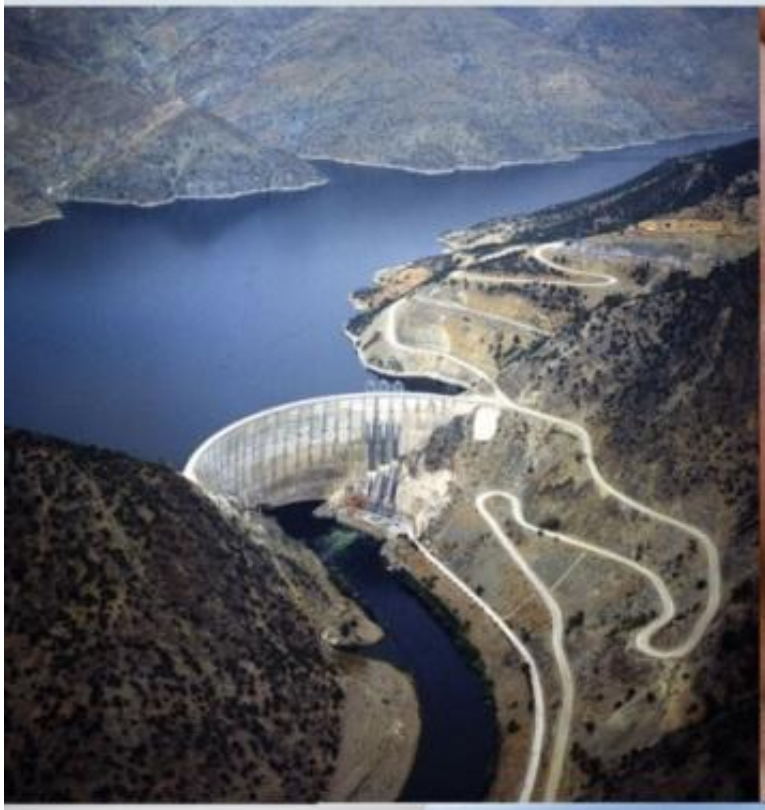


ORSAM WATER BULLETIN

Weekly Bulletin by ORSAM Water Research Programme

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





Issue 164

ORSAM WATER BULLETIN

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❖ Istanbul staring at water crisis

Turkey's largest and most well known city of Istanbul is confronted with a serious threat of drought with water reserve now being sufficient for only 100 days due to lack of rain and snow, a senior water expert has revealed.

"Having only 100 days of water reserve means that very tight measures should be taken,"Xinhua quoted Tugba Maden, a water expert in the Center for Middle Eastern Strategic Studies, as telling over phone.

With a population of 14 million, Istanbul tries to obtain the city's needs of water from 10 dams built in the Marmara and the Black Sea regions. Water levels in these dams have been decreased to the lowest point in six years with 35 percent in total. Three dams have already run short of water.

Istanbul's dams have capacity of holding 868 million cubic metres of water. Currently the water reserve is around 300 million cubic metres. Most seriously, the Melen streamlet has reduced its water reserve to 35 per cent of the total, sending the alarm signals.

Melen streamlet, located in the Black Sea province of Sakarya, provides Istanbul with 676,000 cubic metres of water a day via Omerli dam.

If the condition deteriorates, the authorities should begin transporting water to Istanbul from different water basins, said Maden.

Turkey's Forestry and Water Minister Veysel Eroglu tried to calm down the public, saying: "It is true that drought threats Istanbul in 2014. But we are taking all the necessary preconditions."

"We will build a new dam in Melen, which will bring a release to Istanbul people."

The minister also announced that two other giant dams would be built in Agva, 100 km from Istanbul at the Black Sea coast.

The concerns related with the water shortage is not only limited with Istanbul. Experts foresee serious threat of drought in overall Turkey in general.

"Istanbul staring at water crisis", 23/01/2014, online at: http://www.business-standard.com/article/news-ians/istanbul-staring-at-water-crisis-114012300687_1.html

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❖ Alternatives to praying for rain

Turkey is waiting for rain to fall. Not only because rainy weather is enjoyable, but our dams are near empty at 25 percent of the total capacity. If the situation doesn't change, we will have water shortages in almost all of our cities very soon. There is no real danger of draught on the horizon, so food safety is not a big concern yet. However, I suspect it will also be a major problem soon if things don't change, because we don't have a clear strategy for water and food safety. We were told everything was under control many times by the authorities, but the latest comment from the Minister of Food, Agriculture and Livestock revealed the truth. Minister Mehdi Eker said there is a big risk of water shortages and even draught. He added "he is worried and we must all pray for things to get better."

As a citizen, I am very displeased with the solution that a minister is providing: Praying. I believe we don't need a minister to tell us to pray for rain. I don't understand how he doesn't resign after revealing praying is the only thing to do in times of not having enough rain in the year 2013, thousands of years after mankind first discovered irrigation. The first irrigation system goes back to 3000 BCE if not earlier.

Therefore, I would like to suggest some alternatives and things to do for our esteemed minister, because just praying for rain is so 4000 BCE.

According to IBM, up to 50 percent of the world's water disappears from aging, leaky pipes, costing about US$14 billion every year.

There is a current project in Spain. Cáceres will use a single software platform that integrates several technologies, including remote meter readers, Geographic Information Systems, remote control information, a large number of water quality monitoring sensors and the mathematical model for predicting the behavior of the supply system. These, in turn, will enable the firm ACCIONA Agua to develop an advanced business management strategy for the Cáceres drinking water network. The applied technologies will allow ACCIONA Agua to detect faults, jams or leaks as they happen, reducing the time required to locate and repair them. Until now, leaks could only be detected using

conventional listening scans. This will enable the city to save immense amounts of water.

Smarter water management solutions exist for cities, businesses and utilities. Sensors placed throughout the infrastructure and natural waterways feed data to analytics-driven technologies, enabling real-time tracking and reporting conditions.

Smart solutions include the Intelligent Operations for Water component, which provides extensive visibility and situational awareness spanning water and wastewater operations. This helps improve decision-making, enhance efficiency and reduce risk. This includes the Water Efficiency Analytic component, which helps mitigate non-revenue water through pressure optimization and pipe failure prediction. It turns data from smart meters into opportunities for recapturing revenue and detecting fraud. It delivers insights from big data and smart devices to help operators improve irrigation, flood management and sewer overflows. It takes advantage of flexible deployment options by offering multiple deployment models.

These solutions exist in world technology leaders like Siemens and IBM's portfolios.

Our minister just needs to log in to their websites to find solutions better than praying.

"Alternatives to praying for rain", 23/01/2014, online at: http://www.hurriyetdailynews.com/alternatives-to-praying-for-rain-.aspx?pageID=238&nID=61424&NewsCatID=407

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❖ Half a meter left until death of Lake Sapanca

Lake Sapanca, whose water level is drastically decreasing due to the rise of aridity, is facing a huge problem, as the decrease in water levels could damage the water quality of the lake so much that even liquidation cannot restore it.

Due to the seriousness of the issue, the Sakarya Waterworks Authority (SASKİ) has urged the Turkish Petroleum Refineries Corporation (TÜPRAŞ) in a written statement to consider other sources of water supply to halt the reduction of the lake. Mahnaz Gümrükçüoğlu, a professor of environmental engineering at Sakarya University, has said the oxygen content of the lake is diminishing, which could cause the death of flora species in the lake.

Lake Sapanca is one of the few lakes in the world to provide potable water. It provides the supply of drinking water for the provinces of Kocaeli and Sakarya. Due to drought in the region, the water level of the lake has decreased to 30.44 meters, and only 54 centimeters remain before the lake reaches the level of 29.90 meters, a critical water level, a fact that has caused concern among the authorities.

Recalling the fate of Büyükakgöl, which once provided the water supply for Sakarya's two districts of Ferizli and Karasu around 15 years ago and is now drastically depleted due to unwise policies around the lake, SASKİ General Director Rüstem Keleş has said the lake's water quality is so poor that it cannot be purified.

“If the water continues to shrink, the lake will not be useful for supplying drinking water to the people living around it. And the ecological balance in the lake and the food chain will be negatively affected, too, a fact that means losing the lake as a supply of drinking water. If the lake is not helped to return to its previous state, purification problems will arise,” Keleş told Today's Zaman.

Gümrükçüoğlu said the lake is already unable to refill itself due to excessive water consumption. She warned that a swamp is being formed in the lake bed and that “it means the death of fish soon, and the death of a fish species is enough to disturb the natural balance in the lake.”

“Half a meter left until death of Lake Sapanca”, 21/01/2014, online at: http://en.cihan.com.tr/news/Half-a-meter-left-until-death-of-Lake-Sapanca_0653-CHMTM0MDY1My8yMDA3;+7

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❖ Environment: water shortage threatens Turkey

(ANSAmed) - ISTANBUL, JANUARY 20 - If Turkey doesn't see adequate precipitation before March, water scarcity can be expected to hit the country, as the overall supply has already declined to 50% of what it should be, as daily Today's Zaman reports quoting data from the State Waterworks Authority (DSI) and the Turkish State Meteorological Service (DMI). Experts agree that in order to avoid facing a shortage in the water supply, hydroelectric production must be stopped and potable water must be stored immediately.

According to DSI sources, rainfall has declined by 64% in certain areas, with the largest drop of 70% seen in the eastern Anatolia region. A significant decline in rainfall is also evident in the Yesilirmak, Coruh, Kizilirmak, Ceyhan, Seyhan and Asi river areas, as well as Lake Van. In addition, the basins of Konya, Firat, Dicle and Aras are among areas where a scarcity of water can already be seen.

According to DSI and DMI figures, precipitation in the desired amounts is not expected in January, and if similar figures are also seen in February and March, the country will face the threat of an insufficient water supply. The water levels measured at reservoirs show that there has been a decline in the supply of at least 47% between October and January.

According to the experts, it needs to not only rain but snow, in order to better feed underground water sources.(ANSAmed).

"Environment: water shortage threatens Turkey", 20/01/2014, online at:
http://www.ansamed.info/ansamed/en/news/sections/generalnews/2014/01/20/Environment-water-shortage-threatens-Turkey_9930470.html

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❖ Environment: Turkey; water crisis looming over Istanbul

(ANSAmed) – ISTANBUL, JANUARY 24 - Turkey's largest city of Istanbul is confronted with a serious threat of drought with water reserve now being sufficient for only 100 days due to lack of rain and snow, local media report quoting a senior water expert as saying. "Having only 100 days of water reserve means that very tight measures should be taken," dailies quoted Tugba Maden, a water expert in the Center for Middle Eastern Strategic Studies, as saying. With a population of 14 million, Istanbul tries to obtain the city's needs of water from 10 dams built in the Marmara and the Black Sea regions. Water levels in these dams have been decreased to the lowest point in six years with 35% in total. Three dams have already run short of water.

Istanbul's dams have capacity of holding 868 million cubic metres of water. Currently the water reserve is around 300 million cubic metres. Most seriously, the Melen streamlet has reduced its water reserve to 35% of the total, sending the alarm signals. Melen streamlet, located in the Black Sea province of Sakarya, provides Istanbul with 676,000 cubic metres of water a day via Omerli dam. If the condition deteriorates, the authorities should begin transporting water to Istanbul from different water basins, said Maden. The concerns related with the water shortage is not only limited with Istanbul. Experts foresee serious threat of drought in overall Turkey in general.

"Environment: Turkey; water crisis looming over Istanbul", 24/01/2014, online at: http://www.ansa.it/ansamed/en/news/nations/turkey/2014/01/24/Environment-Turkey-water-crisis-looming-Istanbul_9955232.html

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❖ Turkey's salty 'Lake Tuz' faces worst drought over the last 10 years

Nice and warm weather is threatening Turkey's second biggest and most delicate lake, which is facing its largest drought over the last 10 years.

Located at the heart of Central Anatolia, the ecosystem of "Lake Tuz," which also provides 60 percent of the country's needs in salt, is already endangered due to the mass exploitation of its natural resources.

The lack of rain this winter coupled with the prospective establishment of new companies may split the lake into two, an expert warned.

"The formation of the salt on Lake Tuz is directly connected to the level of water [underneath the ground]. We are [currently] experiencing the uninformed use of the groundwater. The second factor that directly affects the water reserves of Lake Tuz is the decrease of rain," the head of Lake Tuz environmental research center Semih Ekercin was quoted by news portal T24.

Ekercin emphasized snowfall was crucial for alimenting the lake's reservoirs in water, adding alternative plans should be elaborated for years during which rains would be lower than average.

"We are passing through the driest January over the last decade. If February and March also continue like this, there is a possibility of a huge risk. Hence the main vaporization occurs during the summer time when the temperatures in the region rise up to 45-50 degrees," Ekercin said.

He added 10 new salt factories may add up to the eight present ones and are the biggest threat for the lake's survival.

Also home to one of the world's largest flamingo colony, Lake Tuz is emitting a loud S.O.S. for years, as it slowly dies out due to uncontrolled water use while the authorities continue to turn a blind eye.

Environmentalist groups say the lake has shrunk 50 percent in size over the last 40 years.

"Turkey's salty 'Lake Tuz' faces worst drought over the last 10 years", 26/01/2014, online at: http://www.hurriyetdailynews.com/turkeys-salty-lake-tuz-faces-worst-drought-over-the-last-10-years.aspx?pageID=238&nID=61314&NewsCatID=340

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❖ Rouhani pushes ahead with controversial Khuzestan water Project

Iranian President Hassan Rouhani visited on Jan. 14 the province of Khuzestan and promised its residents that he would solve their numerous problems, including issues with the drinking water and pollution of the Karun River. However, the environmental activists in the province said that people were not happy with what the president said and that his words have made them even more upset.

During the past few months, the people of Khuzestan had strongly objected to the implementation of the project known as Behesht Abad, which aims to transfer water from the Karun River to the central provinces of the country.

The Behesht Abad project involves the transfer of more than 1 billion cubic meters [1.3 billion cubic yards] of water from the tributaries of the Karun River to the central provinces of Iran such as Yazd, Isfahan and Kerman. The project, which would stop the flow of Karun into the Persian Gulf, has been faced with strong opposition from the people and environmental activists of Khuzestan province.

During his trip to Khuzestan, Rouhani responded to people's demand for the halting of the Behesht Abad project. He announced his administration's decision that the water from the tributaries of the Karun River would be used only for the purpose of providing drinking water. He also added that previous projects would be halted.

However, Khuzestan's environmental activists have not reacted very positively to Rouhani's comments. Hamidreza Khodabakhshi, an environmental activist and the secretary of the Association of Water Engineers in Khuzestan, believes that people are far from being satisfied with what Rouhani said and, in fact, are upset about it.

According to the environmental activists who reside inside Iran, despite what Rouhani said, local people and experts are still opposed to the idea of transferring water from the Karun River, even if it is only to provide drinking water. They oppose undertaking any new step in this project as long as it aims to transfer water from Karun tributaries.

Khodabakhshi who is a resident of Ahvaz, the capital city of Khuzestan, told *Al-Monitor*, "Rouhani talked about the water transfer project from Karun, providing water for the city of Ahvaz and dredging the Arvand River, but he did not comment on issues such as air pollution or the crisis in the Hoor-ol-Azim Wetlands. His words did not satisfy the people. If we survey the local websites, we can clearly see that for the people of this region issues such as employment, environmental pollution and hydraulic basins are more important than political issues."

Khodabakhshi continued, "The water quality in the Karun River is quite low. It is smelly and has a bitter and salty taste. Based on research, with the decrease in the rate of discharge, which naturally leads to a decrease in the quality of the water, certain animal and plant species of this ecosystem are facing extinction and some may have already become extinct. More importantly, this water is needed for preserving the water quality in the Shadegan Wetland, an international wetland and one of the largest wetland ecosystems of the world. The Karun River, in its course through Khuzestan, provides

water for several large and small wetlands that are very important in maintaining the local ecosystem."

The province of Khuzestan, situated in southwest Iran, has been faced with many environmental problems during the past few years. Its capital city of Ahvaz has been identified by the World Health Organization as the second-most polluted city in the world. It is also reported that since 2001 there has been a substantial increase in the density of the floating particles in Khuzestan's air. This fact has resulted in the emergence of acid rains. Last November, more than 50,000 residents of this province had to check into hospitals or clinics.

During the past few years local activists and even some of the members of parliament (MPs) from Khuzestan have accused the central government of having a discriminatory attitude toward the residents of the province. According to Khodabakhshi, the transfer of water, even when it is intended for providing drinking water, in fact is used to expand the farming industry in the central provinces. In these provinces, the drinking water is being used for farming and when there is a shortage in drinking water, the provinces once again ask for drinking water. With this method, the central provinces expand their own farming lands that do not yield high crops.

During his trip to Khuzestan, Rouhani talked about revitalizing Khuzestan's farming industry and said, "To cultivate 550,000 hectare [2,123 square miles] of land in this province, we need a budget of 150,000 billion tomans [$606 million]. This budget is already approved by the administration."

He also added that in the next three years, with the aid of the National Development Fund, all the lands in the province of Khuzestan would be ready for cultivation. He also emphasized that this project has been approved by Supreme Leader Ayatollah Ali Khamenei some 17 years ago.

Khodabakhshi reacted to this part of Rouhani's speech and told *Al-Monitor*, "Seventeen years ago, the [supreme] leader traveled to Khuzestan and ordered the implementation of a project that would have mechanized 800,000 hectare [about 3,400 square miles] of land that was being used for traditional farming to increase the crop yield. So far, however, the project has not been implemented. It appears that Rouhani has considered the liquidity potential of the country and has decided that the National Development Fund can provide for 550,000 hectare of land. Of course, all experts know which project he is talking about. There are more than 3.3 million hectare [12,741 square miles, an area roughly the size of Massachusetts and Rhode Island combined] of cultivable land available in Khuzestan, but considering the available water sources, only 1.5 million hectare [5,791 square miles] of it have the potential of being cultivated. The restricting element in Khuzestan, even more than the budget, is the water."

Khodabakhshi added, "We cannot expect Rouhani to give an expert opinion on this issue. Naturally, he is saying what his advisers told him to say. What we can conclude is that his advisers do not have a very good plan when it comes to the water issue in Khuzestan."

The Behesht Abad project is the fourth project that aims to transfer water from the Karun River to the central provinces of Iran. With the implementation of the projects Kuhrang I, Kuhrang II and Kuhrang III, more than 930 million cubic meters [1.2 billion cubic yards] of water has been transferred from the tributaries of the Karun River to the central areas of the country. So far, the

residents of Khuzestan, almost half of them ethnic Arabs, have had four peaceful gathering on the banks of the Karun River asking for an end to the Behesht Abad project. At the same time, some of the MPs in parliament have accused the central government of having a discriminatory behavior toward the residents of Khuzestan.

During an interview, Khuzestan's MP Shokr-e-khoda Mousavi accused Rouhani's administration of "disregarding the demands of the people of Khuzestan." He called the project of transferring water from Karun "a cruel discrimination."

He was also one of the MPs who accused Rouhani of favoring the central provinces. He believes that Rouhani's cabinet members are mostly from Iran's central provinces, which is why they support the project. Currently, seven members of Rouhani's cabinet are from the province of Isfahan, which is to be a beneficiary of the water transferred from Karun's tributaries.

Despite this, it appears that with the new moderate administration in charge, the central government is changing its attitude toward the border provinces. During his speech in Ahvaz, Rouhani referred to the Karun River as "the main artery of Khuzestan" and promised to revive the river. At the same time, Minister of Petroleum Bijan Zangeneh has talked about allocating 2% of the oil revenue to Khuzestan and has called the province "Iran's oil production capital." Khodabakhshi also believes that the administration is still new and that people should give it some time before expecting results**.**

"Rouhani pushes ahead with controversial Khuzestan water Project", 26/01/2014, http://www.al-monitor.com/pulse/originals/2014/01/rouhani-water-iran-khuzestan-project.html

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❖ Iran's parliament approves project on transfer of water from Caspian Sea

Iranian parliament has approved the project on transfer of water from the Caspian Sea to the deserts in the country's central parts, Iranian Energy Minister Hamid Chitchian said, Mehr News Agency reported on Jan. 23.

The minister noted that funds have been allocated from Iran's state budget for this project.

Commenting on the Lake Urmia revival project the minister added that a committee was created for saving the lake. The committee will be chaired by Iranian First Vice President, Eshaq Jahangiri.

In April 2012 the former president of Iran, Mahmoud Ahmadinejad attended the foundation-laying of an irrigation system designed for transferring of water from the Caspian Sea. However Iranian MPs and some economic experts considered this project ineffective and demanded suspension of its implementation, after which construction was delayed.

The project for transfer of the Caspian Sea waters to the central regions of Iran includes: construction of hydroelectric power stations, a desalination plant, pumping stations, power lines, water pipes and tanks, according to the message.

The headquarters of Khatam-ol-Anbia, affiliated with the Islamic Republic of Iran Guard Corps (IRGC) will control the project's realization, according to the message.

"Iran's parliament approves project on transfer of water from Caspian Sea", 23/01/2014, online at: http://en.trend.az/news/politics/2233429.html

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❖ UN Resident Coordinator at London Symposium: "Water: Iran's main environmental challenge"

"This is a time of immense opportunity for all Iranians to play a positive role and become more involved in finding solutions to environmental challenges in your homeland" said the UN Resident Coordinator and UNDP Resident Representative in the Islamic Republic of Iran, Mr. Gary Lewis.

Addressing a symposium on environmental challenges in Iran organized by Iran Heritage Foundation in association with Persian Wildlife Heritage Foundation which was held yesterday at the Royal Geographical Society in London, Mr. Lewis said the main environmental challenge Iran is currently facing is water management.

"Annual per capita water availability has fallen from a high of 7,000 cubic metres in 1956. Today it stands at 1,900 cubic metres. By the year 2020, it will drop to 1,300 cubic metres. So there you have the alarming trend for water stress" he said.

The UN Resident Coordinator also stressed on the critical situation of two lakes which he recently visited: Lake Hamoun and Lake Uromiyeh. "The most emblematic example of water concerns is what is happening to Lake Uromiyeh in the northwest of Iran. I recently visited Lake Uromiyeh, once the world's largest lake […] I was utterly devastated by what I saw. It was visually apocalyptic. And it is man-made" Mr. Lewis said.

During his presentation, he also pointed to other human security threats in the form of desertification, deforestation, air-pollution and the loss of biodiversity – as well as a large carbon footprint – as challenges to overcome.

Before concluding his presentation Mr. Lewis said "This is the point where I need to pause and say – quite sincerely – how pleased I am to be reading and hearing a number of outspoken statements – coming from the new Government of Iran – on the need to protect the environment."

Among other speakers was the Head of Iran Heritage Foundation, Mr. John Curtis who said "I hope this pioneering and innovative conference can indeed be a catalyst to spark measurable change in protection of Iran's environment."

Also speaking at the event was Dr. Kaveh Madani, lecturer in the Center for Environmental Policy, Imperial College of London who stressed on the importance of sustainable management of water resources given the extremely high reliance of Iran on agricultural production.

Ms. Laleh Daraie, Global Environment Facility Small Grants Programme (GEF/SGP) National Coordinator made a presentation on UNDP's community based projects in Qeshm Island in Iran. She noted the importance of supporting and involving the local communities in making decisions, rather than making decions on their behalf for them.

Dr. Vahid Hosseini from Sharif University of Technology emphasized on the importance of focusing on man-made particles in controlling air pollution. In this regards he said "Man-made, combustion generated particles go deep into human lungs and affect health much more than dust and other particles that the human body has evolved to resist."

The two-day seminar entitled "Iran's Natural Heritage: A Catalyst Symposium to Spark Measurable Change" gathered together international NGOs, conservation practitioners and internationally renowned scholars from Iran and other countries to highlight the challenges that face Iran and the preservation of its unique habitats, wildlife and once abundant agriculture land.

"UN Resident Coordinator at London Symposium: "Water: Iran's main environmental challenge"",20/01/2014, online at: http://www.bj.undp.org/content/iran/en/home/presscenter/articles/2014/01/20/un-resident-coordinator-at-london-symposium-water-iran-s-main-environmental-challenge-/

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❖ Water becomes tool for regional co-operation

Turkey is aiming to avert water shortages by working out agreements with its neighbours.

The Development Ministry recently issued a report pointing out the risk of water scarcity, and experts say that collaborating with nearby countries on water resource issues would reduce the risks and help to boost regional stability.

The report indicates that Turkey is among the countries suffering from a water shortage, and also says the country uses only 39 percent of its water resources each year. Turkey uses 32 billion cubic metres of water per year for irrigation, while 7 billion cubic metres are used for drinking water and 5 billion cubic metres are used in industry.

With the population estimated to reach 100 million by 2030, water resources need to be used reasonably in order to prevent major shortages, experts said.

Once considered a water-rich country located in a region where many other countries have water shortages, officials are preparing action plans to preserve 25 water basins, starting with the Ergene basin in East Thrace, which is affected by agricultural, industrial and household pollution.

Tugba Evrim Maden, a water research programme specialist at the Centre for Middle Eastern Strategic Studies (ORSAM), told *SES Türkiye* that recently enacted policies have been effective, especially the creation of a specific water management unit under the Forestry and Water Affairs Ministry and the preparation of a new water law to be submitted to the parliament.

The new law will strengthen the implementation of the EU Water Framework Directive by addressing conflicts of authority and responsibility for water management. It also addresses the need for better distribution of water to the growing and increasingly urbanised population, while also maintaining quality standards.

Maden said that while those policies are important steps, more needs to be done.

"Excessive use of water is still a major problem in Turkey," Maden said. "There is a need for raising awareness of people through new projects and telling people that it is not an ever-lasting resource. Turkey should also develop some scenarios covering the next 50 to 100 years to adapt itself to the possible consequences of climate changes with appropriate expertise and technology."

Water resources have also played an important role in relations with the Middle East, especially Iraq and Syria.

"Before the Syrian crisis that began in March 2011, Turkey and Syria had been engaged in a long-term co-operation concerning water, while we had also signed some bilateral agreements with Iraq concerning regional co-operation in water field," Maden said.

According to an agreement signed by the Turkish-Syrian Strategic Cooperation Council in 2009, both countries intended to boost the quality of water and the extent of shared water pumping stations and dams, while Turkey committed in 1987 to permit 500 cubic metres of water to flow into Syria per second.

Turkey and Iraq signed an accord in 2009 for co-operation between water resource experts and sharing of hydrological and meteorological information.

"With 45 billion cubic metres of water [from the] Tigris and 36 billion cubic metres of water [from the] Euphrates [there is] enough water for Turkey, Iraq, Syria. However, it requires to be used in optimum, equitable and smart ways. Such co-operation would lead us to a win-win result. But, first of all, there is a necessity of political stability in Syria and Iraq," Maden added.

The Tigris and Euphrates rivers provide water to a 900-square kilometre area and to more than 54 million people in the region.

Maden said sound co-operation between Turkey, Iraq and Syria concerning water resources would help all three countries in coping with water scarcity scenarios and could even turn into a reference model and peace guarantor for the region.

Vakur Sumer, an expert on water policies at the Department of International Relations of Selcuk University in Konya, said that given the increasing rates of population in Turkey, it could become difficult to maintain per-capita levels of water, requiring smart ways of using this scarce resource.

Sumer agrees that water could be a useful tool in fostering co-operation and reducing tensions in the region.

"However, for this to happen, countries of the region should come together and without prejudice establish a continuing dialogue atmosphere around the benefits that trans-boundary water resources

could create for all of them in the long term. This is unfortunately not very easy considering the instabilities in Iraq and Syria," Sumer told *SES Türkiye*.

"Water, currently, is not a pressing priority for these countries. Soon after a minimum level of stability is reached in these countries, a basin-wide mechanism for dialogue should be created. We have bilateral ad-hoc talks now and we had multi-lateral regular meetings in the past with very limited results," he added.

Sumer also said the next generation of regional talks regarding water resources should focus on practical benefits that could be harvested from trans-boundary water resources. He said the increased impact of climate change on precipitation levels throughout the Middle East could be a starting point for basin-wide dialogue.

"The Northern Euphrates and Tigris [ET] basin, in particular, would likely be faced with dramatic reductions in precipitation. These areas contribute to at least two-thirds of the water of the ET region. So, water scarcity in the region needs to be redefined within these terms," Sumer added.

Another possible partner in water-related co-operation is Israel. Joseph Avraham, Israel's consul for economic affairs in Turkey, said there is potential for co-operation in the water sector between the two countries.

"We encourage the participation of companies in water events, e.g. the water exhibition that took place in Israel [in October], and welcome any initiative in this important sector," Avraham told *SES Türkiye*.

Nine companies participated in the Water and Wastewater Management Conference, held in Tel Aviv, meeting with their Israeli counterparts to discuss water technologies and possible co-operation, although at this stage such co-operative efforts exist only at the corporate level.

According to Israel's economy ministry, Israeli exports of products for water management and conservation have tripled over the past five years and Turkey is among its new markets. Israel is also a world leader in the desalination of seawater, which makes its water products more attractive for Turkish companies.

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"Water becomes tool for regional co-operation", Menekşe Tokyay, 20/01/2014, online at: http://turkey.setimes.com/en_GB/articles/ses/articles/features/departments/world/2014/01/20/feature-01

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❖ Wars for water: utopia or sad prospect?

Scientists are saying that deficit of fresh water may provoke new wars in the foreseeable future. At present, in total, about 700 mln people in 43 countries of the world are suffering from lack of fresh water. It is expected that by 2025, the number of people who lack fresh water may grow up to 3 bln because of global climate changes and increase of population.

The main problem is the unequal distribution of water resources. The minimum amount of water one person needs a day is 20 liters. However, at present, about 1 bln people in the world can afford only 5 liters a day. The regions where deficit of water presents an especially acute problem are the Middle East, China, India, Central Asia and central and eastern Africa.

"For many countries on the African continent, access to fresh water is an issue of national security," Russian expert in eastern affairs Marina Sapronova says. "This is why the decision of Ethiopia to build a dam on the Nile is meeting a radical protest from Egypt. Ethiopia is building a large electric power plant on the Nile, which would supply not only Ethiopia, but also several neighboring countries with electric power. However, Egyptians are concerned that if Ethiopia builds a dam on the Nile, Egypt will be deprived of one fourth of its water resources."

"The problem is that about 98% of Egypt's population live in the valley of the Nile. If Egyptians start to lack water from the Nile, this would not only cause problems with food, this would also badly affect Egypt's industrial system and create a serious problem for the country's national security."

"From times immemorial, the life of Egyptians was centered around the Nile," Ms. Sapronova continues. "Besides Egypt, the Nile water is also used by about 10 other states, including such big ones as Sudan, Ethiopia, Kenya, Rwanda, Uganda and Tanzania. In total, the population of these countries makes more than 300 mln people. Within the last 10 years, the economies of Sudan and Ethiopia have been developing rather rapidly. The increasing number of plants and factories is demanding more water and more electricity."

In Central Asia, a dispute between two former Soviet states – Uzbekistan and Tajikistan – has already been lasting for several years. Tajikistan is building an electric power plant at a place called Rogun on the Vakhsh River. Uzbekistan is concerned that this project may lead to shallowing of the Amu Darya River, into which Vakhsh flows.

"The conflict between the two countries over this project has gone so far that it looks that it couldn't be solved without interference of the world community," an expert in Central Asian affairs Andrey Grozin says.

"This conflict has been aggravating the relations between Tajikistan and Uzbekistan for many years," he says. "In the Soviet time, when both Tajikistan and Kazakhstan were parts of the Soviet Union, the problem of distribution of water resources between areas with much and with little natural water resources, as a rule, was regulated by the Moscow authorities. At that time, practically no residents of the Soviet Union were afraid that one day, they may lack water."

Scientists are predicting that in some 50 years from now, the Earth's resources of drinkable water may reduce by one third, if not by one half. This may be caused not only by global climate changes, but also by irrational, if not barbaric, ways of using nature's water resources by people. If people do not radically change their consumptive approach towards the Earth's water riches, they may once face real armed wars for water resources.

"Wars for water: utopia or sad prospect?", 22/01/2014, online at: http://voiceofrussia.com/2014_01_22/Wars-for-water-utopia-or-sad-prospect-9990/

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❖ Does Climate Change Affect Water War Scenarios in the Middle East?

Increasing human activities have created a great pressure on water resources in terms of both quality and quantity. Another pressure is caused by climate change and changes in precipitation patterns as a result of the climate change. According to the scientific studies, climate change was also observed before the industrial revolution. However, the aforesaid change was not as rapid as it has been today, and could be explained by natural causes such as volcanic eruptions, changes in solar energy and greenhouse gas (GHG) concentrations. Increasing human activities with the beginning of industrial revolution as from 1700s have accelerated the pace of climate change. The Fifth Assessment Report of Intergovernmental Panel on Climate Change (IPCC) titled, the Physical Science Basis published in October 2013 states that warming of the climate system is unequivocal since 1950s, and accordingly, it is extremely likely that human influence has been the dominant cause of observed warming since then. The report also asserts that water shortage and population negatively affected by the water shortage due to the new climate conditions will increase. The rising water demand observed in the regions especially in semi-arid and arid climate zone should be met through storing information regarding the vulnerabilities caused by the current climate change, and through adapting the management of water resources to new conditions. As mentioned in the report, water shortage which currently prevails in semi-arid and arid climate zone will become a chronic problem. Using the words semi-arid and arid climate zone and water shortage in the same sentence, one focuses the attention on the Middle East which also covers Turkey.

It is an unequivocal fact that there is a water shortage in the world and the problem will affect lives of billions of people in the upcoming years. Especially transboundary water basins should be held under the microscope. When it comes to transboundary basins, water is no more an internal matter of a state. Water supply of a riparian country depends on another riparian country. This situation makes water resources a national priority issue in the regions especially such as the Middle East where water is a limited resource. Since water resources are likely to entail conflicts in the recent years, global water problems are considered in the status of "priority policy".

Water resources might serve as a driving force for both peace and war especially in the Middle East. Policies to be pursued by states could lead to a cooperation or a conflict. If there is no present agreement on basin, it is seen that use of water resources is directly proportional to power balances in

the basin. Even though water is not a direct cause of war, it is observed that it has lost its technical feature and is directly affected by political balances. Water might serve as a cause of either cooperation or a conflict depending on the interests of states.

The first and only water war in the history took place between the states of Lagash and Umma in 2500 BC for water usage in the Tigris River basin, and both states ended the war by signing an agreement.

Conflicts broke out between Israel, Syria and Jordan to divert flows of Jordan and Yarmouk rivers in recent history between the years 1950-1960. Another cause of the 1967 Arab-Israeli war is the derivation of Jordan river waters. In the Euphrates-Tigris river basins to which also Turkey is a riparian country, there were disputes between Turkey, Syria and Iraq especially in 1980s and 1990s due to the water projects and dams built on the basin.

According to the 2012 report of the Arab Forum for Environment and Development (AFED), the Arab region will face an increase of 2.5ºC to 5.5ºC in the surface temperature by the end of the 21st century. Which is projected to lead to decrease in precipitation in the region by 20%. This shows that the amount of water in the region will be less than the projections which do not take climate change into consideration in the region. Of course, considering the history of water resources of great importance in the relations between the countries in the region, it would both cause to tension in bilateral relations from time to time, and also would be used as a political tool. However, none of the riparian countries could benefit from the tension and conflict so far. The solution is an inter-state cooperation which would make it possible for each riparian state to reach a win-win solution. Above all, it is required to provide a technical and political institutionalization that would also provide a productive use of water resources by considering the new climate conditions during this cooperation process. Water demand of the growing population in the region, food security concerns and ineffective use of water, and especially modern irrigation techniques in agriculture lead to a substantial water loss. While water management structure should be reorganized for productive use of water, especially users of water should be trained to use water economically. In addition to this, climate change would also change operation and functions of current water structures (e.g. hydropower, flood control, drainage and irrigation systems). According to the studies that have been carried out so far, current water management is not efficient enough to overcome the impacts of

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cliamte change. Water management also affects energy, environment, health, nature preservation and food policies. Hence, it is required to put forward deficiencies caused by the climate change and to adjust water-related managements into new conditions.

"Does Climate Change Affect Water War Scenarios in the Middle East?", Tuğba Evrim Maden, ORSAM, 22/01/2014, online at: http://www.orsam.org.tr/en/showArticle.aspx?ID=2580

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❖ Celebrating water cooperation: Red Sea to Dead Sea

Israel-Palestine Joint Water Committee's work has been referred to as 'water apartheid', and 'pretence of cooperation'.

In December 2013 the World Bank proudly announced a rare agreement on water among Israel, Jordan and the Palestinian Authority (PA). The Middle East is not a region where cooperation among states is common, especially in relation to water. Therefore, the news about this so-called "water cooperation agreement" made headlines in the global media.

While the World Bank, and official authorities of the three countries were very pleased with the outcome, environmentalists and Middle East water specialists were sceptical because of the feared adverse impacts of the project on the environment and fragile ecosystem, and its implications for delicate political conflicts on the ground. Some Israeli experts were suspicious, supposing that the main motivation of the agreement was a geopolitical interest associated with giving support to Jordan. "Saving the Dead Sea" which was proclaimed to the public as the main justification of the agreement was seen as distinctly secondary by critics.

Red Sea to Dead Sea

The agreement calls for transportation of water from the Red Sea to the Dead Sea. The goal is to replenish the waters of the Dead Sea that was in serious danger of drying up. The Jordan River had previously been providing feeder waters to sustain the Dead Sea, but these were diminished over the years by diversions in large volumes by Israel, Jordan and Syria.

The project also responds to the acute shortage of clean fresh water, especially in Jordan. One of the main aims of the project is a commitment to build a new desalination plant in Aqaba, Jordan, that will convert salt water from the Red Sea into fresh water. The desalination project will be built and operated by a private company on a strictly commercial basis. The pipeline is scheduled to run exclusively through Jordanian territory from the desalination plant in Aqaba, to avoid strict environmental regulations in Israel. **Friends of the Earth Middle East** also expressed concerns, pointing out that the volume of water that will be pumped into Dead Sea is not enough to allow the

lake to become viable, and that the project is really just an excuse to build a desalination plant and sell its water at a profit.

The proposed desalinisation plant will produce for Israel and Jordan each, 8 to 13 billion gallons of water a year. Meanwhile, **according** to *The New York Times* the Palestinians "expect to be able to buy up to 8 billion gallons of additional fresh water from Israel at preferential prices". Although 25 miles of the Dead Sea's shoreline lie in the Israeli-occupied West Bank, Palestinians currently have no access to the Dead Sea but could claim that they will have riparian rights in the future when the state of Palestine is finally established. Meanwhile, Palestinians are forced to buy water from the Israeli desalination plant at high prices.

Recently Israel boastfully announced that there is no water shortage any longer in the country thanks to desalination plants and widely used high-tech reclaimed water in agriculture. This is very good news for Israel. However, it is difficult to understand why the Palestinians are denied or significantly restricted access to an equitable share of mountain aquifers and Jordan River basin, while at the same time being encouraged to buy fresh water from Israel. This puzzle cannot be explained without a closer look at water sharing arrangements and so-called "cooperation" between Israel and Palestine.

Myths about water

There are some myths about water issues in relation to Israel and the Palestinians. First of all, contrary to Israeli propaganda, Occupied Palestinian Territories (OPT) are actually rich in water resources, but the unequal distribution of water rights is used for the benefit of Israel while Palestinians are made to struggle for basic water access. The Mountain Aquifer is one of the most important water resources in the region, being fed by the relatively plentiful rain of the West Bank - Ramallah, which receives an average of 700 mm rainfall per year, around the same as Edinburgh - and historically providing up to a quarter of Israel's freshwater supplies. Despite alarmist predictions of insufficient drinking water supplies by 2040, based on the expected population growth in the OPT, Jordan and Israel, it is highly unlikely that drinking water will be scarce. Israel suggested as much when it announced that the country has solved its water problem and was ready to sell additional water to the Palestinians.

The second myth is the pretension that the international water law principles are applicable between Israel and Palestine and cooperation is possible. One of the five clusters of the Oslo Peace Accords was devoted to water. The core principle of customary international water law that requires "cooperation" to realise the "equitable utilisation of shared water". This principle was vaguely affirmed by Oslo but never implemented. The critical question of responsibility for the administration of West Bank water resources was postponed by the parties until the final stage of the negotiation process, which has never taken place despite the lapse of more than 20 years.

According to international water law, joint committees are supposed to facilitate cooperation between countries. However, if the parties are grossly unequal and asymmetrical in terms of economic, political and military power, the idea of international cooperation on an equitable basis is almost impossible to realise. Recent **critical scholarship** on water politics has pointed out this problem that "cooperation" is often conflict-laden and highly inequitable among asymmetrical riparian countries and that the unquestioned promotion of "cooperation of any sort" over water resources is thus deeply problematic.

This exact situation is happening in the context of the Israel-Palestinian water cooperation. Under the Oslo framework Israel and Palestine established a Joint Water Committee (JWC) in 1995 to govern trans-boundary mountain aquifers and to support the sustainable development of the Palestinian water sector. The JWC continued to meet regularly to administer the so-called "joint water resources", a rhetoric that implies international cooperation was maintained even during the violence of the Second Intifada (2000-2005), something which no other joint Israeli-Palestinian committee achieved.

The working of the JWC has been criticised by several water policy experts, as "domination dressed up as cooperation", a "pretence of cooperation", and even as "water apartheid". Jan Selby **researched** and interpreted the first 17 years of JWC operations, concluding that JWC functioned as part of the ideological apparatus of domination. As a result of the Oslo framework, the PA lacks a legal or political foundation on which to challenge Israel's confiscation of water during the past 20 years. Rather than benefiting from JWC, in fact, Palestinian access to both water and sanitation has deteriorated since Oslo.

Problems with cooperation

Difficulties with establishing cooperative use of shared water resourcesalso encountered several other river basins in the region such as the Nile and the Euphrates and Tigris rivers, where the riparian states' political, economic and military power is asymmetrical. However, each case is dramatically different than another due to different political, hydrological and economic reasons. According to key findings of the Selby study, water cooperation is never politically neutral and not always benign; it sometimes contradicts the goals of peace and sustainable development. In case of Israel and Palestine specific consideration are below:

- Israeli-Palestinian water cooperation has been associated with a significant worsening of the Palestinian water supply crisis. Israel has vetoed every single Palestinian application for new wells in the Western Basin of the Mountain Aquifer, only small local water networks have been approved. Meanwhile Israel has repeatedly made improvements in the water systems of its illegal West Bank settlements.
- Revealingly the Palestinian Water Authority has approved every single Israeli application for new water supply facilities for West Bank settlements. This has been done with the knowledge of PA President Mahmoud Abbas and constitutes the first such evidence of the PA lending its official consent to parts of Israel's settlement expansion programme.
- International donors have not challenged Israel's use of the JWC as an instrument of control. Some donors have known that approval of the projects is linked to PA approval of settlement infrastructure, but have preferred to remain silent on the issue.

The World Bank should have done a deeper and more comprehensive research on the work of JWC and so-called "cooperation" between Israel and Palestinians before celebrating a water collaboration agreement that will force the poor party to buy expensive water from the richer party, an arrangement that seems manifestly unjust. Instead, the WB preferred to overlook this detrimental feature and celebrate a new project in a region where water injustice and apartheid are so visible and widely known. To this extent, the World Bank has embarrassed itself by being seemingly ignorant of this fundamental obstacle to constructive cooperation in relation to water policy in the Middle East.

Hilal Elver is the Co-director of the Climate Change, Human Security and Democracy Project at Orfalea Center at the University of California Santa Barbara, and the Author of the Peaceful Uses of International Rivers: A Case of Euphrates and Tigris Rivers (2002).

"Celebrating water cooperation: Red Sea to Dead Sea", Hilal Elver, 24/01/2014, online at: http://www.aljazeera.com/indepth/opinion/2014/01/celebrating-water-cooperation-r-201412072619203800.html

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❖ Cyprus gets new desalination plant with Mekorot Israel's know-how

Fresh water shortage issues are virtually normal now in the Eastern Mediterranean, especially in Cyprus, which has worse water shortage problems than Israel, Syria and Lebanon. The water shortage situation in Cyprus has gotten so bad that lakes are going dry (see photo).

As a result, a giant pipeline is being built to unite the island's northern sector to Turkey as a partial solution.

Water shortages in the southern part of the Island, known as the Republic of Cyprus, will be partially alleviated by a deal with Israel's Mekorot water company that resulted in the construction of a large desalination plant in the city of Limassol. The just inaugurated plant will be able to produce between 40,000 and 60,000 cubic meters of fresh water per day for residents of Limassol, the Cyprus Republic's largest city.

"In a challenging reality, in which many countries are facing an existing or expected shortage of water, the solutions which Mekorot has to offer are of great importance," said Mekorot CEO Shimon Ben-Hamo. He added that Israel is happy to be able to be help a country like Cyprus, which like Israel is "small in size, but big on vision."

While the cost of desalination is not cheap, it has become one of the most popular methods used to produce fresh water for an island nation that already has four other desalination plants.

"The natural water resources are insufficient to cover the increasing water needs, thus, gradually we have adopted the policy of using non-conventional water resources to ensure independence from weather conditions and consequently adequate quantities of water for our country," said Cypriot Agriculture Minister Nicos Kouyialis.

Israel is a pioneer developer of fresh water conservation and production methods; including desalination and recycling of waste water; especially what is known as "grey water".

While not the best environmental solution, desalination has often been called a "necessary evil" due to its high costs and potential environmental risks.

"Cyprus gets new desalination plant with Mekorot Israel's know-how ", 20/01/2014, online at: http://www.greenprophet.com/2014/01/cyprus-gets-new-desalination-plant-with-mekorot-israels-know-how/

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❖ Israeli-Jordanian Peace Agreement May Include Sharing Water Resources

It appears Jordan and Palestine are interested in buying desalinated water from Israel.

That's according to a report in the Haaretz newspaper's business magazine TheMarker.

"Israel recently announced that its current desalination capacity exceeds its needs due to two consecutive years of heavy rainfall," the report said.

Drought-plagued Jordan wants to increase the amount of water it buys from Israel, and the Palestinian Authority (PA) appears to be interested as well, the report said.

"As part of the Israeli-Jordanian peace agreement, Israel sells Jordan 35 million cubic meters of water a year from the Sea of Galilee while Jordan allows the transfer of some 20 million cubic meters of water from the Yarmouk River to flow into Israel during the winter. Some five to 10 million cubic meters of this water returns to Jordan over the summer," the report said.

The price for Jordan is $0.04 per cubic meter. For water in excess of that amount, Jordan pays $0.45, meaning a total payment of about $8.5 million per year, the report said.

"While officials in Jerusalem are reportedly discussing the Jordanian request, a conflict over the PA's outstanding $310 million bill to the Israel Electric Corporation precludes even the possibility of talks on the matter," the report said.

Thanks to desalination, Israel has a valuable item on its hands.

"Israeli planners are looking to desalination as a possible permanent solution to the problem of drought. Some even anticipate an event that was once unthinkable: a water surplus in Israel," the *Jewish Telegraphic Agency* reported.

In 2014, however, Israel is likely to rely less on desalination.

"After two years of relatively heavy rainfall, the government will be reducing the amount of water it buys from the country's desalination plants by 30 percent this year," Haaretz reported this month.

Talks between the government and plant operators landed on a plan for how much water the government will buy. The decided amount is "just 70 percent of their total production capacity of 510 million cubic meters."

"Israeli-Jordanian Peace Agreement May Include Sharing Water Resources", 22/01/2014, online at: http://www.wateronline.com/doc/israeli-jordanian-peace-agreement-may-include-sharing-water-resources-0001

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❖ Over and drought: Why the end of Israel's water shortage is a secret

Remember all the years of being told to conserve 'every drop?' Well, times have changed: Today, Israel has so much affordable water, it can offer to export it. So why is this achievement being kept so secret?

In ancient times and even during the years of the British Mandate (1917-1948), the shortage of water in Palestine, as well as among its neighbors in the Middle East, had a decisive influence not only on the area's economic development, but also on the political strife between Jews and Arabs. Technology has changed all this. Now, the ability to produce all the water that's needed, whether for human consumption or for agriculture, may soon change our way of life and perhaps even, if our neighbors agree, bring peace closer.

There is now a surplus of water in Israel, thanks largely to the opening of several new desalination plants - and the development of natural-gas fields that can power them cheaply. Since water is the source of life, the well-known Israeli imperative to "save every drop" should still be respected. But the price the Israeli population is charged for its water supply should be reduced by more than the 5 percent drop announced on January 1 of this year.

If you're wondering why you haven't heard about this revolution, you're in good company. Simply put, for political and economic reasons, the government continues to play down these achievements.

To understand the situation, it helps to look back to a time before Israeli independence, in 1948. The violence that rocked Palestine in August 1929 shocked not only the Yishuv, as the Jewish community in the country was known at the time. It also stunned the government of Britain, the country that had been awarded the mandate over Palestine by the League of Nations. London decided to determine whether the condition of the Balfour Declaration, of November 1917 (which set out Britain's intention to establish "a national home for the Jewish people") about "nothing [being] done which may prejudice the civil and religious rights of existing non-Jewish communities in Palestine" was being met.

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As a first step, the British government decided to send a well-known agricultural expert, Sir John Hope Simpson, to the land to investigate. His conclusion: Palestine was so densely populated that there was "no room to swing a cat." This finding, together with the report of a committee that examined the situation at the Western Wall, where the 1929 rioting had its origins, brought about Lord Passfield's "White Paper" of 1930, which recommended limiting the number of Jews permitted to enter Palestine.

Hope Simpson's historic error was to take it as a given that there was a serious shortage of water in Palestine and the immediate region. From this it followed that the only feasible agriculture must be based on rainwater irrigation and on relatively large plots of land for the fellah to feed his family. Hope Simpson found, however, that Jewish migrants were willing to pay high prices for land owned by the effendis, with the unavoidable result being that the fellahs had less land available for themselves. He apparently did not consider the possibility of developing additional water sources for irrigation purposes. Also disregarded was the fact that almost unlimited water-well drilling was possible (at that time) in the coastal plain for the irrigation of citrus orchards.

City dwellers, too, needed drinking water. Having grown up in Jerusalem in the early 1930s, I remember the shortage of water there in rain-poor years. The Ein Fara spring in the east and "Solomon's Pools" south of Bethlehem did not provide the minimum amount of drinking water that was needed. Jerusalemites had to dig cisterns to store rainwater. It was not until the late 1930s, when water began to be pumped from the coastal plain, that relief arrived for the city's chronic water shortage. Still, the problem persisted to some degree and became acute during the siege of 1948.

When it came to the water supply, the policy of His Majesty's Government was not the Yishuv's only political problem. The issue was also at the center of the struggle with the Arab states. The Arab League, as their representative, took the offensive against Israel's exploitation of the waters of Lake Kinneret and its tributaries. The Israelis, it was argued, were infringing on the water rights of Jordan and Syria. In the 1950s, the war over water resulted in bloodshed between Israel and Syria. In September 1965, the Third Arab Summit meeting decided upon the diversion of the Jordan River's tributaries by force. Although that decision was not implemented, the conflict over water was a key cause for the eruption of the Six-Day War less than two years later.

Since 1967, the conflict over water between Israel and the Arab states has dried up. In the peace treaty with Jordan, signed in 1994, Israel undertook to transfer 50 million cubic meters of water to Jordan every year from the Kinneret tributaries. The amount was increased in 2013, when it emerged that Israel's water supply exceeded expectations.

National asset

Since its establishment, Israel has considered water a national asset to be protected and expanded. It follows that the government alone can decide on water policy. In regard to the Hope Simpson report, the Zionist movement and the Yishuv rejected outright its conclusions regarding the potential for the asset's expansion. The simplest way to challenge its findings was to argue that the country's water resources were far larger than claimed in the report - and, if possible, to prove it, too. With this in mind, local experts frequently arrived at exaggerated estimates. A case in point is Simcha Blass, an engineer who was involved for many years with Mekorot, the national water company and with Tahal, the water-planning authority. An incorrigible optimist, Blass believed that Israel's water potential exceeded three billion cubic meters a year. In stark contrast, others, including the late Prof. Hillel Shuval, an expert on water management, thought that even if Israel drew on all its potential water sources, it would not be able to produce more than two billion cubic meters a year.

Overestimating the potential of water sources was a useful tool in the Yishuv's dealings with the British, and perhaps also made potential immigrants less leery of settling in the country, both before 1948 and during the period of mass immigration and economic hardship in the state's first years. Indirectly, though, this approach caused serious damage. It brought about over-pumping and the consequent salination of the wells of the coastal aquifer; led to unnecessary and expensive water projects, such as conveying water from Lake Kinneret and the Yarkon River to the Negev; and it encouraged the introduction of water-thirsty agricultural crops, such as sugar beets, cotton and peanuts.

The sugar beet crop was especially harmful, because in addition to the intensive irrigation they required, because once sugar beets stopped being cultivated, the country was left with two unused factories for sugar production, in Afula and Kiryat Gat.

The cotton industry fared better. Cotton was brought to the country at the initiative of Sam Hamburg, a resourceful farmer from California. Its advantage over sugar beets was that the former could be irrigated with brackish water. Disappointment, however, arrived from a different direction. Initially, the large cotton mills that were built in Israel's remote southern towns provided employment for the residents, but in the long term they could not compete with cotton from the Far East.

The mass immigration that accompanied Israel's establishment demonstrated that the existing sources of water were insufficient. The groundwater could not supply more than a billion cubic meters a year, even if the wells were over-exploited. Rainwater, recycled industrial water, brackish water sources and sewage water – which had just begun to be purified – would add no more than 350 million cubic meters a year. All told, this would not be enough for the needs of a constantly growing population and for farming, which at the time was a major aspect of the economy.

The decision to build the National Water Carrier, for the purpose of moving water from the Kinneret southward across 130 kilometers was made in 1948. Implementation of the project, which involved diverting water from three rivers as well - the Jordan, Yarmuk and Litani - from north to south, took until 1964.

The idea to move water southward to the Negev was first broached in 1939 by an international soil conservation expert, Walter Clay Lowdermilk. His book, "Palestine, Land of Promise" stirred the leaders of the Zionist movement. But today, 50 years after the National Water Carrier was completed, it is clear that the costly project added less than 500 million cubic meters of water a year – less than a third of Israel's water usage at the time. Immense collateral damage was also caused: a drastic fall in the level of Lake Kinneret, the conflict with Syria and Jordan over water and, perhaps gravest of all, the enormous damage to the Dead Sea due to the vast decrease in the amount of water entering it from the Jordan River.

Radically altered situation

Almost secretly, Israel's decision makers, including the Knesset's Finance Committee, which was heavily influenced by the farm lobby, decided to build seawater desalination plants in Israel. There were strong arguments made in public discussions against desalination: the enormous costs involved;

the problem of choosing which method to use; and accompanying environmental problems. With the technologies available in the late 20th century, desalinating a cubic meter of water cost more than $1. No farming industry could bear that expense, so urban consumers would be saddled with the cost.

Desalination in Israel began in 1973, when Mekorot built facilities that operated by reverse osmosis; these supplied the Dead Sea, Eilat and communities not served by the National Water Carrier. It was only 35 years later, in 2008, that the government decided to establish five large desalination plants along the Mediterranean coast, with the aim of providing 505 million cubic meters of water a year by 2013 (a forecast met in full) and 750 million cubic meters a year by 2020. However, since 2008, two technological revolutions – both of which also have far-reaching political implications - have radically altered the water situation in Israel.

The first revolution is the immense decrease in the cost of desalination - from $1 per cubic meter to 40 cents, and even less than that in desalination plants built in Hadera, Palmahim, Ashkelon and at Sorek. The savings will grow further thanks to the use of Israeli natural gas instead of electricity to power the plants. The second revolution is the success of the plants used to purify sewage water that were built adjacent to Israel's cities and towns. Thanks to efficient usage, this water now irrigates most of the country's field crops.

What's odd, though, is that the same people who brought you the abundance - the government, Mekorot and the companies that invested billions in creating the desalination and purification facilities - are not blowing their own horn. The public learns about this success only incidentally, as in the news that Granite Hacarmel Investments, part of the Azrieli Group, made a handsome profit of 100 million shekels ($28.5 million) by selling the Palmahim facility shortly after it was built. It was also reported that the pumping of water the Kinneret via the National Water Carrier has been reduced.

There are at least three explanations for this uncharacteristic silence, in the face of success and the concomitant abundance of water Israel now enjoys. One is that even though the cost of desalination has fallen considerably, the government promised the investors a high price for the water. The government can reduce the amount of water it buys from the desalination facilities, but it cannot pay less than what it promised.

A second explanation is the authorities' fear that if the Israeli public finds out about the true situation, it will demand a reduction of water costs far in excess of the five percent declared earlier this month. (Unpaid water bills in Israel in 2013 totaled more than 200 million shekels.)

Concern that Israelis will waste water if they know how plentiful it really is, is the third reason for keeping the facts mum. But does this justify the authorities' policy of hiding the whole truth from the public?

There is also, perhaps, another reason - a political one - for the authorities' lack of candor about the water revolution in Israel. This is the hope that Israel will succeed in exploiting the water issue as a means for improving its relations with both Jordan and the Palestinians. A dire shortage of water exists in the Palestinian Authority, the Gaza Strip and in the Hashemite Kingdom - in the latter of which the problem has been exacerbated by the influx of refugees from Syria. Israel's neighbors welcome its readiness to supply water immediately from the partly idle desalination plants and to establish similar facilities in the Arab countries.

Indeed, Israel is already sending large amounts of water to Gaza and Jordan. Under Article 6 of the peace treaty with Jordan, the two countries are obliged to cooperate in developing water sources. Thus, Israel supplies Jordan with 50 million cubic meters of water a year from the Jordan and Yarmuk rivers, while Jordan pumps water in the region opposite the Israeli Arava for the irrigation of crops there. Recently, and again almost in secret, Israel decided to increase the supply of Jordan River water to Jordan by 20 million cubic meters a year.

There were also other efforts to help out in the water realm. For example, a Mekorot delegation suggested that Jordan, with its help, build a desalination plant 50 kilometers north of Aqaba, to be fed by water from the Red Sea. Amman eventually decided to forgo practical cooperation with Israel on this project and to avail itself of other experts and World Bank funding. All that's left to Israel from this project, some of whose water will flow into the Dead Sea, was the participation of Energy and Water Resources Minister Silvan Shalom in the signing ceremony last month in Washington.

Despite the veil of silence and the political situation, which is still making it difficult for Israel to become a regional water power, there is no longer any doubt that, like the natural gas that is now

available from the Mediterranean, the expected bounty of water will also effect a change in Israel's economic and political situation. That change is likely to have a beneficial effect on everyone in Israel.

"Over and drought: Why the end of Israel's water shortage is a secret", 24/01/2014, online at: http://www.haaretz.com/news/national/1.570374

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❖ The Sick Middle East

The recent fall of Fallujah, Iraq, to an Al-Qaeda-linked group provides an unwelcome reminder of the American resources and lives devoted in 2004 to 2007 to control the city – all that effort expended and nothing to show for it. Similarly, outlays of hundreds of billions of dollars to modernize Afghanistan did not prevent the release of 72 prisoners who have attacked Americans.

These two examples point to a larger conclusion: maladies run so deep in the Middle East (minus remarkable Israel) that outside powers cannot remedy them. Here's a fast summary:

Water is running out. A dam going up on the Blue Nile in Ethiopia threatens substantially to cut Egypt's main water supply by devastating amounts for years.Syria and Iraq suffer from water crises because the Euphrates and Tigris rivers are drying up. Growing the narcotic *qat* plant absorbs so much of Yemen's limited water supplies that Sana'a may be the first modern capital city to be abandoned because of drought. Ill considered wheat-growing schemes in Saudi Arabia depleted aquifers.

On the flip side, the poorly constructed Mosul Dam in Iraq could collapse, drowning half a million immediately and leave many more stranded without electricity or food. Sewage runs rampant in Gaza. Many countries suffer fromelectricity black-outs, and especially in the oppressive summer heat that routinely reaches120 degrees.

People are also running out. After experiencing a huge and disruptive youth bulge, the region's birth rate is collapsing. Iran, for example, has undergone the steepest decline in birth rates of any country ever recorded, going from 6.6 births per woman in 1977 to 1.6 births in 2012. This has created what one analyst calls an "apocalyptic panic" that fuels Tehran's aggression.

Poor schools, repressive governments, and archaic social mores assure abysmal rates of economic growth. Starvation haunts Egypt, Syria, Yemen, andAfghanistan.

Vast reserves of oil and gas have distorted nearly every aspect of life. Miniature medieval-like monarchies like Qatar become surreal world powers playing at war in Libya and Syria, indifferent to the lives they break, as a vast underclass ofoppressed foreign workers toils away and a princess

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deploys the largest budget for art purchases in human history. The privileged can indulge their cruel impulses, protected by connections and money. Sex tourism to poor countries like India flourishes.

Efforts at democracy and political participation either wither, as in Egypt, or elevate fanatics who cleverly disguise their purposes, as in Turkey. Efforts to overthrow greedy tyrants lead to yet-worse ideological tyrants (as in Iran in 1979) or to anarchy (as in Libya and Yemen). One commonly roots for both sides to lose. Rule of law remains a *fata morgana*.

Islamism, currently the most dynamic and threatening political ideology, is summed up by a morbidHamas declaration to Israelis: "We love death more than you love life." Polygyny, burqas, genital mutilation, and honor killing make Middle Eastern women the world's most oppressed.

Middle Eastern life suffers from acute biases – often official – based on religion, sect, ethnicity, tribe, skin color, nationality, gender, sexual orientation, age, citizenship, work, and disability.Slavery remains a scourge.

Conspiracy theories, political zealotry, resentment, repression, anarchy, and aggression rule the region's politics. Modern notions of the individual remain weak in societies where primordial bonds of family, tribe, and clan remain dominant.

The Middle East suffers from an urge to snuff out whole countries. Israel is the best known potential victim but Kuwait actually disappeared for a half year while Lebanon, Jordan, and Bahrain could be swallowed up at any time.

Middle Eastern states spend outsized amounts of their wealth on intelligences services and the military, creating redundant forces to check each other. They venture abroad to buy tank, ship, and plane baubles. They devote inordinate resources to chemical, biological, and nuclear weapons, and the platforms to deliver them. Even terrorist groups such as Al-Qaeda plot to acquire WMD. Cutting-edge methods of terrorism develop in the Middle East.

Economic and political failure creates large bodies of refugees; Afghans have made up the world's largest refugee population since the 1980s; Syrians now threaten to overtake them, sowing poverty and chaos in their lands of refuge. Desperate souls attempt to leave the region altogether for Western countries, with more than a few dying along the way. Those who make it bring their region's maladies to such tidy countries as Sweden and Australia.

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Nineteenth-century diplomats dubbed the Ottoman Empire "the Sick Man of Europe." Now, I nominate the whole Middle East the Sick Man of the World. The region's hatreds, extremism, violence, and despotism require many decades to remedy.

While this process perhaps takes place, the outside world is best advised not to expend blood and treasure to redeem the Middle East – a hopeless task – but on protecting itself from the region's manifold threats, fromMiddle East Respiratory Syndrome (MERS) and harems to mega-terrorism and electromagnetic pulse.

"The Sick Middle East", 25/01/2014, online at: http://townhall.com/columnists/danielpipes/2014/01/25/the-sick-middle-east-n1784131

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❖ Water authorities bracing for expected drought – Nasser

IRBID -- Work on water networks in northern Jordan will address the country's struggle to keep up with an increased domestic demand for water as it faces a flood of Syrian refugees and a looming drought, according to a senior official.

"We are facing a catastrophic humanitarian crisis," Water Minister Hazem Nasser said on Tuesday while handing over pumps and transformers provided UNHCR and Mercy Corps in Irbid Governorate for the rehabilitation of the northern region's water networks.

"One year ago we were in complete chaos; we did not know how to handle the refugee influx. At least now we know our roadmap. We know how to handle it," Nasser said.

"There is a lack of resources, especially financial resources, but this will hopefully come down the road," he added.
Around 600,000 Syrians have found sanctuary in the Kingdom so far, putting a strain on the country's health and education services and already scarce water resources in one of the world's 10 driest countries.

According to the UNHCR, less than a fifth of the Syrian refugees live in Jordan's two official camps, Zaatari in Mafraq and Mreijeb Al Fhoud in Zarqa, with the largest concentration of refugees in the Kingdom's northern region, due to its proximity to the Syrian border.
With the possibility of a drought over the next few months, the minister said he was considering approving an emergency plan for the summer.

"I was hoping this summer would bless us with less suffering, but unfortunately things [have turned out] to be negative. Since the cold spell hit the country in mid-December, we have not gotten any more rain and, according to weather forecasts, it will not be rainy in January or in February," Nasser said.

"We will evaluate the situation on whether to proceed under normal conditions or approve an emergency plan by mid-February. Under drought conditions, our problems could multiply by a factor of five or 10," he added.

UNHCR

The rehabilitation of water networks in northern governorates is expected to provide 30,000 persons with an additional 35 litres of water per day, UNHCR representative in Jordan Andrew Harper said, adding that the UN refugee agency had planned investments totalling about $20 million to support water and wastewater projects in 2014.

In collaboration with global humanitarian agency Mercy Corps, international agencies have already laid out a six kilometre pipe in the northern District of Ramtha and improved the sanitary facilities in 25 schools, Mercy Corps Deputy Country Director Raed Nimri said.

Noting that the vast majority of Syrians live in host communities scattered across the country, Harper said it made sense to start putting more resources into these communities and support projects tackling the country's problems since these would not only help Syrians and Jordanians, but will also last long after the refugees have returned home.

"The materials provided will help us deal with the coming summer," Yarmouk Water Company General Manager Mohammad Rababa said. "We are looking at next summer as a big challenge and trying to be prepared and have all water networks up and running while also searching for new sources of water."

"... We will continue to do what we have been doing so far, ensuring that refugees receive assistance and protection together with the Jordanian government, but there are limits to that, given the lack of resources, water and international support," Harper said while calling for more funds from donor countries.

"The one thing which we are going to strongly lobby for is that if there is a difficulty in getting agreements in Syria, then at least [the international community] should [agree] on the amount of international support a country like Jordan should receive."

"Water authorities bracing for expected drought – Nasser", 23/01/2014, online at:
http://www.zawya.com/story/Water_authorities_bracing_for_expected_drought__Nasser-ZAWYA20140123060512/

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❖ UAE's TAQA eyes investments in water projects in MENA, India

ABU DHABI (Reuters) - Abu Dhabi National Energy Company (TAQA) TAQA.AD plans to grow its water business via new projects and acquisitions across the Middle East and North Africa (MENA) as well as India by creating an independent operation, a company executive said on Tuesday. Currently, the firm's power and water businesses operate together as in many of its markets water desalination and power generation plants are situated in close proximity. The state-owned utility has investments in the energy and power sector from India and the Middle East and Africa to the United Kingdom and north America. Its desalination assets, however, are all located in the United Arab Emirates (UAE). As its sets up a separate water business within the company later this year, TAQA aims to boost its water output by at least 120 mgpd (million gallons per day) in five years by building new desalination plants or through acquisitions. That would mean about four plants each with a capacity of 30 mgpd. "We are looking at doing some projects in the UAE and some across the MENA region and India where the market is huge," Ahmed bin Abbod al Adawi, head of TAQA's global water operations, told Reuters at an energy conference. TAQA may invest in Ghana's water sector after the African state sought the UAE's expertise in this field, he added. TAQA is among bidders for a 46 mgpd independent water project in Qurrayat, Oman. "There is a local and regional market shift to independent water projects, a decoupling from power generation," al Adawi said. This is in part due to the new Reverse Osmosis (RO) technology, an alternative desalination technique that is cheaper, needs less energy and can be sited anywhere along a country's coast. Also, most countries in the region have huge power capacity serving a highly seasonal demand (mainly in summer) that makes it expensive and wasteful to ensure steady water production using power plant-based thermal technology. TAQA, majority-owned by the Abu Dhabi government, has launched its first RO technology project at its existing Fujairah 1 power and desalination plant, investing $186 million to add 30 mgpd of water. The project is due for completion in 2015. (Reporting by Stanley Carvalho; Editing by Mark Potter) This story has not been edited by Firstpost staff and is generated by auto-feed.

"UAE's TAQA eyes investments in water projects in MENA, India", 21/01/2014, online at: http://www.firstpost.com/fwire/uaes-taqa-eyes-investments-in-water-projects-in-mena-india-1352071.html

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❖ Activists slam Thanlwin dam projects for lacking transparency

Environmental activists voiced stern warnings on Tuesday over six dam projects being planned on the Salween River for lacking any social or environmental impact assessment as well as the approval of local communities and the general public.

Local construction giants Asia World, IGE, and Shwe Taung, in collaboration with Chinese and Thai companies, are planning to construct six dams on the Thanlwin River, which crosses Shan State to border Thailand and Myanmar.

"The original plan was to build half of the dams in Thailand. But the local Thai people got to know all the advantages and disadvantages of the projects. After the Thai residents objected to the projects, they are constructed on Myanmar side," said Hein Kyaw from Burma Rivers Network told a press conference on Tuesday.

The Thanlwin, known outside Myanmar as the Salween, flows from the Tibetan Plateau to the Andaman Sea and passes through China, Myanmar and Thailand providing a source of both water and livelihood to many communities.

Kunlon dam, Naungpha dam, Tasang dam, Mantaung dam and Maitong dam have been planned in Shan State while Hatgyi dam and Ywarthit dam will be built in Kayin State and Kayah State respectively. Burma Rivers Network voiced their concerns over the complete lack of transparency involved.

"In Thailand, the rights of local residents are protected by their constitution. But it's completely the opposite on our [Myanmar] side. When we went on field trips, not only the local residents but also MP's from the state parliament did not know anything about the dam projects," said Hein Kyaw.

The bulk of electricity produced from these six projects will be sold to China and Thailand and the project may lead to environmental destruction as well as flooding of farmland, activists say.

Most of the projects are also planned in areas where the conflict between ethnic armed groups and the government is still very much alive. Such big development happening at the expense of local farmers could also aggregate ongoing peace efforts.

"The government will threaten the ethnic armed groups who refuse to accept the projects to leave the land and if they don't leave, there will be clashes," said Hein Kyaw.

The impact on local ecosystems has environmentalists even more concerned as they point out that the dams may also cause changes in the river's water course, impacting livelihoods hundreds of miles downriver. Reducing the flow of the river can result in increasing the levels of salt water in the delta region, effectively destroying the sediment rich soils which are used for farming.

Most of all it is the lack of transparency and public awareness around these projects that is the main worry.

"Local residents don't know about the construction of dams in their areas so they don't know anything about the disadvantages. They didn't even announce them to the public or ask for public opinion," Hein Kyaw added.

Burma Rivers Network has been informing the public, MP's, as well as ethnic armed groups about the dam projects on the Thanlwin River.

They plan a petition in March to call for a cancellation of the projects.

"Activists slam Thanlwin dam projects for lacking transparency", 23/01/2014, online at: http://www.elevenmyanmar.com/index.php?option=com_content&view=article&id=4830:activists-slam-thanlwin-dam-projects-for-lacking-transparency&catid=44:national&Itemid=384

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❖ Gone: Fishing

How will a population so dependent on rivers and lakes stay afloat when faced with a series of mega-dam projects?

"Community livelihoods depend on fish. The villagers fish every day for their income – they really worry about dams," said Youk Senglong, program manager at the Fisheries Action Coalition Team (FACT).

Millions of people fish Cambodia's Tonle Sap lake and 3S (Sesan, Srepok and Sekong) rivers every day to feed their families and the nation, but mooted dam projects along the Mekong River could devastate livelihoods and threaten food security in Cambodia. The country's next major hydropower project will be the Lower Sesan 2 dam, which will be located near the confluence of the 3S rivers and the Mekong.

The Mekong River Commission's (MRC) Strategic Environmental Assessment of the 12 largest planned dams concluded that more than half of the Lower Mekong Basin – the sections of the river located in Thailand, Laos, Cambodia and Vietnam – would become stagnant if the projects were completed.

FACT, an alliance between local and international NGOs, has focused on fish-dependent districts since 2000 when the Vietnam-based Yali Falls dam began affecting the downstream population. "Yali Falls caused a serious disaster – not only with flooding but also with drought," said Senglong.

In a worst-case scenario reported by the MRC, construction of the 12 dams would put more than 100 species of fish at risk of extinction, reducing species by 42%, and resulting in losses of up to $500 million per year for the fishing industry.

"Plans for more than 200 dams will most likely turn off the huge pulse of productivity that occurs, so there is a trade-off – do you want clean energy or do you want food security?" asked Dr Leslie Kaufman, professor of biology at Boston University, in *Hydropower Impacts and Alternatives*, a recent film by ardent conservationist and filmmaker Allan Michaud.

Indeed, of 200 dams planned for the Mekong and its surrounds, many are on minor branches and will not affect the river. It is construction on the Mekong's main tributaries that is a concern.

A November 2012 joint report by the Inland Fisheries Research and Development Institute, the Fisheries Administration and the Ministry of Agriculture, Forestry and Fisheries – all of them Cambodia-based – examined the connection between two Cambodian dams and nutrition vulnerability. The research revealed that only 25% of Cambodians consume enough calories every day and just 19% have the recommended level of iron. Of those with enough iron, 37% comes from fish. Furthermore, with yearly fish consumption of 34kg per person versus the world average of 16kg, Cambodia is heavily reliant on fish for protein.

"This is one of the most intensely fished freshwater areas in the world," said Eric Baran, a scientist at World Fish, an international fisheries research institute. "The 2.6m tonnes of fish caught annually in the Lower Mekong Basin represent seven times more than the catches of the North American inland fisheries sector and more than ten times the inland catch in Australia."

Cambodia's Ministry of Health is aware of the low levels of iron, high malnutrition rates and micro-nutrient deficiencies that are widespread throughout the Kingdom. In a 2008 survey, the ministry found that anaemia in pregnant women was particularly high at 57% and set a goal of reducing it to 33% by next year. A similar study by the World Food Programme (WFP) in 2010 found that more than half of the children tested were anaemic.

Figures from the Ministry of Health also show that 37% of children aged under five have stunted growth due to malnutrition. The Food and Agriculture Organisation of the United Nations (FAO) predicts that schoolchildren will be the biggest at-risk age group if fish stocks reduce, stressing that diversifying diets is key to improving health, but that success also depends on effective technologies and behavioural changes.

Cambodia's reliance on fish as a source of protein makes it acutely vulnerable, according to Baran. "Cambodia is a country where fish production is three times higher than pig production and 20 times higher than chicken production. If it loses fisheries, the agriculture sector will not be able to catch up," he said.

Research is needed about the distinctive bionetwork of the region, including how crops will be affected by changes to the river and siltation, especially as the Tonle Sap's unique hydrology makes it particularly susceptible to change. Flooding at the wrong times and in the wrong places would destroy riverbank farmland, while a lack of nutrient-rich sediment flowing to the soil will obliterate

crop yields. The Upper Mekong dams in China are predicted to have already reduced sediment by 50% in Laos, and Michaud estimates that the construction of the Lower Sesan 2 and Sekong dams in Cambodia would reduce sediment flow by 90%.

A buildup of sediment causes the lifespan of dams to be shortened by decades, and lack of planning for silt distribution has caused problems in other developing countries. Poor research prior to building dams in Guatemala and Honduras has left governments with increasing debts and useless infrastructure.

The World Health Organisation (WHO) cites numerous examples of how dams across the world have led to the spread of malaria, schistosomiasis, filariasis and Japanese encephalitis – parasitic diseases that thrive in and around stagnant water. The Diama dam on the Senegal River caused the biggest outbreak of schistosomiasis ever recorded in Africa and academics credit the first cases of malaria in northern Africa to Egypt's High Aswan dam.

The Yali Falls dam in Vietnam's central highlands, 80km from the Cambodian border, has had a serious impact on downstream villagers in Cambodia where the Sesan river's flow has reduced dramatically. "People don't normally boil the water. They drink straight from the river and it has caused skin problems, especially in children," said FACT's Senglong. "Sanitation is really bad."

Community-based research in Cambodia's Stung Treng province in 2002 reported that locals using the river for bathing and drinking experienced an increase in eye irritation, stomach problems and skin rashes after Yali Falls was constructed.

Researchers also found that displaced residents, no longer able to fish, were forced to supplement their income through means such as wildlife trading and clearing forest to relocate their rice fields to higher ground. FACT predicts that more than 38,500 people will lose access to migratory fish if the Lower Sesan 2 project goes ahead.

Simon Funge-Smith, senior fisheries officer at the FAO, said the difficulty in obtaining accurate statistics on the actual volume of fish harvested causes Environmental Impact Assessment reports to favour construction companies. "Dam projects typically undervalue fish and their role in nutrition and food security," Funge-Smith said. "It's hard to attribute dollar values to a healthy child or normal development – until you lose it."

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Dam it

Three key dams slated for completion in Cambodia in coming years

Stung Treng

(Stung Treng province)

With a 980-megawatt capacity and a 211-square-kilometre reservoir, construction of the Stung Treng dam will result in an estimated 21 villages being displaced.

Sambor

(Kratie province)

At 18km long and 56m tall, with a 2,600-megawatt capacity, the Sambor dam would be the largest in Cambodia with a reservoir of 620 square-kilometres and extend across the Mekong mainstream and the mouth of the 3S rivers. Seventy percent of the power will be routed to Vietnam.

Lower Sesan 2

(Stung Treng province, 25km east of the confluence with the Mekong)

A 75m-tall dam with a reservoir covering 355 square-kilometres and 400-megawatt capacity. Generated power will be routed to Vietnam and sold back to Cambodia.

"Gone: Fishing", 24/01/2014, oline at: http://sea-globe.com/dam-projects-mekong-cambodia/

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❖ Ghana: Bui and the Tale of Three Hydro Dams

GHANA can now boast of three hydroelectric power dams with the completion and inauguration of the Bui Dam Hydroelectric Power project located on the Black Volta, a boundary river between Bole in the Northern Region and wenchi in the Brong Ahafo Region.

With its turbines turning, Bui becomes the third hydro-power plant to be developed in Ghana after the Akosombo and Kpong projects.

This means, three regions of the country can boast of hydro-power dams. These are the Northern and Brong Ahafo regions for Bui and the Eastern Region for Akosombo and the Kpong dams.

Size of dams and capacity

The Akosombo Dam remains the largest of the three, covering an area of 8,502 square kilometres and has an installed capacity of 1,020 MW of power.

The Volta Lake created by the dam is the largest reservoir by surface area in the world, and the fourth largest by water volume. Its northernmost point is close to the town ofYapei and its southernmost at the Akosombo Dam, 520 kilometres downstream from Yapei.

Ghana's famed Akosombo Dam holds back both the White Volta and the Black Volta which formerly converged where the middle of the reservoir now lies, to form the single Volta River.

It takes approximately 36 hours to travel round the vast expanse of the Volta Lake, which has been created by the dam. The Akosombo Dam is 2,200 ft long, 440ft high and 1,400ft wide at the base and holds a water volume of 148 kms (32.6 x 1012 gallons).

The Kpong hydro-electric project, which represents the third stage in the development of the Volta River, commonly known as the Volta River Project, is the third largest dam in Ghana, with a total installed capacity of about 160 MW.

Nonetheless,if all four units at Kpong are running, there is a rise in tailwater elevation, which limits the output of the generation to about 148 MW.

The combined Akosombo/Kpong system has an installed capacity of 1,180 MW, while the Kpong head pond has minimal storage capacity and is therefore operated in tandem with Akosombo, as a run-of-the-river plant to optimise water use from the Volta Lake.

The joint firm energy output from the Akosombo/Kpong hydroelectric. development is about 4,800 Gigawatt hours (GWh).Meanwhile, the Long-Term Average (LTA) capability of the two plants is about 6,100 GWh.

Ghana's second largest dam, the Bui Dam, which was commissioned in December 2013, is the largest chinese- funded project in Ghana and the largest foreign investment in Ghana, since the construction of the Akosombo

Hydroelectric Power Project in the early 1960s, according to Baah et al., 2009.

The main dam's structural volume is 1,000,000 m3 (35,314,667 cu ft), while its full capacity is 12,570,000,000 m3 (10,190,665 acre-It), Its active capacity is 7,720,000,000 m3 (6,258,706 acre-It) and minimum level: 288 km2 (111 sq miles). With a surface area of 444 km2 (171 sq miles) at maximum level and 167 m (548 ft) at minimum level, the Bui Dam has a normal elevation of 183 m (600 ft).

Its reservoir also measures 40 km (25 milesjin average length and has a maximum water depth of 88 m (289 ft).

Construction of the Bui Dam is to increase power supply to meet the growing consumer and industrial demand and is expected to generate 400 megawatts of electricity power.

Construction of the dam

Originally conceived by geologist Albert Ernest Kitson in 1915, construction of the Akosombo Dam by an Italian consortium, Impregilo, began in 1961 after plans were finally drawn in the 1940s, and was completed in 1965.

The first stage of construction of the Akosornbo hydro dam began in 1961 when the Volta River Authority (VRA) was established, and work started on the Akosombo dam and power station.

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Whereas by September 1965, the first power was flowing from Akosombo, marking an important step in the economic development of the newly formed Republic of Ghana, the Kpong generating station was completed in 1982.

Although the actual construction of the Bui Dam began in 2008 and was completed in 2013, it took over 50 years of conceptualisation, drawing of plan, negotiations and scouting for funding before the dream could be actualised.

After a long-term preparation for the Bui Hydro-electric Project in 2007, through international bidding, the employer, the Ministry of Energy, successfully brought in the Chinese governmental aid funds to Africa, and as a.world-class construction contractor, Sinohydro Corporation Limited was contracted to build it.

With the total contracted sum of about US$790 million and the duration of 1,640 days, the project was contracted in international popular EPC (Engineering - Procuring - Constructing) mode.

Financial implications

The Akosombo Dam project was estimated at over GH¢552 million ($258 million, £230 million). This sum was to cover the cost of the dam and power installation (at Ajena), the opening up and equipping of the bauxite mines and a complete plant for producing aluminium, the Volta Aluminium Smelting plant (VALCO).

On the other hand, the Bui Dam project was estimated at US$622 million. It was jointly funded by the Government of Ghana counterpart funding of US$60 million and a concessional loan of US$263.5 million, as well as a buyers credit of US$298.5 million from the Chinese Exim-Bank.

These loans are expected to be repaid in part by the supply of cocoa at the current market prices. Consistent with the Chinese practice of linking their aid to Chinese construction services, the Bui project was undertaken by the Sino hydro Corporation - a state-owned Chinese construction firm.

Socioeconomic benefit and employment

The Akosombo and Kpong dams provide electricity for much of the country, as well as for export to Togo, Benin, and nearby countries, to earn foreign exchange value.

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Lake Volta is also important for transportation, providing a waterway for both ferries and cargo watercraft. Given good management, Lake Volta is the location of a vast population of fish and large fisheries. The lake also attracts tourism, and tourists visit the island of Dodi.

Establishment of the Volta River Authority (VRA), to manage the two dams, has also created permanent jobs for hundreds of Ghanaians all over the country. In 2008, officials of Sinohydro indicated that at its peak, the Bui Dam project was expected to employ about 3000 workers.

The construction and management of the project has already provided about 1,500 positions, while more than 6,000 people have worked at the Bui site since the commencement of the project.

The Bui hydropower plant is also expected to increase the installed electricity generation capacity in Ghana by 22 per cent up from 1,920 MW in 2008 to 2,360 MW. Furthermore, like all hydropower plants, the project avoids greenhouse gas emissions that would have occurred if thermal power plants had been built instead.

An additional expected benefit is the irrigation of high-yield crops on 30;000 hectares of fertile land in an "Economic Free Zone."

Challenges and impact

In spite of the immense benefits the construction of the three hydroelectric dams has brought to Ghana, sight cannot be lost on the challenges and negative impacts they have had on several Ghanaians. As a result of the formation of the Volta Lake, about 78,000 people were relocated to new towns and villages, along with 200,000 animals belonging to them, while about 120 buildings were destroyed.

Also, the presence of aquatic weeds along the lake and within the tributaries has resulted in even greater detriment to local human health, as the weeds provide the necessary habitat for black-fly, mosquitoes and snails, which are the vectors of waterborne illnesses such as bilharzia, river blindness and malaria. These diseases have increased remarkably, since the construction of the dam.

Additionally, the loss ofland experienced by the 78,000 people relocated meant the loss of their primary economic activities from fishing and agriculture, loss of their homes, loss of their family

grave sites, loss of community stability, and the eventual loss of important social values among others.

Impacts as a result of the Bui dam project can be classified into two - social and environmental. Socially, building of the dam required the forced relocation of 1,216 people, of which only 217 had been resettled as of June 2010. In theory, all affected people were expected to be moved to a new locality called Bui City.

However, as of 2010, the city did not exist and there was not even a schedule for its construction. Instead, the first 217 relocated people were moved to a temporary settlement called Gyama Resettlement Township. Fisherfolk were also resettled on dry land, losing their livelihoods.

The environmental impact was mainly the inundation of parts (21 per cent) 9f the Bui National Park, home to the only two populations of black hippopotamus in Ghana, whose population is estimated at between 250 and 350.

But the then Manager of the Bui National Park,Mr Christian Atsu Fumey- Nassah, is quoted as having said on Space FM in Sunyani on August 29,2007, "We have adequate measures for hippo habitats which would be flooded, but would in the long run be moved upstream",adding, "the issue of translocating the hippos, which wouldn't pose much of a problem, would be addressed later."

“Ghana: Bui and the Tale of Three Hydro Dams”, 23/01/2014, online at: http://allafrica.com/stories/201401231317.html

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❖ Developers Will Be Involved in Dams Construction

Jakarta Provincial Government is going to involve developers to realize the construction of dams in all around the capital city. Later, those dams are expected to be water reservoir areas when rain strikes, so flooding could be decreased.

"Our priority is to manage existing dams this year," stated Vice Jakarta Governor Basuki T Purnama at City Hall, Thursday (1/23).

According to Basuki, Jakarta Provincial Government is prioritizing the construction of dams which has been ongoing since last year. Among those dams are the ones located in Halim Perdana Kusuma and Bumi Perkemahan Cibubur.

"We'll send heavy equipment there. Our priority this year is that," he told.

Moreover, Basuki furthered, Jakarta Provincial Government will also build dams without going through tender process. Later, the construction works will be using equipment belongs to Jakarta Provincial Government.

"Jakarta Public Works Department will dredge (dams) with their own equipment. We'll buy the equipment and do it ourselves just like in Pluit Dam. We'll do the same in Riario Dam," he uttered.

Regarding developers who already have permit for beach reclamation, Basuki continued, they are also asked to build dams according to the rules applied.

"In line with President Decree, developers are obligated to improve land resulted by reclamation. We want them (developers) to free lands in Cengkareng, Ranjungan, including Pantai Indah Kapuk," he said.

In addition, currently Jakarta Provincial Government is also trying to acquisition land as wide as 50 hectares in Marunda, North Jakarta, to be transformed into dam. However, the effort is still hindered

because there are parties still occupying the land.

"We want to dredge, but there are several land lots that are still being occupied. If there was dredger, we do it directly," finished Basuki.

For information, this year Jakarta Provincial Government will finish the dredging of 12 dams in its jurisdiction. Those dams are Bojong, Sunter, Teluk Gong, Situ Lembang, Melati, Rawa Babon, Cengkareng, Grogol, Pegangsaan II, Bujana Tirta, Riario, and Tomang Barat.

"Developers Will Be Involved in Dams Construction", 24/01/2014, online at:
http://www.beritajakarta.com/2008/en/newsview.aspx?idwil=0&id=31402

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❖ Xayaboury dam construction surges ahead after flood delay

Construction of the Xayaboury Hydropower plant is up and running again after being temporarily halted by flooding in the middle of last month, and is now 21 percent complete.

Unseasonally heavy rainfall in the north of Laos last month caused the dam's water level to suddenly increase, spilling over into the construction area.

Minister of Natural Resources and Environment Mr Noulinh Sinbandhit and Deputy Minister of Energy and Mines Mr Viraphonh Viravong visited the site at the end of last week, accompanied by officials and members of the media.

The project's technical deputy director, Mr Rewat Suwanakitti, told visitors the incident was unusual and unexpected.

"However, it didn't impact the construction and will not impact the overall time schedule," Mr Rewat said.

The water level rapidly increased from December 16 to 19. It then took a further two weeks for it to return to normal.

"The two weeks was a small amount of time compared to the total period for construction, which is 90 months," Mr Rewat said.

"Now everything is back to normal and the project is 21 percent complete."

The delegates also visited resettlement villages to see if the people displaced and impacted by the dam were being properly compensated under government regulations, and to ensure the project was helping them escape poverty by 2020.

According to the company 15 villages have been affected, of which six are in Xayaboury province and nine are in Luang Prabang province.

The project has led to seven villages being resettled and eight being relocated.

A total 694 new houses will be built to compensate for the 614 households displaced by the project. All up 3,095 people have been affected.

The delegation visited the new resettlement villages of Talan and Natoryai in Xayaboury province and Ban Neunsavang in Luang Prabang province.

"Through the visit and talking to the villagers, as well as from the evidence of the situation I have observed with my own eyes, we can see that the villagers' lives have really improved," Mr Noulin said.

The minister encouraged the villagers to speak out if they needed help or were facing any problems.

Neunsavang's village chief, Mr Thongda Chanthavong said the village moved to the new area in February last year people had settled quite well.

He said employment in the construction of the dam and the training provision provided by the project had raised family incomes to a total of more than 9 billion kip, which is higher than it was at the old village.

Mr Viraphonh said sustainable income for villagers was a crucial objective of the project and he urged everyone to discuss and pay more attention to ensuring this.

Mr Soukan, the project's resettlement consultant, said the project was strictly following laws and regulations pertaining to compensation for resettled villagers.

Five of the 15 villages have now been resettled, with the rest to be completed by 2015.

The project has provided resettled villages with land clearance, house construction, water systems, electricity, schools, a health care centre, a temple, a market, road access and other compensations.

It also provides training to help villagers in the new settlements learn skills in raising animals and agriculture.

Construction of the US$3.5-billion 1,285 MW Xayaboury hydropower plant, located on the mainstream of the Mekong River, began at the end of 2012.

Commercial operation is slated to begin in 2019. The pre-construction period ran from 2007 to 2012.

The dam's operational phase covers 29 years of the concession agreement from 2019 to 2048, before ownership is transfered to the Lao government.

About 9,000 people are employed in the construciton of the dam. The company is looking to hire more as it estmates it needs over 10,000 labourers.

The project will create jobs for Lao people and the power it generates will be exported toThailand and domestic use earning Laos foreign reserves that can be spent reducing poverty.

"Xayaboury dam construction surges ahead after flood delay", 21/01/2014, online at: http://mekong.waterandfood.org/archives/4772

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❖ Hong Kong cannot afford the false luxury of wasting water

Su Liu calls for holistic management of Hong Kong's water resources, which means officials must do more to capture and recycle wastage

In his policy address last week, Chief Executive Leung Chun-ying made it clear that "Hong Kong needs sustained economic growth to address issues such as poverty, housing, an ageing society, environmental protection and the upward mobility of our young people". Sound familiar? Yes, it is an elaboration of Deng Xiaoping's famous saying, "Development is an absolute principle".

Did Leung mean that "sustained economic growth" is the magic pill to solve Hong Kong's problems? Or was he trying to say that we should seek economic development in a sustainable manner?

Sustained economic growth means achieving growth at any cost; while sustainable development means that at times there may appear to be no growth, but in the long term, growth is sustainable.

Even if economic growth were the sole objective, the policy address missed some fundamental factors enabling such growth. Water is one of them. By nature, Hong Kong's water is in short supply. So what did Leung say about a sustainable water policy for sustained economic growth? Almost nothing.

The "total water management" strategy launched in 2008 governs Hong Kong's water resources management. Ideally, such a strategy would ensure Hong Kong can manage its water in a closed loop.

This loop consists of two halves: the supply of clean water, which is managed by the Water Supplies Department, and the handling of waste water, which is the responsibility of the Drainage Services Department. "Closing the water loop" means considering the two halves as a whole; waste water is a potential resource that can be purified and reused.

Currently, however, the two halves are separate. The water management strategy is driven by the Water Supplies Department, and while it has proposed many initiatives regarding our water supply, it does not fully deal with the other half.

The department believes that "given its geography and population, Hong Kong cannot acquire all of its water resources locally to support growth". Therefore, we must rely on the mainland for most of our water supplies. It has barely explored the possibilities of reclaiming and recycling water.

Such a structure creates the false luxury of being able to waste precious resources. This is evident in our spillage management and flood control operations. In 2013, total spillage from Hong Kong reservoirs reached 40 million cubic metres. This means that rainwater is being deliberately discharged from our reservoirs to make room for purchased water from Dongjiang. Also last year, a further 1.1 million cubic metres of rainwater was discharged from the drainage department's flood storage tanks in two locations.

The added sum does not even reflect the full amount; it excludes rainwater that is captured from the hills through three storm-water drainage tunnel systems and discharged directly into the sea. Water that could have been reclaimed and purified is simply dumped in the sea.

Leung has promised to review our total water management strategy; however, without an overall vision for Hong Kong beyond 2047, this review cannot be meaningful. Hong Kong must consider a water strategy that is capable of closing the loop.

“Hong Kong cannot afford the false luxury of wasting water”, 24/01/2014, online at: http://www.scmp.com/comment/insight-opinion/article/1411856/hong-kong-cannot-afford-false-luxury-wasting-water

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❖ Of dams and droughts

The danger posed to Egypt's water security with the building of Ethiopia's Renaissance Dam is a fact, not the invention of alarmist theories, writes

Egypt has a total water supply of 68 billion cubic metres. Of this, 55.5 billion cubic metres derives from the Nile, four billion cubic metres from subterranean sources in the Delta and Western Desert, eight billion cubic metres from treated agricultural drainage water, about half a billion cubic metres of rainwater, and some 300,000 cubic metres of desalinised water from Sinai. On the basis of global water poverty rates and in light of increasing population figures, Egypt already suffers a water deficit and this could reach the degree of drought by 2025.

In order to forestall such a deterioration in water security and, simultaneously, in order to further development plans, Egypt developed a framework for cooperation with the 10 other Nile Basin countries that would promote the interests and welfare of all. Various agreements and conventions have been signed within this framework, some before and some after those countries obtained independence. In addition, Egypt has carried out many joint projects with upper riparian countries, involving the construction of dams (Uganda and Sudan), digging wells (Kenya and South Sudan) and training technicians in irrigation, agriculture and health.

The most significant development in this regard was the Nile Basin Initiative, which sought to promote bilateral and multilateral cooperation among all Nile Basin countries. However, the aim and spirit of this initiative were undermined by a drive by upper riparian countries to formulate a legal framework, known as the Entebbe Agreement (2010), with which they wanted to replace all previous international agreements that guaranteed Egypt and Sudan's rights to Nile waters and to their established quotas of these waters. In addition to this flagrant denial of Egypt and Sudan's historical water rights, the drive extended to denying the right to prior notification of any hydraulic projects that might harm other countries along an international river course, a right that had been guaranteed under the framework agreement for the Nile and its tributaries signed in 1997. Moreover, instead of the principle of unanimity in decision-making, which is only logical in view of the nature of

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international river courses, the upper riparian countries insisted on the majority vote mechanism for the Entebbe Agreement, a majority that they have claimed now that seven countries signed that agreement.

Ethiopia, as the self-appointed leader of the upper riparian Nile Basin countries, did more than encourage them to put paid to all previous international agreements and principles. It began to implement a number of dam construction projects on the Blue Nile, as part of a mammoth waterworks programme that calls for 33 projects recommended by the US Bureau of Reclamation in 1964. Foremost of these projects is the Renaissance Dam project that Addis Ababa initiated on 2 April 2011.

Naturally, the Ethiopian action triggered an outcry in Egypt in view of the threat that project poses to Egyptian water security and all the more so in light of the impending conclusion of the Entebbe Agreement, which aims to redistribute water quotas among the countries of the Nile Basin and which introduces restrictions on swamp drainage or water-loss projects that can attract waters to Egypt and Sudan.

The Renaissance Dam project, in fact, consists of two dams. The major dam, made of reinforced concrete and used to generate electricity, is now envisioned to be 1,800 metres long and 145 metres high. The second is an auxiliary or "saddle" dam, constructed from stone and rubble directly on Ethiopia's border with Sudan. It will be 4,800 metres long and 50 metres high and have an annual reservoir capacity of 74 billion cubic metres.

This is a remarkable and sudden development on the specifications of that border dam as recommended by the US Bureau of Reclamation in 1964. In those days, the envisioned reservoir capacity was 11 billion cubic metres per year. However, this capacity quickly climbed to 14.6 billion, 63 billion, and now 74 billion cubic metres per year. The dam can be heightened further to generate a reservoir capacity of 100 billion cubic metres per year and increase its electrical power output to 700 megawatts, which would enable Ethiopia to become an energy exporter to its neighbours.

The objections voiced by Egyptian experts of all relevant disciplines to this dam were not based on vague and alarmist speculations. Rather, they were informed by scientific, economic and engineering facts and figures that are set out in a report by the tripartite technical committee (made up of two experts each from Egypt, Sudan and Ethiopia and four impartial international experts). The experts stressed the following points:

- The information and data supplied by Ethiopia is insufficient to judge the benefits of the dam.
- Potential dangers can arise due to the fact that the geo-mechanical studies, in particular, are incomplete with respect to the geological and mechanical properties of the site of the dam in light of its new specifications.
- Studies on the auxiliary dam have not been performed and, on the basis of the information supplied by Ethiopia, the conditions for securing it are insufficient.
- The calculating models used to design the dam are rudimentary and inappropriate as a basis for constructing a dam of those specifications.
- There are water and environmental dangers that will arise from the construction of the dam.

In view of the foregoing, Ethiopia should take the following steps:

- Halt construction of the dam for an agreed upon period so that the reservations of the technical committee can be addressed.
- Supply accurate and transparent statistics to enable the technical committee to assess potential dangers and devise solutions to avert them.
- Commit to implementing the recommendations of the joint technical committees, especially that advising Ethiopia to build several smaller dams which, combined, can insure its electricity needs while not endangering the water security of other countries, particularly Egypt, which is the most vulnerable to the dangers of reductions in the flow of water.
- To reach a tripartite agreement with Egypt and Sudan, backed by international guarantees, to regulate the construction of dams in Ethiopia and Sudan, on the Blue Nile in particular, in a manner that is not prejudicial to Egypt's rights and the Egyptian people's right to life.

Egypt has a water deficit of 23 billion cubic metres a year. This is a concrete fact. The urgent question, therefore, is how to compensate for the deficit. If this challenge is already formidable in view of the mounting pressures that population growth would place on our water supplies with

existing quotas, imagine how formidable it would be if the deficit is further magnified by the following factors:

- The creation of a commission under the Entebbe Agreement of 2010 whose chief task will be to work out a new redistribution of Nile waters, which will jettison the historical quota system that had assured Egypt and Sudan 84 billion cubic metres per year, of which Egypt obtained 55.5 billion cubic metres per year.
- The shortages in Egypt's Nile water resources as a result of the construction of Ethiopian dams and the creation of a large enough reservoir to generate electricity which, in itself, is a complex question (what systems and mechanisms will be used to guarantee the flow of water to Sudan and Egypt, even at currently existing levels?).

Surely such scientific and technological facts should have convinced Ethiopia that it should not push ahead with a hydraulic project of that scale, given the certain dangers it poses to Sudan and Egypt. However, Addis Ababa has remained stubbornly uncooperative. In the negotiating rounds on 4 November and 8 December 2013, and 4 January 2014, it rejected all Egyptian confidence-building proposals as well as the offer of partnership in the dam on the condition of danger aversion. Cairo was thus forced to declare these rounds a failure and suspend talks until Ethiopia produces something positive. As for the Sudanese position, that is another subject entirely.

The writer is former president of Menoufiya University and an expert on Egyptian water issues.

"Of dams and droughts", 23/01/2014, online at: http://weekly.ahram.org.eg/News/5183/21/Of-dams-and-droughts.aspx

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❖ Gujarat scientists develop 'nano-film' that prevents water loss by 90%

An innovative attempt is being made by scientists in Gujarat to develop a water-conserving farming technique than can better Israel's drip-irrigation system. Two universities in the state have developed an artificial "molecular-blanket" or a "nano-film" that can prevent water-evaporation from soil by 90 percent.

"By using this molecular blanket, we have been able to prevent evaporation loss by 90 percent and we have also discovered that the plant tends to grow 50 percent faster and taller, said Professor Dinesh O Shah, founding director of Dharmsinh Desai University (DDU), that is collaborating with scientists of the Anand Agricultural University (AAU) on develop this technique.

Shah, a former professor emeritus of Chemical Engineering and Anesthesiology at University of Florida, is currently heading this research on molecular blanket which is a thin "nano-film" of material developed using the same substance used in water-proofing of concrete. This film, which is nothing but a "hydrophobic capillary wall", when applied to the soil prevents large-scale evaporation losses, says Shah who was in the city to deliver the Father Herbert D'Souza Memorial Lecture on 'World of Surface Science and Nanotechnology' at St.Xavier's College on Monday.

"In collaboration with AAU, we grew 'chana' (gram) in beakers containing soil that was covered with this molecular blanket, and we found that plants grew 50 faster and taller than a normal plant. The number of leaves on these plants were also 16 times more compared to a normal plant," said Shah who has contributed to nine patents and 250 research papers.

"This is the next best thing to the drip-irrigation-system popularised by the Israeli's. Molecular blankets are the future of water conservation, especially when water is becoming more and more expensive," Shah said adding that the nano-film developed by them is not an expensive one. "It needs more field trials," he added.

Shah said that the team of scientists working with him were now looking to develop this nano-film from a "bio-degradable material". "We are now trying to develop a biodegradable molecular blanket which will disintegrate in 6-8 months and will thus allow water to seep in the soil during the monsoon.

"Gujarat scientists develop 'nano-film' that prevents water loss by 90%", 20/01/2014, online at: http://www.financialexpress.com/news/gujarat-scientists-develop-nanofilm-that-prevents-water-loss-by-90-/1219353

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