



# *Magazine.*

**WATER & DEVELOPMENT**

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# When Soda Replaces Water



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EDITOR IN-CHIEF

In the mountains of southern Mexico lies the city of San Cristóbal with around 170,000 inhabitants. Located in one of the rainiest regions in the country, you might be surprised to learn that many neighbourhoods in San Cristóbal only has running water two days a week. Luckily for the people, however, there's a local bottling plant just next to the city. Unfortunately, it doesn't bottle much water – but Coca Cola.

In order to make one liter of Coca Cola you need two liters of water, and thus the production has started to dry up local wells

and water reserves. In addition, the famous soft-drink producer has made its products so cheap and accessible, while the availability of water is scarce, that residents in San Cristóbal drink, on average, two liters of soda every day.

Now, of course, water issues are not limited to Mexico. Instead, it's a global crisis of inequality. While twelve percent of the world's population uses 85 percent of the planet's water, it is estimated that around 1.1 billion people in developing countries lack access to clean water. Furthermore, a UN report concluded that some of the

world's poorest (residents in the slum areas of Manila and Accra), pay significantly more for water than people living in London, New York or Rome.

This is what is up for debate in this issue of FUF Magazine. We will take you from China, through Uzbekistan, Tajikistan, Sri Lanka, Jordan and the US, to Iran – all in order to shed light on the issue of water. In

any case, however, the citizens of San Cristóbal do not have to worry. According to a Coca-Cola press release in response to protests, the company says they have planted "more than 205,000 trees" in the Mexican state of Chiapas. So even if the citizens don't have water, they can at least go for a stroll in the woods!

*Have a good read!*



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# Droughts & Climate Change are Drivers of Religious Extremism

An article by Johanna Caminati Engström



Photo: EC/ECHO/Anouk Delafortrie, Flickr.

As Boko Haram keeps making the news headlines and with 10.7 million people in urgent need of humanitarian assistance, the crisis in the Lake Chad basin is alarming. Drought, climate change, corrupt governance and religious extremism are only some of the overlapping challenges that the international community faces.

"I believe that the tragedy of Boko Haram is inextricably linked to poor water management," said Amina J. Mohammed at the World Water Week in Stockholm last August. The Deputy Secretary-General of the United Nations and previously Nigerian Minister of Environment was referring to the complex humanitarian crisis in the Lake Chad Basin. The lake, situated in the Sahel region, is shared by Cameroon, Chad, Niger and Nigeria, and its basin extends to Algeria, Libya, and Sudan, impacting the livelihoods of nearly 40 million people.

Since the 1960s, Lake Chad's surface area has shrunk by over 90 per cent. Yet, a recent study found that the lake size has not decreased since the 1990s but remained stable in the past two decades. Nevertheless, climate change is having profound adverse impacts on the conflict and climate projections show that weather conditions will become more extreme and

unpredictable. In addition, the Logone and Chari rivers flowing into Lake Chad are heavily exploited for irrigation. This makes the lake highly sensitive to fluctuations in water inflow and temperature that affects evaporation.

The populations of the Sahel region are known to be resilient. They have had to cope with the general cyclical climate pattern and its variability, where three seasons define where water can be found and what can be grown. They have done so th-

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*As farming and pastoral livelihoods suffer, the region has become a recruiting ground for Islamic extremism*

rough diversification and semi-nomadic lifestyles as well as trade and seasonal migrant work. Yet, the current web of cau-



ses is complex and has undermined such resilience strategies. It encompasses conflict, water and environmental mismanagement, climate change and population growth.

As farming and pastoral livelihoods suffer, the region has become a recruiting ground for Islamic extremism with the militant group Boko Haram. The group's ambition is to impose a stricter interpretation of Sharia laws to fight the corruption resulting from Western colonial education. Since 2009, the Boko Haram insurgency and the government's military response have killed tens of thousands of civilians and displaced millions across the Lake Chad region. It has also disrupted all humanitarian activities taking place in the Lake Chad Basin, where an estimated 10.7 million people need humanitarian assistance.

These overlapping crises are concerning. Key donors have set up the Oslo Consultative Group on the Prevention and Stabilization in the Lake Chad Region in order to coordinate their response. At the regional level, the Lake Chad Basin Commission and the African Union Commission have adopted a regional stabilization strategy. With Boko Haram still making the news headlines, the conflict seems far from resolved, but the militant group will unlikely be defeated on the battlefield alone. The international community agrees that the response has to be multidimensional and target the drivers of insecurity of the region, including poor and corrupt governance, drought and environmental degradation. Also, resilience-building programs should focus on equitable water management while empowering local populations and building social cohesion. Or religious extremism will win.



**Johanna Caminati Engström**

Johanna is a Master's student of International Development and Management. With a background in Human Rights Studies, her fields of interest include global justice issues with focus on the environment, feminist theory and development cooperation. Regions of interest are the MENA region and SSA.





# BUILDING THE TALLEST DAM IN THE WORLD

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A featured article by Tessa Stockburger & Jonathan Wirths



Water has often been a central topic in the relations between the five former Soviet Republics: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The current construction of Rogun Dam on Vakhsh River in Tajikistan illustrates how the demand for water can become the source of various conflicts.

**M**ost of Central Asia's water comes from the upstream countries Kyrgyzstan and Tajikistan, from where it channels downstream to Kazakhstan, Turkmenistan and Uzbekistan. During the era of the Soviet Union, the upstream countries were provided gas and coal during winters to generate heat and power. However, water and energy sharing agreements broke down following the collapse of the Soviet Union. Relationships between upstream and downstream countries became increasingly tense which aggravated water management, energy availability and poverty levels.

Tajikistan has been particularly affected, with families living without heat or light during temperatures as low as -30 degrees Celsius for weeks at a time during winter. To resolve energy shortages, Tajikistan has continued to push for the development of hydropower facilities, most recently

Rogun Dam, projected at 335 metres. Rogun Dam is hoped to boost the national economy through power exports to countries such as Pakistan and Afghanistan. However, since its proposition in 1959, it has had many setbacks such as the resistance from various parties. For decades, Rogun Dam has cast a shadow on Tajik relations with its neighboring countries, particularly Uzbekistan. While the Tajik government perceives the project as an economic and hydro-energy opportunity, downstream Uzbekistan is concerned with the potential increase in droughts. In response Tajikistan has said that if its neighbour sponsors the project, it would be able to control the annual release of water, but Uzbekistan's former president was not willing to change his stance.

The ongoing conflict with Uzbekistan eventually led to the World Bank's feasibility study from 2014. Both governments had previously agreed to acknowledge its





*“For decades, Rogun Dam has cast a shadow on Tajik relations with its neighboring countries”*

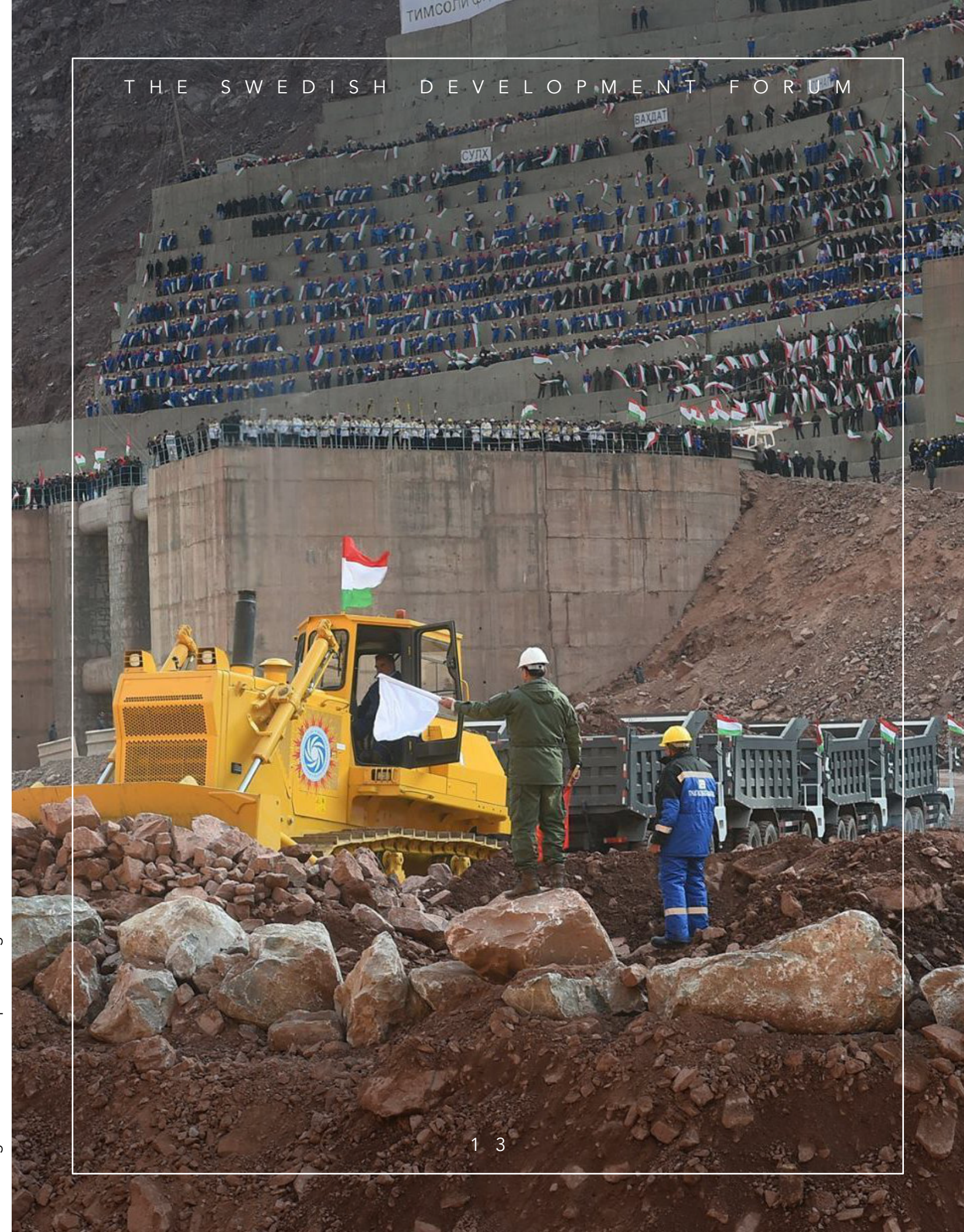
results but did not make any further concessions. The World Bank report concluded that the project could lead to sustainable growth, although some negative impacts would have to be taken into account.

In 2016 with a new president in Uzbekistan, Shavkat Mirziyoyev, the opposition to the dam was eventually dropped and interest in renewing cross-border trade with Tajikistan was expressed. Still, for Uzbekistan, Rogun Dam remains an uncomfortable source of control by the Tajik government which could in theory just turn of the tap and leave the large Uzbek fields unirrigated – a threat to the livelihoods of people living around the Vakhsh River.

Rogun Hydropower Plant will serve the purposes of electricity generation, irrigation for agriculture and the control of water flows. Unfortunately, the dam is not

the silver bullet solution as it is often presented. Construction and filling of the reservoir could take until 2040 or later. Economic and technical considerations weigh much heavier in official plans than environmental and political concerns. One of the main weaknesses of the Rogun Dam is that it is unlikely to provide energy for rural households at an affordable price. While it could close the overall energy gap, that would only be achieved in two decades and it does not solve the distribution problem. Instead, a service-based approach has been proposed that incorporates decentralised, renewable solutions into the energy system. These have proven to be successful for a fraction of the cost and time that large-scale infrastructure projects require.

The construction of Rogun Dam brings with it the resettlement of up to 42,000 people. In this process, Human Rights Watch has found several violations of hu-





man rights that are also in breach of Tajik law. The project could further the acute sense of disenfranchisement among disadvantaged rural populations, particularly among the ethnic minority of Garmi people. Besides facing the burden of having to build new homes by themselves, residents often had to rely on their own money to build these as the government compensation was either not provided or insufficient. Livelihood levels lowered among those resettled due to loss of farmland, limited employment opportunities and decreased food availability whilst expenses increased. Other issues include insufficient access to electricity, water and education and ineffective complaint mechanisms. Homes were partly demolished while people still lived in them without the respective new houses being finished. There's no wonder why tens of thousands

of people have refused to leave their homes as has been reported.

Although civil society and researchers raised concerns about the environmental impact, there is no extensive environmental assessment besides the World Bank's feasibility study. The dam is a large-scale disturbance of hydro and geological systems and will adversely affect ecosystems around the dam and further downstream. Critics of the dam have claimed that it could increase the water deficit and corresponding risk of drought by 22 per cent with the impact reaching as far as the Aral Sea. Environmental impacts include losses in wildlife and agricultural biodiversity, landscape destruction, soil erosion, deforestation and loss of vegetation cover, decreased water quality and groundwater pollution and depletion. Concerns over a

massive disaster cannot be fully appeased yet as the capacity to assess seismic activity in the region is still limited.

Rogun Dam has become a national symbol of progress for Tajikistan and an opportunity to project that same image internationally. Within the country some see Rogun Dam as a national necessity, others have voiced strong criticism. Undeterred from the controversy, the Government of Taji-

kistan pursues this project as a centrepiece of its nationalist ambitions. It is hoped that it accounts for the environmental and human rights concerns that have been raised. Despite the disputes, Rogun Dam could be an important piece of the puzzle that, with international cooperation and complementary energy solutions, could foster development in Tajikistan and the entire region.



#### **Tessa Stockburger**

Tessa Stockburger is a Master Student of International Development and Management at Lund University. Her background is in Public Health working mostly in harm reduction in Australia. Interests include gender equality and sustainable development.



#### **Jonathan Wirths**

Jonathan is a Master's student of International Development and Management at Lund University. Coming from a strong interdisciplinary background his interests encompass water governance, urban development and migration. Having worked with WASH in India for half a year, he is now writing his thesis on agency and transitions in urban water institutions in Ranchi, India.



# When Agriculture Smothers the Ocean

An article by Carolina Yang

Agriculture today feeds off the world's dwindling freshwater resources, yet is a major polluter to the oceans. Dead zone in the Gulf of Mexico is the toxic cultivation from industrial agriculture, choking much of the marine life. The integrated effort in food production and diet could allow the ocean to breathe again.

**D**ating back to 8,000 B.C., the ability to construct irrigation canals facilitated the transition from hunting and gathering to cultivation for human civilization. Today, agriculture withdraws 70 percent of the world's freshwater, and is the main source of water pollution. Water as a molecule travels through a circular system composed of ocean, air, and soil, and serves as a carrier of nutrients and pollutants. Therefore, it connects the seemingly distant agriculture and marine ecosystems and allows the natural ecosystems worldwide to affect each other.

In the summer of 1972, scientists first identified areas in the Gulf of Mexico as a dead zone due to the discovery of oxygen depletion at the bottom of the ocean. In spring and summer, algae would rapidly grow into layers on the water surface, in high concentrations that is visible even in aerial images. After exhausting the availa-

ble nutrients that allow the algae to bloom, the extensive death of the algae and their decomposition proceed to deplete oxygen in the ocean. This drastic drop in oxygen levels leads to the massive die-off among marine life. Global warming exacerbates the situation as warmer water holds lower oxygen storage capacity, at the same time rises the respiratory rate among marine organisms to drain the oxygen at an even faster pace.

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Further studies on the proliferation of algae reveal that the excessive nutrients washed down by the water channels are closely linked to industrial agriculture.



Pollutants from fertilizer and manure brought into the ocean by streams and rivers are contributing to the formation of the dead zone. Agribusinesses like Cargill and Tyson, that slaughter 35 million chickens and 125,000 cattle on a weekly basis to supply meat to retailers like McDonald's and wholesalers like Walmart, have a critical role in the dead zone pollution. Millions and thousands of livestock also imply tens of million tons of manure generated every year, which further deteriorate the quality of the Mississippi River. The

fact that US citizens on average consume the highest amount of meat, 97 kilograms per capita per year in 2016, imposes a murky future for the Gulf of Mexico, with an expected increase to 99 kilograms by 2025.

With the Gulf of Mexico being a symptomatic dead zone among other such 500 sites worldwide, a study shows that paradigm shifts in both agricultural practices and consumption should be rapidly implemented in order to alter the status

quo of the dead zone. Researchers from leading agricultural institutes in the United States are calling for public investment in agroecological principles, to aid the transformation from large scale monoculture to holistic and sustainable production systems. On the other hand, food companies are also taking more initiatives

in serving plant-based alternatives as meal options in the hope of catering to the growing demand. By adopting sustainable approaches from both producers and consumers' sides of the food supply chain, it can revitalize the ocean with a more promising outlook.



**Carolina Yang**

Carolina is a master's student of Agroecology at Swedish University of Agricultural Sciences. With the background in forestry and resource management, she holds great passion in environmental sustainability, with a focus on sustainable food system.





# Jordan is Running Out of Water

A news piece by Siobhan Coseckran

Photo: Leonardo/Flickr.

Jordan is one of the most water-poor countries in the world. Geographical disadvantages are partly to blame; its climate is one of the driest in the world, receiving just 200 millimetres of rainfall per year. Added to this, climate change is reducing rainfall levels even further, while temperatures are rising to a point that threatens the water-supply networks of the Jordan and Yarmouk Rivers. All the while, population growth is increasing the demand for water. In the past ten years alone, Jordan's population has increased by almost 50%.

In this context, the refugee crisis has become a key consideration. Jordan is home to 760,000 registered refugees - the second highest share of refugees per capita in the

world. Over 660,000 have come from Syria alone. Iyad Dahiyat, Jordan's minister of water, estimates that Syrian refugees have increased water needs by 21% across the country, rising to 40% in the north. The ministry has calculated that the water sector has to pay approximately 440 Jordanian Dinar (approximately €550) per year for every refugee.

Jordan is now facing an unprecedented level of pressure on its water resources. The United Nations defines 'absolute scarcity' as a supply of less than 500 cubic metres per person; today Jordan's average annual water supply is 150 cubic metres per person.

The government has mobilised to tackle

the crisis. Crackdowns on water theft in cities have conserved 120 million cubic metres of water in the past 5 years. New pipelines for groundwater and projects to desalinate water from the Red Sea represent an attempt to pursue innovative, long-term solutions. However, projects have been held up by limited funding and concern over unknown environmental effects. As a result, Jordan has relied upon an increased supply of water from Israel this year - from which it already received 50 million cubic metres of water annually.

The government has also taken action to

reduce pressure on resources by restricting numbers of refugees. However, last year, when the government refused entry to 60,000 refugees from Daraa, Syria, Jordanians reacted with anger and social media messages vowed to "share their bread" with the new arrivals. Instead, the structural issues of water use in Jordan have been criticised. Around 65% of water goes to the agricultural sector, where water-saving solutions have not yet been pursued. Without wider changes, fears remain that secure water supply in Jordan may be nothing but a pipe dream.



**Siobhán Coskeran**

Siobhán is a Master's student in International Development and Management at Lund University. She is particularly interested in issues surrounding education, gender inequality, and sustainable development.



# Why Sand is Selling in the Desert

An article by Aida Esmailzadeh Davani & Erika Alm

Selling sand in the desert is an old proverb to describe a skilled salesman. However, the definition may need to be reevaluated. Sand used in construction is becoming a rare and precious resource and the high demand is causing problems for ecosystems and humans alike.

With more and more people moving to cities, there is an urgent demand for new houses. With this comes an increased demand for sand that can be used in concrete and other construction materials. According to a recent article, there has been a sixfold increase in sand extraction over the last 25 years. This excessive use of sand resources is causing ecosystem services to collapse and entire islands to disappear.

The sand used by industries is often found along river banks and coastlines. Consequently, coral reefs are damaged and species that live alongside rivers, for example

crocodiles, fish and dolphins, are disappearing. Furthermore, it is assumed that the sand extraction on the shores in Sri Lanka made the coastal line less resilient to the tsunami in 2004. The rivers from which the sand is extracted are also important fresh water reservoirs for the people living close by.

Since this problem is still relatively unknown to the public, there are currently no major efforts aimed at solving it. According to Aurora Torres, one of the researchers investigating the impacts of sand extraction, there are three main ways of combating the over-exploitation of sand.

The first way is to diminish the need for sand, second, to extract sand in a more sustainable way, and lastly, to pursue other options for sand. One possibility is to reuse concrete and other types of building material by crushing it into smaller fragments. However, the main users of sand are the fast-growing nations in Asia, where

there is a lack of old infrastructure to apprehend this material from. There have, however, been a few successful efforts where sand is replaced by other materials. India's a prevailing problem with plastic waste initiated the idea of substituting sand with plastic granules made from the by-products of the plastic industry.

Sand is a finite resource, like oil and minerals. The shortage of the resource will become even more problematic unless it is addressed promptly by policy- and decision makers. In order to make a difference, awareness must be raised about the excessive sand extraction and that it is in fact an urgent problem.

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Aida Esmailzadeh Davani

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Erika Alm

Erika has a bachelor's degree in Environmental science, and is currently writing her master thesis in Forestry Science.



# When China Turns Off The Tap

An article by Hanna Geschewski

China, source to some of the world's largest rivers, has pushed for the construction of dams along its river systems at an unprecedented pace. But what does this concentration of power over water resources mean for neighbouring countries?

Hydropower is often praised as an environmentally and socially acceptable alternative to fossil fuels in the fight against man-made emissions. For many less industrialised but water-rich countries in particular, it seems to be a promising opportunity to boost economic growth and ensure energy security.

In many cases, however, commercial hydropower development involves the building of large dams along rivers. This has several negative impacts on local communities, which depend on the rivers for their livelihoods, and on the ecosystem health of surrounding areas. But dam construction is not only problematic for the environment and local people. As seen in the case of China's transboundary river policies, they can also be a strategic instrument for withholding water resources from neighbouring countries.

China has more than 40 cross-border rivers with its neighbouring countries, including major water systems such as the Yangtze, Mekong, Brahmaputra, Indus and Ganges. Most of them have their sources in the Tibetan Plateau, which falls largely into the Chinese-occupied region of

Tibet and is also known as the world's third pole due to its enormous freshwater reservoir. More than 1.4 billion people in downstream countries like Bangladesh, Nepal, Pakistan, Myanmar and India depend on the rivers from Tibet. India alone draws half of its river water from Chinese territory, at 347 billion cubic meters per year.

However, in view of increasing water scarcity, it is in China's direct interest to keep as much water as possible within its borders. This explains in part China's urge to build new dams, which could soon make the Himalayas the most dammed region in the world.

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*It is in China's direct interest to keep as much water as possible within its borders*

The Brahmaputra river, or Yarlung Tsangpo in Tibetan, has seen some of the Chinese government's most ambitious dam projects, including 12 existing dams and 28 planned dam projects further down-



stream. In addition, the feasibility of diverting 200 billion cubic meters of water into the Yellow River in eastern China is currently being tested as part of China’s multi-decade South-North Water Diversion Project. At the same time, Brahmaputra is of immense importance for neighbouring Bangladesh and India. At almost 170 million cubic meters, the river’s annual transboundary discharge to India alone is higher than the combined outflows to Southeast Asia. It has been reported that if the Chinese diversion project succeeds, there will be a sharp decline of 60 percent of the total annual water flow to India and Bangladesh.

Given China’s ambitious plans for its cross-border rivers, it is all the more striking that it rejected the signing of the 1997

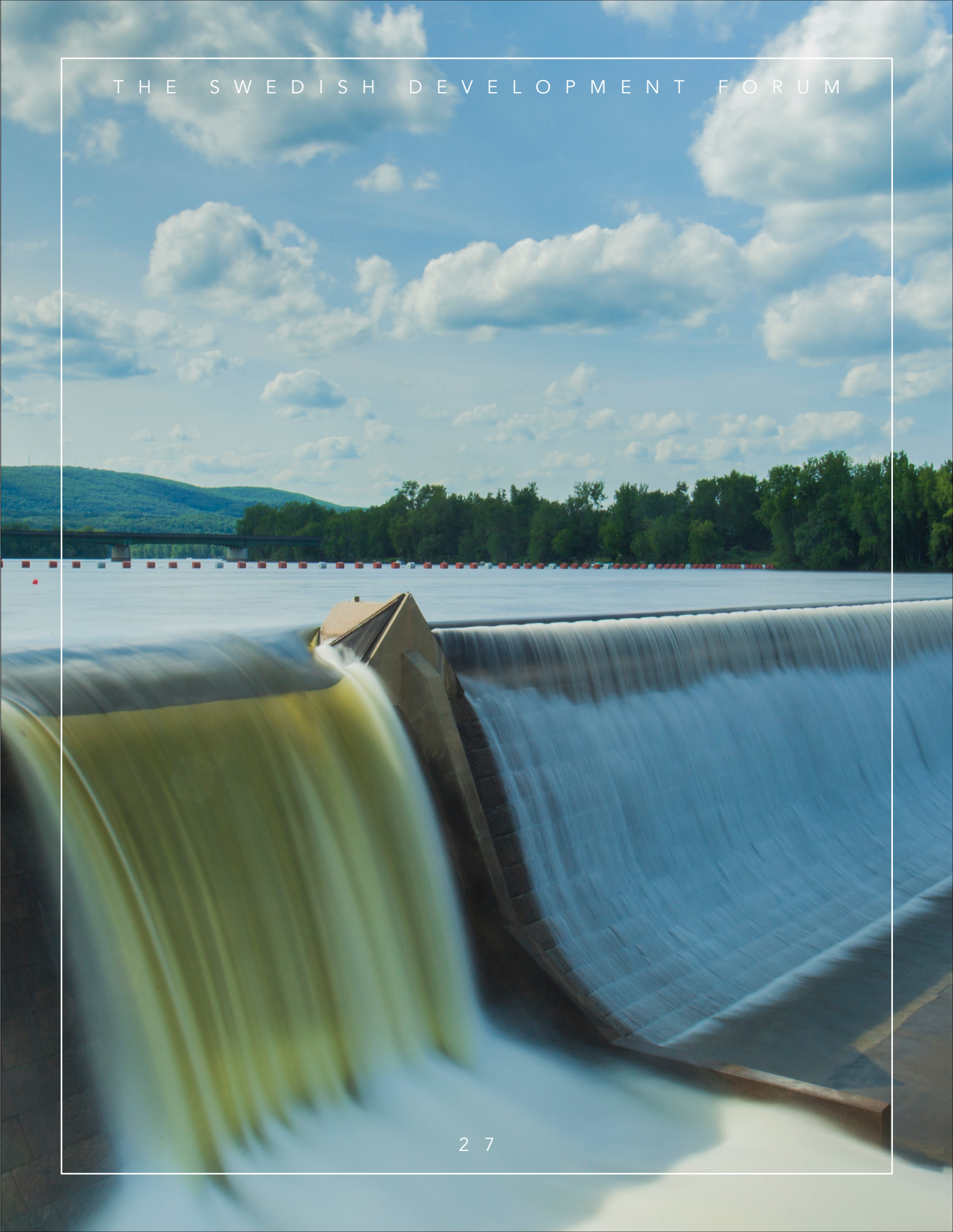
UN Watercourses Convention which provides a legal framework for the management of transboundary water systems. Moreover, there are currently no water treaties between China and its southern riparian states, including India, Bangladesh and Nepal.

This puts China in a unique position of power over water resources. As geopolitician Brahma Chellaney said: “Whether China intends to use water as a political weapon or not, it is acquiring the capability to turn off the tap if it wants to; a leverage it can use to keep any riparian neighbors on good behavior”. This highlights the importance of international binding rules and regulations for the use of transboundary water resources.



**Hanna Geschewski**

Hanna is currently pursuing her master’s degree in Environmental Studies and Sustainability Science (LUMES) at Lund University. She is 28 years old, comes from Northern Germany and has spent the last nine years in Nepal and India, making South Asia her second home.





# Water as a Human Right

An opinion piece by Kathrin Hegger

The supply of water, our most essential natural resource, will face shortages in the coming decades. Water was declared a human right by the UN in 2010. Therefore its accessibility should be ensured. In which way this will be done remains disputed.

**T**he availability of water impacts our daily consumption, our sanitation habits and basically the supply of close to all our consumed goods. This makes it arguably the most important natural resource we have. However, the global water access will face increasing problems in the coming decades as our population is increasing as well as the supply of it might face shortcomings.

Faced with these problems, the question about who should own water has risen in recent decades. The right to water was de-

clared a human right by the UN in 2010, however, this does not contradict the privatization of water which is discussed as a possible solution to ensure and improve the access to water by the people. Arguments in favor are that the privatization is helpful in ensuring and improving infrastructural necessities. Catarina de Albuquerque, the former UN special rapporteur on the right to safe drinking water and sanitation, compares it with the provision of health and food, which people pay for and are classified as human rights. She argues that it is solely important that

people are not excluded.

The international water market is only dominated by few companies and situations are revealed repeatedly in which the water access of citizens are limited in favor of companies. In the coming decades, we will have to ensure that the access to water will be secured. Water, the most valuable

natural resource we own, should not fall victim to economic profit seeking. Our guiding principle should be the assurance that every human as well as future generations, independent from the political situation of his or her country, should be able to have a safe access to water. The access of water by humans should be prioritized over the access by companies.



**Kathrin Hegger**

Kathrin is from Germany, studying a Master's Programme in Environmental Studies and Sustainability Science at Lund University.



# Disastrous Floods After Prolonged Droughts Have Challenged Iran

A guest article by Seyyed Hasan Hosseini

Heavy rainfall and flooding in late March and early April 2019 affected millions of people in Iran, caused deaths, displacement and catastrophic damage to the infrastructure. This is happening while the country has long suffered from frequent droughts and adaptive management practices are not in place to deal with such fluctuations.

**O**n March 25, a short but quite intense rainfall caused a tragic flash floods in the southern Iranian city of Shiraz. This was only a week after widespread record-breaking rainfalls caused flooding in northern regions. This incident alone killed 21 people and washed away over 150 cars at the entrance highway to the city. In early April, floods resumed more intense than before and damaged various contemporary and historic structures. Roads blocked by landslides made sending relief to the flood-hit places very difficult. Floods con-

tinued towards Khuzestan, and while they resulted in less human casualties as the area was evacuated in time, they still caused serious damage to villages and the agricultural sector.

These extreme events can be related to climate change. But there are other factors that could worsen the damage, including poor soil and vegetation conservation, settlements along riversides and floodplains, a lack of efficient forecasting methods and alarm systems, design problems due to limited funds and insufficient data or know-



ledge of the local hydrological variations. Iran is rich in historic water structures and conducting research on them can help to learn something about the variations in the past.

At the same time, the extreme events had some benefits. For example, they helped to revive Lake Urmia in Azerbaijan and the Hoor-al-Azim wetland in Khuzestan after years of drying up. Developing alternative solutions (e.g. artificial groundwater recharge) and the foresighted operation of reservoirs could lead to even more benefits. But the focus was typically on water storage in spring to compensate for summer deficits. As a result, the reservoirs were almost full and could not hold any additional water.

Despite recent events, the water crisis in Iran is usually associated with water shortages. The overuse of freshwater due to rapid population growth combined with frequent droughts over the last few decades has led to unsustainable water mana-

gement schemes. The uneven distribution of rainfall, both spatially and temporally, is another fundamental problem in Iran that has led to huge investments in water transfers between basins. In addition, 90 percent of the water extracted in Iran is used for agriculture with rather low water efficiency. “A fix that backfires” is the process that happens for most of the water transfer and irrigation upgrading projects. The added water is usually used to expand farms or grow crops higher profits, instead of increasing efficiency or recovering vulnerable environments.

Food security has always been a priority for the country and the government is reluctant to change the agricultural water share just for the sake of the environment. Recent floods have shown that instead of building new control structures that are likely to worsen the current state of the environment, it is possible to provide more water for the environment in order to maintain higher control capacity in the reservoirs.



**Seyyed Hasan Hosseini**

Hasan is a visiting researcher at Lund University and a PhD candidate in Water Resources Engineering at Tabriz University. His research focuses on adaptive water management under uncertainty of predictions, remote sensing of rainfall, and extreme hydrology.







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