn disastrous if not handled with caution."

The municipal boreholes and its water reclamation plant supply about 35% of water requirements.

"However the boreholes and the reclamation plant cannot sustain Windhoek without the additional 65% of water supplied by the [State] utility NamWater. If the dams do not receive sufficient inflows, severe restrictions need to be enforced," Amukugo cautioned.

Rains in central Namibia are usually received between October to April, but rainfalls have been below average this season.

"We still hope that more rain will fall until the end of April to replenish dam levels," said Amukugo.

Windhoek has approximately 350 000 residents but faces service delivery challenges due to the growth of informal settlements at the outskirts of the city.

According to the municipality, approximately 500 to 600 people move to Windhoek every month and erect shacks and then require sanitation, running water and electricity supply.

"Windhoek faces water crisis",04/03/2015, online at: http://www.news24.com/Africa/News/Windhoek-faces-water-crisis-20150304?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=1502903a64-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_c1265b6ed7-1502903a64-250676857

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❖ Along fouled Ganga, fresh resolve to make the river clean

Mahesh Chander Mehta, acclaimed by his peers as the dean of India's tiny environmental bar, practices law from an airy office on the fourth floor of a dimly lit building in south Delhi.

Even late in the year, it is still warm enough in India's capital to keep the windows open. On the street, taxis and natural gas-fueled tuk-tuks clamour for space in the square by the Opp Mool Chand Metro Station. A poster of the Taj Mahal drapes the wall of a tobacco shop across the street. The view is unobstructed by the smokestacks and huge chemical storage tanks that once populated the banks of the Yamuna River, a tributary of the river Ganga that is close by.

The autorickshaws, the Taj Mahal, and the riverbanks cleared of dangerous industrial facilities have professional standing in MC Mehta's office. They are wound into the legal work of an exceptional career that, among other successes, forced a fuel switch for India's public transport vehicles from leaded gasoline to cleaner compressed natural gas. His 1985 case in the Supreme Court removed toxic industries from the Yamuna. Another case, finished in the 1990s, saved the Taj Mahal's luminous white marble from acid rain.

With each case, and there are hundreds, Mehta also pushed sympathetic jurists and the nation's highest courts to become India's only institutions truly dedicated to enforcing environmental and public health statutes. "We have laws in India to protect our people, and our land and water," said Mehta in an interview. "I was one of the first to use them in the Supreme Court."

The open window, though, also carries the unmistakable scent of unfinished business – the smell of raw sewage from the Yamuna, one of the Ganga's largest tributaries, which receives the stinking tide of untreated toilet and manufacturing wastes from New Delhi's 25 million residents.

Ganga pollution case still open

In 1985, Mehta brought a suit in the Supreme Court to clean up the Ganga, the Mother River of India, and its tributaries. Despite a long series of court orders to close polluting factories and build wastewater treatment plants, too many directives were ignored by state and national authorities.

University and government water quality measurements show that the river is more foul, dangerous, and dirty than ever.

Reports by international organisations reach a similar conclusion. The Ganga, stretching 2,525 kilometres from the Himalayas in northern India to the Bay of Bengal in the east, is one of the planet's most polluted rivers.

Yet as 2014 came to a close the celebrated lawyer, now 68-years-old, was more encouraged about the prospects for India's holiest river. "The river is not dead," he said. "It needs our help. India may be ready now to clean the Ganga."

There are tangible political, regulatory, and legal clues that lead to Mehta's wary optimism. In May, and again in August, India's new prime minister, Narendra Modi, appeared on the banks of the Ganga in Varanasi and promised to clean up the river. "When I see the pitiable condition of the Ganga, I feel pained," Modi said in May. "But I feel it is Maa Ganga who has decided I have to do something for her. The need of the hour is to restore the glory of the Ganga. Today Maa Ganga is calling us, her children, to make the river clean once again."

The prime minister appointed a top lieutenant, Uma Bharti, as Minister for Water Resources and renamed the department the Ministry of Water Resources, River Development and Ganga Rejuvenation. In late September, the Modi government committed Rs 510 billion rupees ($US 8.1 billion) in the next five years to stop discharges of untreated sewage and wastewater from 118 of the 222 towns and cities along the river.

In early December, in a second vital step, the Modi government indicated it was prepared to make permanent an indefinite halt in hydropower construction in Uttarakhand. The decision would safeguard water quality and water supply in the three fast-flowing Himalayan rivers that merge to form the Ganga.

Nineteen months ago, a vicious flood along those same rivers in Uttarakhand killed an estimated 30,000 people and wrecked the state's hydropower industry. A special study commission, ordered into existence by the Supreme Court, issued in April 2014 a report on the causes of the flood. The report recommended shutting down 23 proposed hydropower projects and curtailing construction at

others.

In an affidavit filed with the Supreme Court last month, BB Barman, the director of the Ministry of Environment, Forests, and Climate Change, said his agency would abide by the recommendations. "A cradle of civilization, it is a life support system for about half-a-billion people who live in its basin today," Barman said. "Acknowledging these values of the National River Ganga, the government has accorded the highest priority to rejuvenating it. All along her path anthropogenic interventions have overburdened the flow of the river. The restoration of an aviral and nirmal dhara [clean and continuous flow] of the Ganga has thus become essential immediate steps."

Between May and December, in the third and arguably the most important step to clean the Ganga, a three-judge panel of the Supreme Court in October transferred part of the decades-old Ganga pollution case, the sections dealing with industrial contamination, to the National Green Tribunal, its dogged sister court.

The NGT, established in 2010 and one of the three national courts in the world exclusively deciding environmental cases, has earned a reputation for judicial courage and clear rulings to stem industrial pollution.

In 2013, the NGT shut down the nation's sand mines until they complied with sound mining practices and water quality statutes. In 2014, the Tribunal shut down the $675 million coal mining sector in Meghalaya, because of rampant water pollution and mining practices lethal to young miners. It was the first time a state-level fossil fuel industry anywhere in the world had ever been shut for environmental safety reasons.

In handing over a sizeable portion of the Ganga pollution case to NGT, the High Court said it looked to its colleagues to exert the same level of aggressive jurisprudence: to compel industries to stem the tide of chemical and biological pollutants into the Ganga, and to fine and jail executives who were slow to comply.

"We are confident that the tribunal, which has several experts as its members and the advantage of assistance from agencies from outside, will spare no efforts to effectively address all the questions arising out of industrial effluents being discharged into the river," said the Supreme Court panel in its order.

Corruption, inaction spoil decades of work

Make no mistake. Cleaning the River Ganga will take all of India's skill.

In 1947, the year it became independent from Great Britain, India was a nation of 344 million residents. The Ganga and its tributaries drain parts of 11 Indian states. The five states along its main stem – Uttarakhand, Uttar Pradesh, Jharkhand, Bihar, and West Bengal – were home to 120 million people.

Today the Ganga and its tributaries support 500 million people, or 40% of India's 1.27 billion people. Ninety percent of the basin's waters are used in agriculture, according to government reports. More than 50,000 big and small factories use the river for draining their wastes, much of it untreated.

In his court appearances 30 years ago, MC Mehta argued that the river's condition was not only a violation of India's nascent modern water quality statute, it was unconstitutional. Article 21 in India's 1949 constitution assured "the protection of life", which the court interpreted as the "right to a healthy life".

A succession of court orders designed to change national priorities followed:

*On September 9, 1985, industries located on the banks of river Ganga in urban areas were put on notice to stop discharging untreated effluents from their factories.

*On September 22, 1987, 20 tanneries that were working on the banks of Ganga and discharging effluents into the river were shut.

*On December 1, 1988, Ganga Basin municipalities were ordered to set up sewage treatment plants.

*On April 8, 1992, the State Pollution Control Boards of three Ganga River states were ordered to identify the industries discharging effluents and to submit a report.

*On July 23, 1993, a select group of plants were shut down. Others were warned that the same fate awaited them unless they took pollution-control measures.

The river, though, got dirtier. One reason was corruption. An Auditor General report found numerous instances of what it called "unauthorized activities" and financial mismanagement including one state pollution control board member "parking" Rs 10 million "in his own account".

Another reason is that industries and cities ignored the High Court's orders. National and state pollution control authorities took few actions to enforce them.

"We regret to say that the intervention and sustained efforts made by us over the past 30 years notwithstanding, no fruitful result has been achieved so far except the shutting down of some of the polluting units," wrote three justices of the Supreme Court in the October 29, 2014, order transferring the Ganga case to the National Green Tribunal.

"This is largely because while orders have been passed by us their implementation remains in the hands of statutory authorities, which have done practically nothing to effectuate those orders or to take independent steps that would prevent pollution in the river."

Can the Ganga be cleaned?

Like the Jordan, the Nile, and the Yangtze, the Ganga's waters sustain India's religious faith, influence its culture, and mark its history. Millions of Hindu pilgrims gather for prayers along its banks at dawn and dusk, bathe in its filthy water, and cremate the dead in the red flames of hot pyres.

The river's degradation is more than an insult to national pride. Fecal coliform contamination, and chemical pollution from chromium, mercury, lead, and all manner of chlorinated compounds cause disease and death, according to Indian health agencies.

India hasn't ignored the river's condition. It just has not been capable of summoning the collective national energy to clear the Ganga's waters. Prime Minister Rajiv Gandhi tried in 1986, months after MC Mehta filed his pollution case, by forming the Ganga Action Plan.

More than Rs 500 billion were spent over 14 years to build 83 sewage transport networks and treatment plants, according to government figures. Most weren't large enough or sturdy enough to operate well. They were meant to treat under one billion liters (264 million gallons) of the estimated 8.25 billion liters (2 billion gallons) of wastewater that the Ganga's towns poured into the river daily, according to Central Pollution Board reports.

Newer Ganga cleanup campaigns – the Ganga River Basin Management Plan and the National Mission for Clean Ganga – have so far proved equally ineffective.

Taken as a whole, though, the biggest obstacle for the Ganga cleanup is not the money, tools, and practices, though those are critically significant. Instead, it is whether India has the national spirit and the capacity to summon decades of focused investment and management to ensure that by mid-century Indians can swim, fish, and drink safely from the mother river.

India degraded

The Ganga's condition is emblematic of the decades of resource exploitation – and insufficient water and energy infrastructure investment – that have left India's cities and countryside in dismal condition.

Over 80% of the nation's rivers are badly polluted, according to national reports. The air in India's cities, according to the World Health Organization, is among the dirtiest and most dangerous on the planet. Litter carpets roadsides and fields. Piles of garbage stink up India's grimy cities. Running water and electricity are not available for a third of the country's 1.27 billion people. Open defecation is practiced by millions of men, women, and children who don't have access to latrines or toilets.

The astonishing state of India's deterioration is gut-wrenching proof that the country's environmental security system is not working.

For years, India's environment and economy have suffered the twin and destructive insults of conflicted management. On the one hand, it takes years for companies to gain air, water, and land permits, what India calls "clearance," from state and national regulators. The system, initially intended to foster careful review, has become a perfect generator of payoffs and bribes at every step of the process, according to the November findings of the High Level Commission, a panel charged by the Modi government to suggest regulatory improvements.

"The lasting impression has remained that the Acts and the appurtenant legal instruments have really served only the purpose of a venal administration, at the Centre and the States, to meet rent-seeking propensity at all levels," said the authors of the report. "This impression has been further strengthened by waves of large scale 'clearances', coupled with major delays in approvals in individual cases. It should also be added that our businessmen and entrepreneurs are not all imbued in the principles of rectitude – most are not reluctant, indeed actively seek short-cuts, and are happy to collaboratively pay a 'price' to get their projects going; in many instances, arbitrariness means that those who don't fall in line have to stay out."

On the other hand, once clearances are issued, enforcement of the nation's environment and health statutes is spotty at best, and more often does not exist at all. Plant managers that pour raw wastes into India's water, or blacken the air, are generally left alone. Just about the only laws India's resource authorities take seriously are those protecting wild animals. Truckers convicted of transporting an improperly chained or poorly fed elephant, for instance, typically face huge fines and long jail sentences.

Though India has spent decades clawing at its landscape for coal, building power plants, installing big hydropower projects in the Himalaya, draining groundwater for endemic grain surpluses, building airports, and encouraging industries of every kind, the country's development is sliding backwards. Economic growth has slipped to 5% a year, half of the annual rate from the first decade of the century. With four times as many people, India's $US 2.1 trillion economy is little more than a tenth the size of the American economy. Electricity is in short supply and business-damaging brownouts and blackouts are daily, even hourly events in much of the country.

Prime Minister Modi has made it clear he understands that India's economic weakness is tied to the nation's ravaged ecology. Among his first national initiatives was Swachh Bharat, the "Clean India" campaign, to clear messes from India's streets and countryside. The Swachh Bharat campaign may evolve into a national air and water cleanup program, said Indian business executives.

Modi's reputation as an economic development specialist interested in sustainable goals was made as chief minister of Gujarat, an industrial state that built a portion of its relative prosperity with a sizable solar energy industry. In several speeches in 2014, Modi tried to assure his nation of the value of environmental and economic lessens learned decades ago in the United States and the West. Economic strength is closely tied to a clean environment. "In so far as the context of environment is concerned, the rich Indian tradition clearly stipulates that environment is a natural wealth," Modi told reporters while visiting the US Congress in September. "No one has the right to exploit it to his advantage. I think if India and the U.S. spread this message together to the whole world, it would be an ideal option to conserve the natural wealth and protect our environment."

A change in priorities

It took five European nations decades and $50 billion to clean up the Rhine River. India and the 11 states in the Ganga drainage basin say they are prepared to invest in a national cleanup. The decisions and announcements of the last few months – the prime minister's promise, the Environment Ministry's hydropower decisions in Uttarakhand, the transfer of responsibilities to the National Green Tribunal – appear to be shifting the nation's attention to a more rational strategy of building economic strength by securing a premier natural resource.

The shift comes amid a ground-breaking and disputed assessment by the Modi government of the administration of environmental laws in India's economic development. That assessment, by a High Level Commission appointed by the Modi government, was completed in November and is under review by the Ministry of Environment, Forests, and Climate Change. The report could lead to new permitting agencies and a restructuring of regulatory authority.

The commission's report proposes to fix India's broken environmental management program by making a fundamental trade in regulatory principles. In exchange for hastening government review of

big resource-threatening projects – mines, power plants, transmission lines, highways, big industrial plants –the commission called for India to establish a credible regulatory regime that enforces environmental law and actively investigates and penalizes violations.

The active steps proposed by the commission are two-fold. The first is to exempt some big project proposals from the citizen involvement and public hearing process required by India's environmental impact assessment rules. The second is to replace the politically appointed and mostly corrupt national and state Pollution Control Boards, which review and issue permits, with professionally-staffed National and State Environmental Management Agencies. The new agencies would be politically independent, review permit applications with contemporary scientific standards, and issue decisions.

Such a trade in principles and operations also requires a big shift in India's cultural values, which do not hold enforcement of environmental rules in high regard. Environmental group leaders worry that weakening citizen involvement and public oversight provisions in the law invites more abuses. Industrial executives wonder how replacing the mostly corrupt state pollution control boards with more aggressive national and state environmental management agencies will affect their operations.

Role of the NGT

Four national government institutions are now sworn to the Ganga cleanup – the prime minister's office, the Ministry of Environment, Forests, and Climate Change, the Supreme Court, and the National Green Tribunal.

Arguably the most important is the tribunal. Thirteen days before the High Court transferred the industrial portions of the Ganga case, the NGT was already at work making its presence felt along the Ganga. Acting on a petition filed by a citizen advocate and a public interest non-profit group, the tribunal fined Simbhaoli Sugar Mill and Distillery in Uttar Pradesh Rs 50 million rupees for repeatedly discharging pollutants into the Ganga, and for violations of water quality statutes.

The tribunal also fined the Gopalji Dairy Rs 2.5 million for similar violations, which were damaging habitat for turtles and rare freshwater Ganga river dolphins.

Behind the stiff penalties, however, runs a current of unease. Ever since Prime Minister Modi was elected, the leaders of the country's environmental non-profits have worried that their pro-development leader was determined to weaken the National Green Tribunal's authority.

But Ritwick Dutta, a prominent environmental lawyer in New Delhi, said he did not expect the Modi government to meddle with the NGT. "He needs a strong court to do what is needed on the Ganga," Dutta said. Prakash Javadekar, the former national spokesperson for the Bharatiya Janata Party, and the Minister of Environment, Forests, and Climate change, said as much in responding to questions in November from Parliament about the influence of the Tribunal. Javadekar said neither he nor the prime minister would change the NGT's role or authority.

On October 19, in ceremonies honoring the NGT's fourth anniversary, Javadekar and Swatanter Kumar, the NGT's chief judge and chairperson, assured the gathered audience that the Tribunal's work was focused on pinning liability on polluters, settling disputes as a path to setting better environmental standards, and limiting pollution.

When his turn to speak came, Javadekar stressed the excellence of the Tribunal in executing its mission and the importance of ensuring compliance with the law as the pillar of India's governance. "We exist in an accountable system. Environment protection cannot be achieved by shutting off. We need clarity of rules and legal positions and compliance. So we tell violaters, rectify. If not, then punishment. If that fails, then close," Javadekar said. "In four years, the NGT is not just a building, it is an institution, and institutions are needed to create a system that works."

On the Ganga, that system is being tested like never before.

"There is no gainsaying that river Ganga has for the people of this country great significance not only in the spiritual or mythological sense but also in material terms for it sustains millions who are settled on its bank or eke out their living by tilling lands that are fertilized by its water," three justices of the

Supreme Court wrote in the October 29, 2014, order transferring a portion of the Ganga case to the National Green Tribunal. "Despite the experience of the past we have not lost hope, for the Central Government appears to be resolute in its efforts to ensure that the mission of cleaning the holy river is carried forward and accomplished. How far will the Government's renewed zeal make any difference on the ground is for anyone to guess. What is, however, clear is that if the mission has to succeed, all those concerned will have to rededicate themselves to the accomplishment of the cause that will not only cleanse the holy river but comfort millions of souls that are distressed by the fetid in what is believed to be so holy and pure that a dip in its water cleanses all sins."

The lights of store fronts switched on in India's capital and the clamor of the streets grew more intense when MC Mehta, the renowned lawyer, summed up the challenge this way: "We've been involved in this case for 30 years," he said. "I hope it takes less time than that to finish the work."

"Along fouled Ganga, fresh resolve to make the river clean again", 07/03/2015, online at: http://scroll.in/article/710749/Along-fouled-Ganga,-fresh-resolve-to-make-the-river-clean-again

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❖ Thames Water trials £3.2M aquifer storage scheme in Kent

ASR, more commonly used in desert regions of the Middle East and America, allows an aquifer to be used as an underground reservoir, where drinking water can be stored and then extracted again in times of water shortage. The £3.2M operational scale trial at Horton Kirby, the most advanced scheme of its type in the UK, involves a 250m deep borehole into the Lower Greensand Aquifer where water can be stored in an underground 'bubble'.

Thames Water groundwater experts began investigating ASR over 10 years ago, and testing work carried out since 2005 had identified Lower Greensand as the most suitable aquifer. Aquifers already provide 30% of London's tap water, with the chalk aquifer at Horton Kirby being used to supply parts of Kent, but this is the first time that aquifers are being put to use for storage purposes.

Drilling began on the new borehole at Horton Kirby in September 2014, and was finished in January. By repeatedly putting water into the aquifer, allowing it to rest then recovering it by pumping it back out, the aquifer is "cleaned". This process, combined with the suitable make-up of the Lower Greensand aquifer, enables a bubble of good quality water to be stored, as only the edge of the bubble mixes with existing water in the ground. The next challenge for the Thames Water team is to be able to store a greater volume of water without it seeping away.

When in use, the ASR scheme will take ready-to-drink water from a mains water pipe and then store it in the aquifer. When the water is needed it will be taken back out and disinfected before going back into the public water supply. The water will not have to go through a complex treatment process as the water within the bubble is stored securely and does not mix with the natural, poorer quality groundwater in the Lower Greensand aquifer.

Groundwater resources manager at Thames Water, and UK Groundwater Forum member Dr Mike Jones said: "This is an exciting time for water resource development in the UK. Aquifers are a vast reserve of water storage space. In the Thames Water area there is 10 times more storage space in shallow aquifers than in the raw water storage reservoirs we've built at the surface; there is even more storage in the deeper aquifers like this one, so we need to make use of it."

"Aquifer storage isn't the magical answer to the south-east's water stress, as not all aquifers are suitable for this type of project - but it's a great start and I'm confident this work will help us understand how we can best use our natural aquifer resources in the future, especially to help combat the effects of climate change."

Ed Uden, Groundwater Team Leader at the Environment Agency, said: "This scheme is also good news for the River Darent, a chalk stream flowing through Horton Kirby and other villages in Kent. Instead of water being taken from the environment in the summer, which can cause the river flow to be reduced, the ASR scheme will allow up to 5 million litres per day to be taken from the water stored underground and put into drinking water supply, protecting the river.

"Thames Water, the Environment Agency and the Darent River Preservation Society (DRiPS) are all keen for this to happen, to ensure that water resources can be developed sustainably to meet demand and protect the environment."

Alan Williams, chairman of the Darent River Preservation Society, added: "We have monitored this project since its inception at the Horton Kirby site. Our site visit in December 2014 to the ASR 3 site demonstrated to us the progress that has been made. It certainly shows how clean water can be stored in times of plenty.

"DRiPS will continue to support the use of ASR for it is good for the river, the valley and the consumers. We realise that it is not a complete solution but it is a step in the right direction."

"Thames Water trials £3.2M aquifer storage scheme in Kent", 05/03/2015, online at:
http://wwtonline.edie.net/news/thames-water-trials-3-2m-aquifer-storage-scheme-in-kent#.VP2ls_msVz8

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❖ Will California De-Salt the Pacific to Alleviate Its Drought?

A few special conditions might make expensive desalination plants worth the price.

As California enters its fourth year of drought, several cities are considering a drastic solution: Huntington Beach, Monterey, and others are thinking about building desalination plants to turn the Pacific Ocean into potable water, the *Los Angeles Times* reports.

Getting water from the ocean may seem like an obvious idea, but nature and physics drive a hard bargain here. Desalination always requires lots of energy, which is hard on the environment, if the plant runs on fossil fuels. Burning up all that electricity is also expensive, making plants politically unpopular. The city of Santa Barbara, California, estimates its plant will raise water bills by 38 percent for the average household, the *Los Angeles Times* reports. Back in 2011, when Victoria, Australia, was building its desalination plant, the state's premier called it "a very expensive white elephant."

Still, certain conditions—including desperation—help citizens accept desalination plants. Researchers have pinpointed these conditions by studying places where desalination is popular. A look at those regions offers some hints about how likely California will be to follow suit.

If water is contested in regions where states fight a lot about water rights, desalination can be a popular and peaceful solution. That's in part because people see lake and river water differently from the way they see desalinated water. States are more likely to feel that rivers or lakes "belong" to them, so they resist sending freshwater from within their borders elsewhere, University of Manchester geographer Erik Swyngedouw argues in a review he wrote for the *Annals of the Association of American Geographers*. When Spain—home to eight of the world's top 20 desalination companies—was considering sending Ebro River water to more arid areas, a million people took to the streets to protest.

People see lake and river water differently from the way they see desalinated water.

Another region where desalination is popular? The Middle East. Before Israel and Jordan began desalinating water from the Mediterranean and Dead Seas, they fought intensely over water from the Jordan River and local aquifers. Desalination made water less of a zero-sum game, according to researchers from Israel's University of Haifa. By analyzing governmental meeting minutes, the researchers saw a shift in how officials talked about water after desalination projects went up. Politicians stopped talking about water "rights" and started treating water like any other commercial good that they could buy and sell. It was also easier for officials to price water because they could tally up the cost of running a plant. The intrinsic value of river or aquifer water is more debatable.

Just last week, Jordan and Israel signed an agreement to build a plant that will desalinate water that Israelis and Palestinians will share.

If people are worried about global warming, that also gives desalination a push. In many regions around the world, climate change will make rainfall patterns more volatile and droughts more extreme. But the sea will always be a steady source of water.

The global-warming argument is popular in Spain, Swyngedouw writes in his review:

Projections indicate a decrease of precipitation in the already highly water-stressed southern regions of up to 40 percent by midcentury compared to average 1961–1990 levels (Martín Barajas 2010). The overall predicted effect on reservoir water availability is estimated to be around –5 percent to –7 percent.

On the basis of such compelling data, a consensus has emerged among water business leaders, elite institutions, and some environmentalists that the twin forces of climate change and demographic expansion point to desalination as potential sociotechnical fix.

Of course, at some point, regions may just need water so badly that de-salting the sea seems worth it, outside of any other benefits. There's a reason desalination is so widely accepted in Israel, which makes about 20 percent of its water from the sea. The country is chronically in need of water. Compared to the United States,Israel naturally produces 100 times less renewable fresh water per capita.

Controversial water politics, global warming worries, and desperation—which of these conditions apply to California?

Although water rights are controversial throughout the American West, it's hard to imagine them rising to the level of Jordanian-Israeli relations.

One recent survey found that the majority of Californians are worried about climate change, but doesn't say whether folks correlate the issue to water availability. An environmentally friendly mentality is not necessarily compatible with desalination, either. Environmentalists often protest desalination projects because they dump super-salty water back into the ocean, which can be disruptive to marine life.

Is the drought in California bad enough to force people to accept pricey de-salted water out of desperation? Again, it's hard to imagine that anywhere in the U.S. will become as water-stressed as the Middle East. Perhaps Californians will get a little more thirsty if the drought continues, however. For now, the National Weather Service predicts the drought will either persist or intensify throughout the spring.

"Will California De-Salt the Pacific to Alleviate Its Drought?", 05/03/2015, online at: http://www.psmag.com/politics-and-law/politics-of-de-salting-the-sea

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