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Children like this boy in Gaza face the worst of water scarcity.

OILING THE WATER FLOW

By Thalif Deen

The volatile politics of the Middle East has long been dominated by the fluctuating fortunes of a single commodity: oil.

But as another critical resource grows increasingly scarce, future conflicts could very well revolve around water.

At the first International Water Summit (IWS) in Abu Dhabi, over 30,000 participants, including political and business leaders, met to avert such a grim scenario by discussing common strategies to manage water resources sustainably.

Crown Prince General Sheikh Mohammed bin Zayed Al Nahyan stressed at the Summit, "For the United Arab Emirates (UAE), water is (now) more important than oil." Indeed, desertification is a sweeping environmental problem, with widespread effects in countries such as Syria, Iraq and Jordan, where shortages have driven up the cost of water 30 percent in 10 years.

"One shared factor of all the countries in the Middle

East is their lack of water resources and poor water management," says Munqeth Meyhar of Friends of the Earth Middle East, who closely monitors the mounting water crisis in the region.

Besides global problems like climate change, the main culprits include unsustainable agriculture practices and overgrazing. Agriculture alone monopolises 70 percent of fresh water in the Mideast/North Africa region.

A raft of new water projects is now in the works, ranging from multi-billion-dollar government-led infrastructure ventures to high-tech innovations in areas such as low-energy desalination, water leakage prevention and water efficiency.

With some of the world's largest hydrocarbon reserves, the Middle East is well-positioned to invest heavily in solutions.

The paradox is perhaps best described by a Kuwaiti official who once remarked, "Whenever we dig for water, we strike oil."



WATER, WATER EVERYWHERE...

By Naresh Newar

In less than a decade, the desalination process of converting sea water into drinking water has become a technological dream come true for arid countries across the world, especially in the Gulf region.

Desalination technology has moved incredibly fast, experts say.

"There have been more rapid changes in desalination technology in the last five years than we saw in the last 50 years," Dr. Corrado Sommariva, president of the International Desalination Association (IDA), tells TerraViva.

This was made possible by the lower cost of membrane desalination and the pressures from mounting water scarcity.

The same period has witnessed a 57-percent increase in the capacity of desalination plants on-line, to more than 75 billion litres per day, according to a joint report by IDA and Global Water Intelligence (GWI).

Today, desalination meets just one percent of the world's water needs, but by 2025, it is expected to grow to 14 percent.

The largest membrane desalination plant is in Australia, and much bigger plants are planned for Algeria and Israel. Saudi Arabia has the world's largest thermal

desalination plant.

The main problem is that desalination is still expensive and very energy-intensive. This means recycling desalinated water should be given greater priority.

Ironically, it is largely the water-rich countries that have proven most effective in economic use of water, experts say.

Japan, for example, has a history of water reuse of almost 50-60 percent, even though it is blessed with abundant fresh water resources.

"Japan has such high water-use value, and the Gulf states are way, way below," Ghassan Ejeh, senior vice president of the Belgian firm Besix, told TerraViva.

The biggest challenge now is to reduce energy consumption for the desalination process, and renewables like wind and solar offer an innovative solution.

"Our challenges in the coming days are (the) energy footprint. The nations which were built on oil-rich economies - energy efficiency was never their emphasis. But that has to change now."

It seems that making water at any cost is simply not sustainable.

...AND NOW SOME DROPS TO DRINK

By Naresh Newar

Arid countries across the globe are finding themselves high and dry, with not enough groundwater to slake the thirst of both food crops and people.

But for coastal states, there is an obvious solution, although it is often energy-intensive.

"The only option left for those countries is to desalinate, take the salt out of the ground water or sea water," says Tony Scowen, business development director of Xylem, a U.S.-based company with desalination plants in the U.S., Middle East and Europe.

Xylem's plants distribute 40 to 190 million litres of water every day. The biggest is located in Dubai's port town of Jebel Ali, with a daily capacity of over 100 million litres.

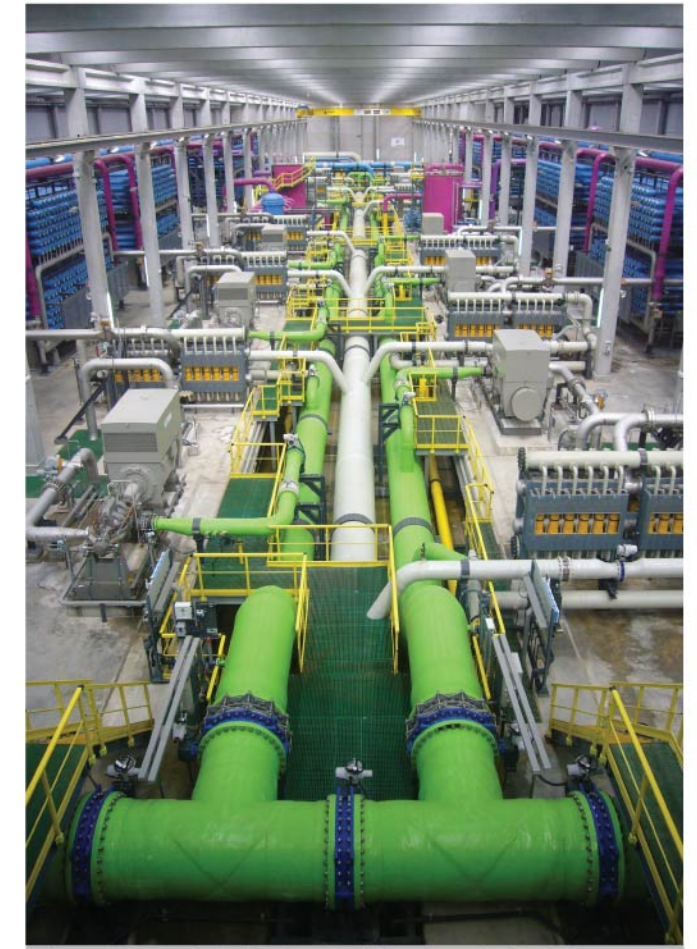
Xylem uses Reverse Osmosis (RO), a pressure-driven process that separates fresh water from other substances via a semi-permeable membrane. It begins by drawing in sea water from about 100 metres offshore and transporting it to the land-based treatment plant. The water passes through a six-millimetre screen to remove any rubbish and is then lifted by pumps into two sets of filters that remove sizeable particles.

From there, the water goes to holding tanks and is pumped again into the five-micron cartridge filters, and finally into the very fine RO membranes, which separate out unwanted molecules - including the salt. The end product is then re-mineralised, returned to a holding tank and distributed to the public.

The waste water, which is more saline after the process, is pumped back into the sea, away from the inlet.

"The main challenge is to ensure that contaminants in the sea don't get through to contaminate the membranes or get biological build-up on the membrane," Scowen explains.

He adds that the technology is evolving due to the growing popularity of



A reverse osmosis desalination plant in Barcelona, Spain.

desalination, in countries from Saudi Arabia to Spain.

But the future expansion of desalination will depend

in part on boosting the process' energy efficiency: an average modern reverse osmosis plant today needs six kilowatt-hours of electricity to desalinate one cubic metre of water. But many in the field are optimistic that technology will develop to make the equation more sustainable and less expensive.

Desalination alone cannot solve the water crisis. Water-scarce countries are urged to be open to recycling "used water" - a term that experts at the World Future Energy Summit seem to favour over "waste water". High priority must be placed on recycling and reuse. "We need to be able to collect back used water and (have) the ability to invest in infrastructure and systems to treat it and use it, and then top up the water we can use," says Harry Seah of Public Utilities Singapore.



Roma Juma makes tea for guests using her smoke-free stove.

GREEN PEACE

By Zofeen Ebrahim

The sight of a pregnant woman carrying a pile of firewood on her head with a toddler at her side is a fairly common one in many developing countries. But what many don't know is that of the nearly 1.5 million people who die due to indoor smoke, 85 percent are women and children.

"That is double the number of people dying from malaria," said Dr. Kandeh K. Yumkella, director general of the United Nations Industrial Development Organisation, Chair of UN-Energy, and soon to become the U.N. Secretary General's Special Representative for Sustainable Energy for All.

Speaking at the launch of the task force on energy and security in Abu Dhabi at the World Future Energy Summit, Yumkella explained how the growing demand for energy has increased economic and social vulnerability, especially for people in the poorest parts of the world.

The task force, formed by Masdar, Abu Dhabi's renewable energy company, and the International Peace Institute (IPI), aims to examine the effectiveness of mechanisms to defuse energy-related conflicts, the impact technological advances will have on the future

international energy dialogue, and the role renewable energy will play as a peace dividend. "Energy is a source of tension and conflict," pointed out Terje Roed-Larsen, president of the New York based IPI, a not-for-profit think-tank dedicated to promoting the prevention and settlement of conflicts by strengthening international peace and security institutions. As energy wars brew across the globe, Larsen, giving examples of conflict-riddled Northern Iraq and South Sudan, said there was an urgent need to respond to the crises that are "so costly to lives and livelihood". Currently, 1.3 billion people are without access to energy and 2.7 billion people rely on traditional biomass. Terming it a very "important" task force with a critical mandate, Dr. Sultan Ahmed Al Jaber, CEO of Masdar, who is also the United Arab Emirates Special (UAE) Envoy for Energy and Climate Change, said that energy demand will go up by 50 percent in the next few years. "Competition will intensify and should not be overlooked while solving the global security puzzle," he said. "Reinforcing the need for clean, secure energy will ease geopolitical tensions."

STAR RISES A LITTLE

By S. Suri

Any comparison of energy output from renewables with conventional energy sources must necessarily fail at the start. Renewables are new, they are a beginning, and it's still too early to weigh such figures and to discount renewables. But despite significant advances in Abu Dhabi and Morocco, and promising commitments by the Saudis, the MENA region was reminded it is still doing less than many others.

"The total installed capacity (in the MENA region) is less than 1 GW, excluding hydro," Tareq Emtairah, executive director of the Regional Centre for Renewable Energies and Energy Efficiency in Egypt, told a meeting. The meeting was billed: "MENA, A Rising Star in Renewable Energy Investment".

"Between 2002 and 2011 less than six billion dollars was invested," he said. "Italy alone did that much in 2011." In the larger pattern, he said, "of 22 Arab countries, 16 have indicative targets. But we do not see stability in commitment to

renewable energy."

Emtairah said the pricing and tariff structure was not conducive to deployment of renewable energy. The need to address low-income end users is understandable, he said, but subsidies for conventional electricity in MENA countries were already costing 50 billion dollars annually.

"The ingredients are there but they have not been put together," said Marc Fevre, Partner, Baker & McKenzie firm in UK. However, putting them into place is still possible given new commitments, he said.

A major commitment has come from Saudi Arabia. "We are happy to see Saudi committing to 54 GB capacity by 2035, which would be substantive," said Stefan Singer, director of the Global Energy Policy at WWF International. "It's a very strategic move for whatever reasons."

But setting targets is one issue, he said. Putting them into a national participatory context is another.

"We hope MENA becomes a rising star at some point in time."

Apart from investment, many countries in the region have not considered grid connections, he said.

"Grid connections are not boring connections between power stations," he said. "They are critical to bringing the fruits of renewables to people." And they are fundamental to energy planning. But that brings up the comparative issue again. Why compare to conventional energy sources? Compare to the zero, some say, where renewables were not long back.

"Ten years ago, Masdar (the Abu Dhabi company leading investment in renewable energy) did not exist," said Yousif Al Ali, director of the Shams solar project in Abu Dhabi, the biggest in the region. "The science park in Qatar was not there. And many others. But today I am optimistic and excited. I believe we will be a rising star. We have put the foundation to be a rising star."



The Shams solar plant in Abu Dhabi is an island of success in MENA.



MOST SCARCE, MOST NEEDED

Mohammed Eid Obaid has a hard job as water manager with the Al Ain Distribution Company. He is in charge of supplying water in an area where he says “the need is more, and water is scarce.” That job is best done, or done better, he says, by saving water, more than finding new water. In developing countries, he says, an average 30 percent of water is wasted. “In some countries it is 70 to 80 percent.” For a man in that job, waste water is “non-revenue water.” Water is best saved not just by turning the tap off, but by fixing leaks. And not always with a visibly leaking tap. “Only 10 percent of leaks are visible.” And so the company has set up extensive technology “to detect and locate the leakage.” Not all the water he can produce or save is enough to give his 72,861 customers 24-hour water, though. Water supply is restricted to short periods through the day. He needs to produce more, and save more – demand he says is rising five to eight percent a year. But his company is catching up – loss of non-revenue water has been saved considerably. It’s a difficult balance, but keeping it is his job.

A woman finds the oldest way to carry water to her home in Cairo.

SALT OF THE EARTH

Saline water is not bad water, as we think. And worse, as a lot of farmers think. Because they are the ones who may need to make friends with it. In the Dubai emirate within the UAE, “only three percent of the water is fresh,” says Dr. Rachel McDonnel from the International Centre for Biosaline Agriculture in Dubai. Saline water, she says, can be a resource. The institution has been conducting experiments to see how long, for instance, date palms can survive in saline water. They did – it’s just that they didn’t produce any dates. But then again, “50 percent of the date palms grown in Dubai are not for fruit.” Given how many there are, there can be huge savings on

date palms that are irrigated with saline water. Convincing farmers is the problem – “farmers tend to be conservative,” she says. And so the institute is promoting models where farmers can see how it works. “If they can see it, they will believe it.” And believe also that they may not need to irrigate every day. Once in three days seems to suffice in many cases. And that too means a two-thirds saving straightaway. Also, combined with agroforestry, they are beginning to discover “what wonderful species we can grow in saline water.” And they are also “looking at which species improve soil fertility. That then means less fertiliser, and saving water.” Dubai is oil-rich but water-frugal.

EVERY DROP COUNTS

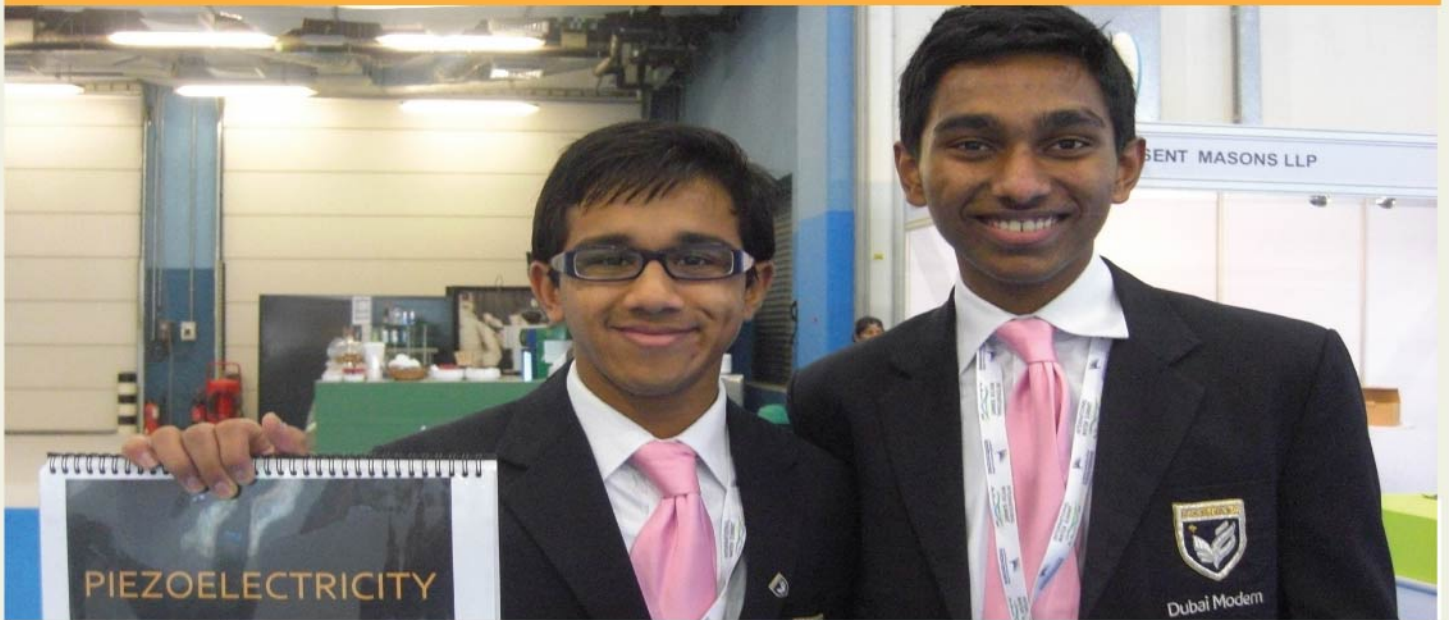
“When it’s gone, it’s gone forever.” Razan Khalifa Al Mubarak, secretary general of the Environment Agency of Abu Dhabi (EAD), is talking about groundwater, a non-renewable resource that has reached the tipping point. Situated in one of the most arid regions of the world, the UAE has realised that it will have to use its groundwater more judiciously and efficiently if it wants to extend the lifespan of what’s left. It has begun relying increasingly on non-conventional sources such as desalinated and treated sewage water, and minimising water use in the agriculture sector and public spaces. “In the UAE, during 2012, the area of soil-less agricultural production increased by 12 percent thanks to glasshouses and use of hydroponics,” said Al Mubarak. The Abu Dhabi government has also implemented an Agriculture and Food Safety Policy which supports farmers and provides them with incentives to adopt best agricultural practices. Another measure will be adoption of targets for water consumption as part of the Abu

Dhabi Environment Vision 2030, led by the EAD. A Water Council has been set up to ensure better integration between different stakeholders working on water policies in the future. And, after a comprehensive soil survey in the UAE, the best agricultural soils have been identified and this knowledge will be combined with water availability to optimise the crop yield. Efficient irrigation techniques like subsurface irrigation are also being piloted.



As the child knows, every drop counts.

POWER AT EVERY STEP



Anjaneya Malbani (left) and Abhyuday Sooriyeh at the WFES green ideas fair.

By A. D. McKenzie

Would those long treks through airport corridors become more tolerable if travellers knew they were creating electricity with each weary footstep?

Some enterprising young people present at the World Future Energy Summit (WFES) in Abu Dhabi certainly think so. They dream of installing piezoelectricity tiles at airports as a way of generating clean energy.

Piezoelectricity comes from mechanical stress or pressure, such as that of footsteps on the ground. This energy can build up in certain solid materials, particularly crystals and some types of ceramics.

"We can capture this energy using wires and store it in something called capacitors, which are like batteries," said Anjaneya Malbani, a 16-year-old student at Dubai Modern High School, an Indian-curriculum school in the

emirate.

He and a group of classmates have drawn up a project that they've been presenting at the WFES's "green ideas" fair. They hope to be selected for a prize that could take the project forward.

"We would like to get this in the United Arab Emirates because the UAE is a big hub and the number of travellers here is expected to grow a lot in the coming years," Malbani told TerraViva in an interview. "Since we're based in Dubai, we're looking at the Dubai International Airport, which is predicted to have one hundred million passengers (per year) by 2020."

Piezoelectricity is not a new concept as it was used in sonar during the early part of the 1900s, and has been employed in other applications over the years. The East Japan Railway Company installed power-generating floors at their Tokyo station, for instance,

to harvest the energy produced by thousands of moving feet.

Tiles with crystals that can retain piezoelectricity do not come cheap, however. Abhyuday Sooriyeh, another 16-year-old student who's involved in the project, said a tile of one square metre costs around 7,500 dollars.

"You may think it's really expensive, but if you put the tiles in the right places, the whole thing reaps profits," he said. "We would like to see them in areas with the most passage of course."

Each footstep creates eight watts of electricity, Sooriyeh explained, and that is even at a leisurely pace. More can be created by running, brisk walking or fast dancing, for instance.

Will we be seeing passengers doing the tango through airports in the future? Dancing to generate clean energy could well become a new trend among the upwardly mobile.

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