

SIWI REPORT no 37

The Water Report 2016

*Migration • The 2030 Agenda •
Sustainable Growth*



Content

Foreword: Casting a wider net	4
Editors’ introduction: Water’s role in a sustainable future	6
Reflection: Out of sight – out of mind?	8
Chapter 1: Water, migration and how they are interlinked	10
Box: How changing water supplies can contribute to food insecurity	11
Box: Water shortages resulting in displacement and misery inside Syria	12
Box: Impact of Syrian refugees on Lebanon’s water resources	13
Box: Water scarcity as a long-term driver of rural-urban migration in Syria	15
Chapter 2: Connecting the 2030 Agenda and the Paris Agreement through water	18
Box: How UN-Water supports an integrated approach to addressing water and sanitation in the 2030 Agenda for Sustainable Development	20
Box: Growing number of private sector actors take action to address urgent water challenges	21
Box: Who is being left behind in the progress towards universal coverage of water and sanitation?	22
Box: Water a priority in countries’ efforts to act on climate change	23
Box: Conventional water thinking - stumbling block for sustainable food production and urbanization	24
Chapter 3: Water for sustainable growth	28
Box: The impact of improved infrastructure of sanitation on economic growth and employment generation	29
Box: Making space for water in the new urban agenda	30
Box: 2030 WRG - Catalyzing finance and partnerships for livelihood security	31
Box: Financing water for sustainable growth	32
Box: From Source to Sea	34
List of authors	36

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Publisher: Torgny Holmgren
Co-ordinating editor: Victoria Engstrand-Neacsu
Editors: Anders Jägerskog, Karin Lexén, Torkil Jønch Clausen
Language editing: Nick Chipperfield
Design: Claes Halvarsson, SIWI

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Casting a wider net



At the core of SIWI's work is building and sharing knowledge about water and development issues. A better understanding of our shared challenges, responsibilities and opportunities is necessary if we are to successfully and sustainably manage the world's water resources for future generations.

For several years, we published the World Water Week Report, meant as an inspiration in the lead-up to what we believe is the world's most important annual water meeting.

With The Water Report, which you now hold in your hand or read on your electronic device, we take a step further, and cast a wider net.

The Water Report 2016 takes on the highly current, and sometimes parallel, issues of water and migration. While we are witnessing some of the largest refugee flows since

the Second World War, water crises are highlighted as one of the most pressing global challenges. How these two issues are linked, if at all – read more in the first chapter of this report.

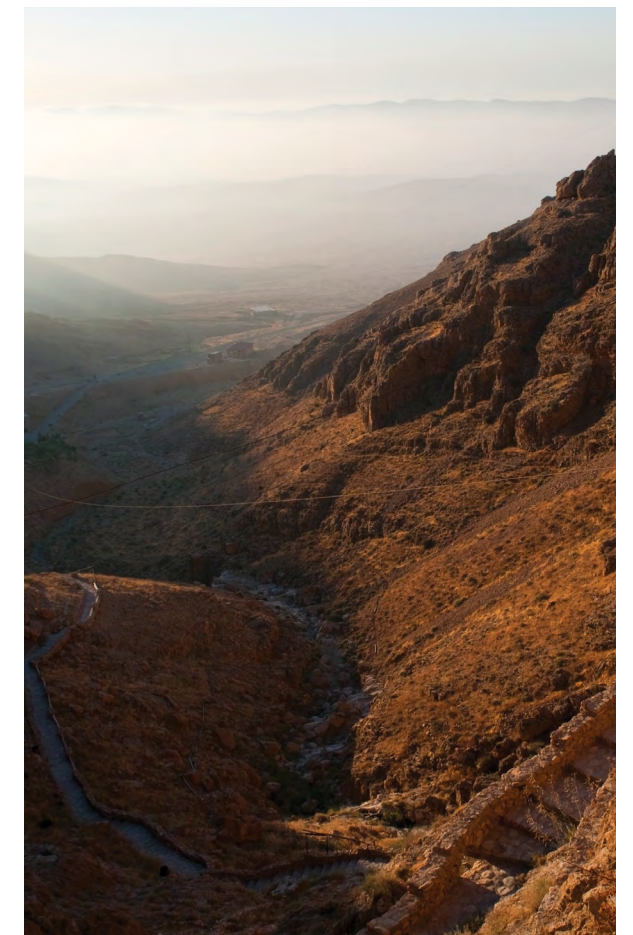
2015 was a year of big decisions. The time has come for implementation. SIWI and The Water Report aims to follow, on an annual basis, the implementation of the Sustainable Development Goals - the Water Goal (SDG 6) and the other water-related SDGs - as well as the implementation of the Paris Climate Agreement.

Hoping to offer inspiration for talks at World Water Week and beyond, the report's final chapter discusses several aspects of Water for Sustainable Growth – the theme of the 2016 World Water Week.

But before diving into the core of the report – don't miss *Out of sight – out of mind?*, an attempt at putting words to water – the world's most precious, and one of our most threatened, resources.

Torgny Holmgren

Torgny Holmgren
Executive Director, SIWI
Publisher, The Water Report



Photos: iStock

Water's role in a sustainable future

By Torkil Jørnch Clausen, Anders Jägerskog, Karin Lexén and Victoria Engstrand-Neacsu

In recent years, water issues have come to claim a firm position among the top challenges facing global leaders. It has been evident in the Global Risks report published by World Economic Forum, where water crises is named the top risk in the coming decade. It has been made a global concern through the Sustainable Development Goals (SDGs) where a goal has been dedicated specifically to water and sanitation.

SIWI has been part of efforts to bring water up on the global agenda. One of the more recent fora SIWI is actively engaged in, as an expert organization, is the High Level Panel on Water, launched earlier this year at Davos by UN Secretary General Ban-Ki Moon and World Bank President Jim Yong Kim.

We shall continue to work hard and advocate for wise water management. One part of this effort, is this report. With 'The Water Report', which is a development of previous years' World Water Week reports, we want to put the spotlight on issues we believe must be discussed.

This report has three main sections. In *Water, migration and how they are interlinked* we raise an issue that is central to the ongoing migration crisis in the Middle East and Europe. Some have claimed that drought is part of the underlying cause of the Syrian conflict and the subsequent hunger and migration. We believe that this is an over-simplistic way of looking at the problem. In the report, we have generously been offered perspectives on this complex situation by colleagues from World Resources Institute (WRI), Norwegian Refugee Council (NRC), Issam Fares Institute, and Revolve Water. We firmly believe that water, and more specifically water governance, must be part of the analysis of the situation in the region. We hope these contributions will help form a knowledge base for further discussions and potential solutions.

In *Connecting the 2030 Agenda and the Paris Agreement through water* we show the role water plays as a connector in the implementation of the SDGs and the Paris Agreement, and how it is a common denominator for most of the SDGs. Given the increasing demand for freshwater globally, and the severe impact of water-related climate

change, the extent to which wise water resource management is implemented will directly impact the achievement of the Paris Agreement and Agenda 2030. We feel we have a responsibility to raise the awareness of water's importance as a cross-cutting resource. To exemplify the need for wide and multi-faceted action, we are very pleased to include contributions from UN-Water, CDP (formerly the Carbon Disclosure Project), The French Water Partnership, as well as SIWI's Malin Falkenmark, Alejandro Jiménez and Moa Cortobius.

We are only just at the beginning of the implementation of the global decisions of 2015. So far plans to follow up are still in the development stage, at national levels. It will take dedication, innovation and hard work to reach the goals we have set for ourselves as a global collective. SIWI claims that water, and how it is governed, must be a central part of all our discussions and efforts. We intend to regularly take stock of the future process. This report is our starting point, and we hope it will lead to efforts that push boundaries.

The final section, *Water for sustainable growth*, puts the spotlight on the theme of the 2016 World Water Week. We show how water is a key ingredient in developing and maintaining sustainable cities, ecosystems and economies. Access to good quality freshwater will enable progress and job creation, a lack of it – or too much of it – will slow down or inhibit sustainable growth. To offer various expert perspectives on this wide topic, we have contributions from International Labour Organization (ILO), Organisation for Economic Co-operation and Development (OECD), UN-Habitat, Water Resources Group 2030 (WRG 2030) the Swedish Agency for Marine and Water Management (SwAM) and the International Centre for Integrated Mountain Development (ICIMOD).

Disclaimer: The views expressed by Anders Jägerskog do not necessarily reflect the views of the Swedish International Development Cooperation Agency (Sida) or the Swedish Government.

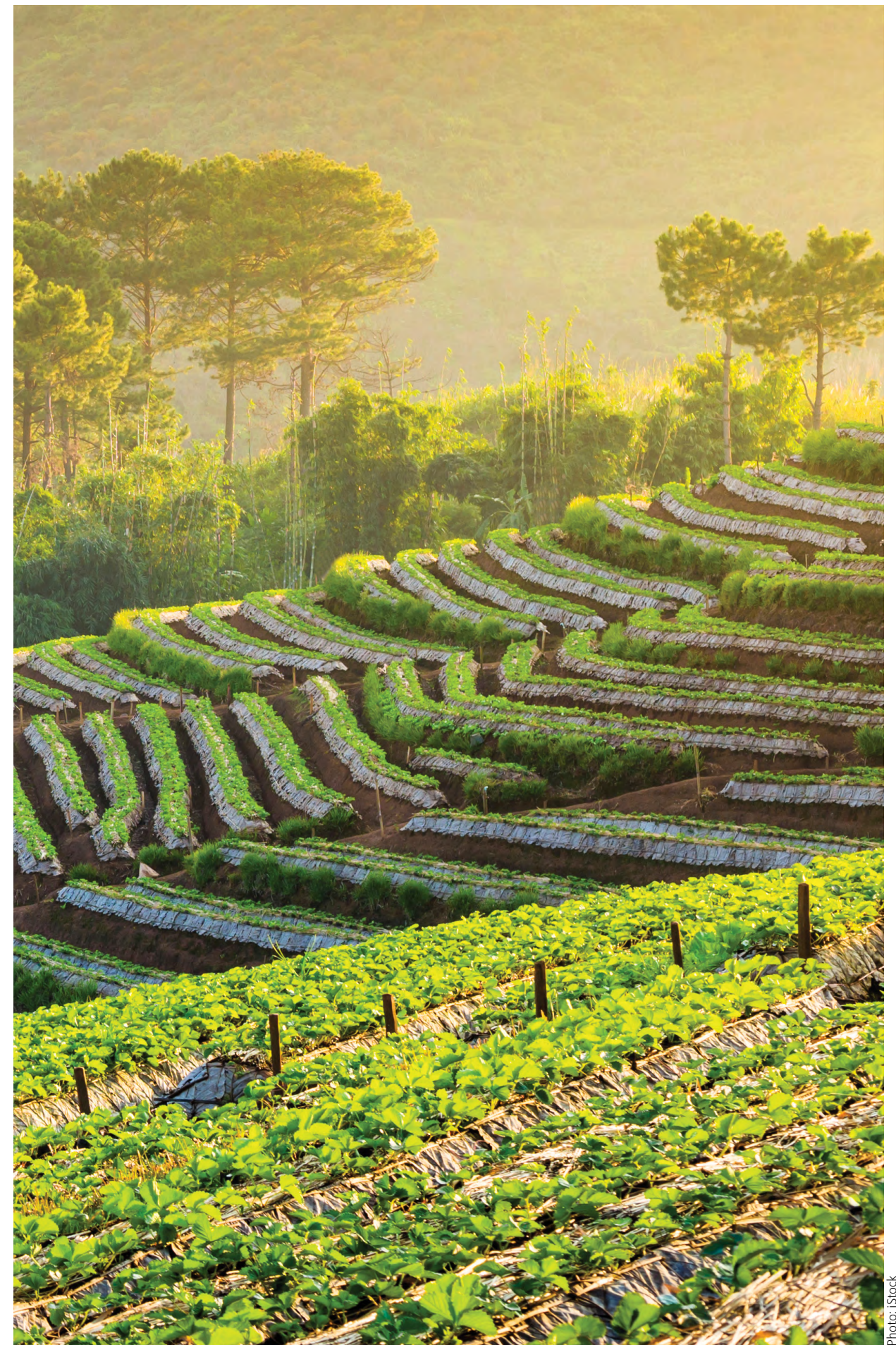


Photo: iStock

Out of sight – out of mind?

By Jens Berggren

Out of sight – out of mind? | For many people in our urbanized world, water comes from a tap and disappears down a drain. It is commonly known as liquid that fills our rivers, lakes and seas and provides a beautiful backdrop for our vacation photos.

Water is known by a surprising number of names depending on its phase and place in nature. It is called clouds as tiny droplets cruising in the skies, closer to the ground the name changes to fog or mist. It is known as rain when these droplets coalesce and start to fall, but should they freeze they become snow or hail. With so many names, it is not surprising that many of us forget that all of it is water. It is even more challenging to remember the water that we cannot see. There is 100 times more liquid freshwater hidden underground than in our surface systems and all our plants thrive on the slivers of water clinging to soil colloids in the unsaturated zone between the groundwater table and the land surface. The water molecule is intrinsically woven into the fabric of life, forming the major part of substances like sap, blood, sweat and tears.

Making water work for us | Water has always been one of the forces shaping life on planet Earth. It has been argued that “Homo sapiens was an evolutionary response to the scattered distribution of water in space and time” and that our “improved terrestrial mobility was a response, first and foremost, to the need to quickly locate water sources in a drying world” (Finlayson, 2014). So, some two million years ago, the first humans started to run across the planet in search for water.

Around 10,000 years ago, with the advent of agriculture, humans started settling down along rivers, lakes and creeks. To secure a sufficiently steady supply of water for their crops, the early farmers started digging canals and dams for irrigation. Instead of running after water, we created infrastructure to make the water run to us. Water availability has largely decided where we live and how we make a living, but with cheaper energy, mechanization and infrastructure we have become increasingly adept at moving water. The water infrastructure of large

cities convey a total volume of 244 cubic kilometres of water per year, roughly three times the annual flow of the river Nile, through pipes extending for 30 thousand kilometres, that is; from pole to pole and back to the equator (McDonald, et. al., 2014).

It is a terrible irony that it is the Fertile Crescent¹, where the first traces of farming and water management is found, that people are fleeing from today, partly due to a failure to manage water wisely.

“Getting the right amount of water of the right quality to the right place at the right time is indispensable for all growth and development.”

Water for work | The vast majority of water is withdrawn for commercial purposes. Some two thirds of the global water use goes to irrigation on one fifth of the arable land. This water helps produce around 40 per cent of the global food, most, if not all, of it for sale. Around one sixth of the water use goes to power production and one fifteenth is used in manufacturing. All in all, some 90 percent of the global water is abstracted as input to the production of goods and services that also employs a large part of the global human resource.

Securing water for sustainable growth | As water, under all its different names and functions, permeates life on this planet, it is almost impossible to imagine or analyze what our existence would be like without our historical abundance. The response to the simple question: “What is water worth?” will vary wildly from a microchip maker in a parched Taiwan to a flooded factory owner in the hard-drive making districts of Thailand. One will willingly pay dearly for every additional litre she can get while the other may be prepared to pay as much for what she can avoid.

Getting the right amount of water of the right quality to the right place at the right time is indispensable for all growth and development. The key question is how

¹ The Fertile Crescent is the region in the Middle East which curves from the Persian Gulf, through modern-day southern Iraq, Syria, Lebanon, Jordan, Israel and northern Egypt.

much it costs, in effort, time and money, to get it right against the losses incurred by getting too little, too much, too distant, too late or too dirty. For many people in the relatively well-watered and stable hydrologies of northern Europe and eastern North America, water management is a game of margins, going from mostly right to almost perfect, but for 71 percent of the global population the situation is far more challenging as they face water scarcity for at least one month of the year (Mekonnen and Hoekstra, 2016).

High time to think deeper about water | The global challenges of both demand and supply of water is

mounting. Growing populations and economies require and pollute increasing volumes of freshwater. At the same time, the availability of water is in increasing peril from climate change-induced extreme weather. It is clear that we will need to invest more in water security, but we also urgently need to consider how we invest the water at our disposal in our economies and societies. We need to start planning for our future from a water perspective. What water fits what purpose, how can we harvest a local surplus to save it for a day when it doesn't rain, can we spend our water on producing goods and rely on imports for our food and can we attract business' and job opportunities without guaranteeing basic water security?

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Water, migration and how they are interlinked

By Anders Jägerskog and Ashok Swain

At a time when we are witnessing some of the largest refugee flows since the second world war, and water crises are being highlighted by the World Economic Forum in their 2016 Global Risks Report (WEF, 2016) as the most important concern for the coming decade, the importance of trying to understand the linkages between water and migration is widely accepted. Increasingly, researchers and policymakers are seeking to explain migration and refugee flows in terms of water scarcity – often perpetuated by climate change. We argue for caution and deeper analysis, and not to look for “easy” answers to complicated questions.

Historically, migration and water were related, broadly, to nomads and pastoralists looking for water and food for their animals. Nomads on the African continent, in the Middle East and Asia often lived a life where they moved in accordance with where they could sustain a livelihood for themselves. The new debate tries to see linkages between water scarcity (which includes natural va-

riability), migration (and refugee flows), and conflict. We argue that it is important not to draw hasty conclusions in terms of causal linkages in this respect. The availability of freshwater has also fallen short of adequately meeting its increased demand in most parts of Asia, Africa and the Middle East. Nearly two billion people in the world lack access to clean water and more than two billion do not have adequate sanitation facilities.

The loss of livelihood due to increasing water scarcity and variability could force those affected to migrate. Furthermore, the water scarcity is becoming much more problematic (e.g. through increased variability of flow with subsequent vulnerability) due to global climate change. Climate change may also potentially alter rainfall patterns, which may lead to increased flooding, drought, and soil erosion in tropical and arid regions of the world. In that sense, climate change is exacerbating pre-existing phenomena such as natural climatic variability.



Photo: iStock

How changing water supplies can contribute to food insecurity

By Andrew Maddocks, Betsy Otto and Tianyi Luo

When social unrest erupts, especially at a scale that causes migration, it is nearly impossible to identify a single cause. Water scarcity, however, is cited with increasing frequency as a significant multiplying factor. One water-related driver that deserves further consideration is high water supply variability.

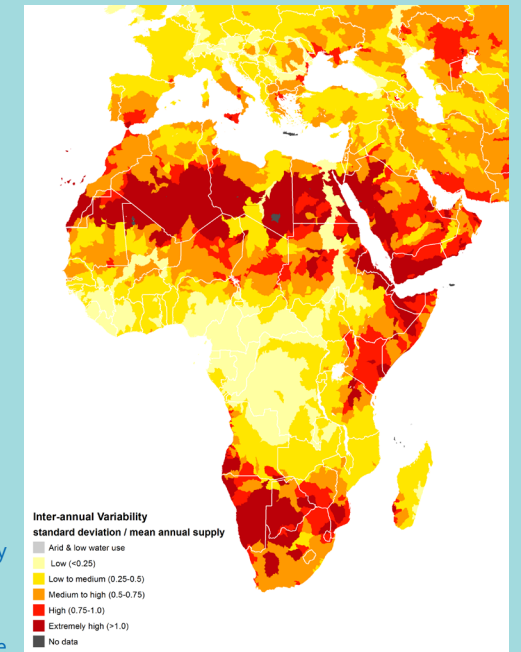
World Resources Institute's (WRI) Aqueduct Water Risk Atlas maps 12 water risk indicators worldwide. One indicator, inter-annual variability, measures how much surface water supplies change from year to year in given areas. Areas with high inter-annual variability have seen a significant change in available surface-water supplies over 60 years of historical averages. That variability can come in the form of periodic, extended droughts, which can cause serious humanitarian crises. These inter-annual swings are predicted to become more pronounced with climate change in many areas already prone to conflict or instability, such as the Middle East and parts of Africa.

Several are, in fact, playing out right now. In May 2015, an El Niño settled into the Pacific, raising ocean temperatures to their highest levels since 1997 and creating the strongest El Niño-influenced weather patterns in a decade. As of early 2016, southern and eastern Africa were still experiencing the associated drought. Dry soil and poor preparedness exacerbated the conditions, according to Simon Mason, a climate scientist at Columbia University, all of which created food shortages affecting millions of people.

Angola and Zimbabwe were among the worst affected areas, while Ethiopia

experienced one of its driest seasons of the past 50 years. In early 2016, South Africa reported its lowest annual rainfall on record, resulting in the country's smallest corn harvest since 2007 and raising the likelihood that it would need to import food. Areas within each of these countries experience high to extremely high inter-annual variability (see map), meaning that periodic droughts such as the current El Niño-influenced pattern are relatively common. These dry seasons can be devastating for people who depend on subsistence agriculture or are poor and particularly affected by rising food prices. Additionally, high water stress – competition among users for limited renewable surface water resources – can magnify periodic droughts' negative effects.

The current El Niño has not yet triggered documented migrations, but history suggests cause for concern. A devastating drought in Syria from 2006-2011 drove more than 1 million people into food insecurity and helped trigger a mass migration of 1.5 million people into cities. That wave, combined with exceptionally poor economic conditions, a political reform movement, and a violent uprising against a repressive political regime helped ignite Syria's ongoing civil war. Challenging agricultural conditions have also contributed to past migrations from Africa's Sahel drylands and Horn region, underscoring the link between water supply variability, food insecurity,



ity, the potential for unrest and mass migration.

Similar risks will likely increase in the face of growing populations, rising demand for resources and climate change. Changing precipitation patterns could reduce or disrupt historic patterns of rainfall and growing cycles, and diminish the water available for irrigation. The result will likely be lower agricultural yields and livestock productivity, directly affecting local food security and even global food prices. No country is immune to the risks.

The historical cases and future risks are significant. Understanding current and future water-food conflicts requires the best available data and early warning systems. Having the tools to understand that data, such as the inter-annual variability maps above, is an important first step.

The problem of so-called climate change-induced population migration is increasingly seen as one of the foremost crises of our times. To date, these concerns have tended to be viewed as peripheral. However, their sheer assumed size (with some projecting a possible displacement of one billion people), (Weiss, 2015), has now

brought them to the fore as one of the most important issues on the global political agenda. Food scarcity has already forced a large number of people to move across international borders. This phenomenon has been of growing concern to the international community, particularly because mass migration creates security concerns

for nation states. Still, these analyses provide, arguably, overly simplified answers to deeply complicated questions. There are often many reasons (including underlying push and pull factors), that cause people to flee or migrate. Often, the underlying reasons for the migration and refugee flows – such as poor governance, and water and land management – are often overlooked when analyzing the key reasons behind migration. Rather, it seems easy to blame drought and climate change, as has increasingly been the case.

Today, when we have seen a major flow of refugees from war-torn Syria (and Afghanistan and Iraq) to neighbouring countries, as well as increasingly to Europe, more questions have been raised about the linkages between conflict, water scarcity, climate change, droughts and migration. According to the UNHCR, 4.3 million people have fled Syria, and another 6.6 million people have been displaced internally due to the war.

Water shortages resulting in displacement and misery inside Syria

By Noosheen Mogadam and Thomas Whitworth

A number of academics and analysts consider water scarcity a major catalyst for the Syrian crisis. Research papers examining Syria's economy, including Chatham House's publication in June 2015, as well as REACH's September 2015 thematic report, find that a prolonged drought lasting for more than five years resulted in a significant reduction in agricultural production, unemployment and migration. An estimated 1.5 million individuals moved from rural to urban areas in search of employment opportunities, including to the centres of the initial uprising in March 2011.

As the Syrian war enters its sixth year, water security continues to deteriorate for many civilians. While the consequences of the drought are still endured, evidence shows that control over power and water infrastructure is used as a weapon of warring parties, contrary to international law. For example, in August 2015, deliberate water cuts affected up to two million people in Aleppo. Damascus has also been affected. The Wadi Barada provides a significant amount of water to Damascus City but supply networks that pass through opposition-held enclaves have been periodically closed. It was not until January 2016 that an agreement was reached between local leaders and the government to inter alia allow water flows in exchange for the delivery of humanitarian aid. Such agreements must be respected, though access to such resources are basic human rights, not to be bargained over for political or strategic gain.

Whilst conflict and protection concerns are the primary drivers for the current displacement trends, a lack of access to essential services such as water is cited as a major reason amongst both Syrian refugees and internally displaced people within Syria for fleeing their communities. This displacement places yet another burden on the often already stretched capacity of host community services.

A combination of damaged infrastructure, a lack of maintenance, manipulation and limited power-supply has resulted in a 50 per cent reduction in access to safe water relative to pre-crisis levels. According to the 2016 Humanitarian Needs Overview, this has forced an estimated 69 per cent of people inside Syria to rely on unregulated and often expensive sources of water for drinking, domestic use and personal hygiene.

NRC's interviews with beneficiaries further confirm that safe access to water is a key priority. The lack of water is directly responsible for reduced dignity for both displaced and host populations many desperate and willing to make significant life decisions based on the availability of supply. In some areas of Syria daily struggles are faced related to water, triggering protection concerns. Increased rates of waterborne and skin diseases are documented with lack of adequate medical services. In desperate situations, family members, including children, must go to water standpipes and other water collection points sometimes traversing long distances and waiting in queues to bring water containers back to their homes, often at risk of attack from warring parties. Women and children needing to use latrines which are sometimes communal facilities are left vulnerable to attack and abuse, especially after dark.

Attempts have been made to address the many challenges faced by civilians in Syria in exercising their right to water through both responsible emergency humanitarian assistance and longer-term programming. These interventions include water trucking, the provision of household-level water treatment and storage assistance, repairing water-supply systems and working with authorities to improve the provision of safe water. NRC simultaneously advocates for better tracking of damages to water infrastructure across the country, information to civilians about the location of safe water sources and collective reporting of water consumption patterns through humanitarian coordination mechanisms.

The December 2015 UN Security Council Resolution calling for a nationwide ceasefire in Syria, if respected, may mean that water facilities and infrastructure inside Syria can be rebuilt and protected. Wider issues, however, need also be addressed, such as better water management systems, and respect for international conventions related to water sharing by countries neighbouring Syria.

Understanding the reasons behind this, and possible links between water and migration, is imperative if one should be able to put in place policies that address the causes of the refugee situation. In this article, as well as the other contributions in this section, some of the linkages between water and migration are analyzed with the aim of providing a more coherent, and hopefully clearer, picture.

In a context where increasing emphasis is placed on linkages between different issue areas and avoiding silo approaches, it is relevant to see how migration can be

considered in the context of water, climate, energy, and food debates. These four areas have all become more politically important for countries in the Middle East. They are also interlinked, either directly or indirectly, with the broader world. Migratory flows, be they refugee movement or labour migration, affect Europe, Asia and beyond. The global impact of instability in the region is clearly being felt, not least in the second half of 2015 when migration from the region to Europe increased substantially. However, the number of refugees entering neighbouring countries - Turkey, Jordan and Lebanon - were far higher.

Impact of Syrian refugees on Lebanon's water resources

By Nadim Farajalla

The World Bank estimated the Lebanese population in 2012 at 4.4 million, an increase of 25% from 3.5 million in 1992 (World Bank, 2012). Until 2012, the country had been experiencing a decline in its population growth rate from 4.84% in 2003 to 0.96% in 2011 and 2012 (World Bank 2013). This is illustrated in the table.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Population growth (annual %)	4.84	4.33	3.40	2.30	1.46	1.11	1.44	2.19	0.96	0.96

Lebanon has a large number of Palestinian refugees with about 425,000 registered with UNRWA (AUB/UNRWA, 2010). In 2011, the war in Syria erupted and a stream of refugees started flowing into Lebanon. The total number of Syrian refugees registered with the UNHCR reached 1.84 million, (UNHCR 2016), distributed throughout the country, (see Figure 1), which roughly represents a 30% increase in the resident population of Lebanon. This influx of people has had a severely negative impact on the environment in Lebanon, with increasing demand on water, higher generation of sewage that goes untreated and an increase in solid waste that is often disposed of in dumps. All of this has put water resources in Lebanon under severe pressure – high demand coupled with increasing pollution. Currently, Lebanon's renewable water resources are estimated at around 926 m3/capita/year (MOEW 2010). However, with an influx of the equivalent of more than a third of the country's population, this number is expected to have dropped to below 700m3/capita/year. The increase in demand for water across the country ranges from as low as 0.1 million cubic metres per year, (MCM/yr), in some regions of the north and south Mount Lebanon, to a high of 7.42 MCM/yr in the Bekaa region (MOE/EU/UNDP, 2014). Water for this increased demand came mostly from the public water supply, with nearly 30% of refugees using this source. Wells were the second source for 24% of refugees (MOE/EU/UNDP, 2014). This increased demand resulted in an associated increase in sewage generation. The generated sewage is disposed of – untreated – into surface and subsurface water sources, common practice in most areas of Lebanon due to the lack of wastewater treatment facilities. The contamination resulting from this pollution renders more water sources unusable thereby depriving more people of an increasingly scarce resource.

The international community has been trying to relieve this situation of growing demand and worsening pollution by helping improve the water sector infrastruc-

ture in several communities throughout Lebanon that are hosting Syrian refugees. The thrust of these efforts has been to improve water distribution networks and build wastewater treatment plants. This human tragedy is worsening, threatening the lives and livelihoods of refugees and their host communities through a resource that is supposed to be the source of life.

GLOBAL APPEAL 2015 UPDATE

Legend:
● Refugee Location
● UNHCR Charge de Mission
● UNHCR Country Office
● UNHCR Sub-Office
● UNHCR Field Office
— Coast line
— Boundary of former Palestinian mandate
— Do not show
— International boundary line

Figure 1. Distribution of Syrian Refugees in Lebanon (source: UNHCR 2016)

The securitization of water is likely to remain a key issue given increasing water scarcity driven by population growth and a growing refugee population, the high level of dependence on transboundary water, and a volatile political situation in the region. According to most projections, the added challenge of climatic variations, as well as climate change, will lead to higher temperatures – and therefore greater evaporation – and less rainfall, thereby further exacerbating water scarcity. While securitization of water or climate is understandable, especially in a region such as the Middle East, it runs the risk of encouraging inappropriate government responses. As noted by White, (2011), the relationship between migration and climate in Africa (sub-Saharan, trans-Saharan or trans-Saharan) is weak. He also notes that migration is usually confined to local or sub-regional patterns. Outsiders have been keen to invoke the “threat” of what they call climate refugees, enabling them to further strengthen border controls. White also notes that securitization of environmental challenges enables the security sector to be the main actor in formulating debate and policy. This leads to a focus on defending borders, enabling deeper security co-operation and co-ordination, while policies to address environmental challenges, which are exaggeratedly deemed to be causing migration, receive little attention. White holds that “‘Getting tough’ – responding in a militarized fashion – is an easy, cynical step in a warming world... Building a fence is easier than changing lifestyles. Yet the injection of security imperatives into climate-induced migration is unethical and unworkable.”. Not only does securitization play into the consideration and adoption of inadequate policy measures, it may also serve to “explain” the failure of governments to address underlying challenges relating to, for example, water governance in Syria. De Chatel, (2014), Sowers et al., (2013), and Weinthal et al., (2015), have all noted

that it was the Syrian regime’s failure to establish proper water governance and irrigation systems in the south of the country that led to unpreparedness when drought hit harder than usual. While drought led to major internal migration, the reasons were not the drought itself, but were rather “part of a broader pattern of rural neglect” (Weinthal et al., 2015, p 1).

Large-scale trans-border migration has several dimensions that tend to cause tension between recipient and sender states, regardless of the underlying causes, (Swain & Jägerskog, 2016). In some cases, granting migrants permission to enter its own territory, may strain the relationship between the recipient and sender states. This may be caused by recipient states’ inability to provide basic services to its own citizens. Another possibility is that having settled in a host country, migrants may act against the government of their original country. In some cases, migrants may be encouraged, or manipulated, by host states to react due to existing political differences between the host and the sender states, (Swain 2015), almost certainly resulting in further negative implications for regional water resource development.

Maddocks, Otto and Luo highlight the intricate linkages between water and food insecurity, and how disturbances in this balance can lead to migration. Mogadam and Whitworth highlight the situation in and around war-torn Syria, the constant struggle to maintain, improve and upgrade water systems in Syria and neighbouring countries. Farajalla highlights the pressure on water systems that has been brought about in Lebanon due to the refugee crisis. De Chatel provides an analysis of how mismanagement and the lack of adequate water governance, rather than drought, led to the internal migration inside Syria in the years preceding the civil war.



Photo: iStock

Water scarcity as a long-term driver of rural-urban migration in Syria

By Francesca de Châtel

Fifty years of resource mismanagement and growing water scarcity were key drivers of rural-to-urban migration in Syria from the 1980s onwards. The failure of large-scale agricultural development projects, combined with drought and economic reforms in the 2000s, further undermined farmers’ livelihoods and dislocated rural communities. As rivers disappeared and wells ran dry after years of over-exploitation, farmers abandoned their land and sought work in the big cities. Adnan, who grew up in a village on the banks of the Khabur River in north-eastern Syria, left for Beirut in 2002 after the Khabur ran dry. “After they built the Bassel Dam in 1999, water levels quickly decreased. We started using drip irrigation, but soon there was no water left at all. Before, we irrigated most of our land with water from the river; some of it was rain-fed. But when the rains failed, we couldn’t sustain the rain-fed land either. And then they raised the price of diesel. After that, there was no point in working in farming anymore.”

The area around the Khabur River is semi-arid steppe land that was traditionally used for seasonal grazing of sheep and camels and rain-fed agriculture. However, the area’s fragile ecological balance was disrupted by the steady intensification of agriculture from the 1950s onwards, with the introduction of irrigated wheat and cotton and intensive grazing. Groundwater depletion, the drying of springs and rivers – the Khabur Basin had a

water deficit of 3.1 billion m³ in 2003 – soil salinization and wind erosion meant that by 2008 the region that was once considered the breadbasket of Syria was “in danger of agricultural collapse” (Hole, 2009). As poverty levels rose, villages were gradually abandoned.

While the Khabur Basin is one of the starker examples of the environmental and social impacts of long-term water mismanagement in Syria, farmers in many other parts of the country faced similar situations of water scarcity from the early 1990s. With little or no support from the government, farmers were faced with growing poverty and many were forced to migrate to the cities in search of work. The north-east of the country, the most neglected and impoverished region, was worst affected and while poverty levels were declining in other parts of Syria in the late 1990s and early 2000s, people in the north-east were growing poorer and more food insecure.

The plight of farmers worsened with the liberalization of the economy after 2005: the government increasingly focused on banking, tourism and real-estate, and turned away from agriculture. When state subsidies on diesel fuel and fertilizer were cancelled in 2008 and 2009 at the height of a severe drought in the country’s north-east, the already dire situation in this part of the country further deteriorated. The United Nations estimated that 300,000 people left the drought-stricken north-east



Photo: iStock

between 2008 and 2010. The migrants ended up in slums and makeshift tent camps on the outskirts of Damascus, Aleppo and other cities, barely surviving on low-paid work in factories, on construction sites or as seasonal agricultural workers. In 2009, many like Adnan felt their future had been taken from them. “I wish we could go back home and tend to our herds like before. But there is no water. That has changed everything. I’m desperate. I’m 32 years old. I’ve been working for 10 years. And for what? I live in a slum, I earn low wages, I eat bad food and I’m not even married. What happens after this? Another 10 years of this?”

Concluding thoughts | While it could be argued that wider discussion of migration and environmental challenges, and the linkages between them, is positive, it is also of the utmost importance to critically analyze these linkages. Establishing overly simplistic and causal linkages between water scarcity, climate change and variability and migration is not helpful, and may also lead to flawed policy responses. As has been noted above, there has been a tendency to jump to conclusions about causalities between water scarcity, climate change and migration. However, this is rarely the case. Instead, water should be

seen as one of many areas that can contribute to migration, together with a range of other issues. Ultimately, it represents one of many challenges that can be addressed in a systematic manner.

The interlinkages between water challenges and climate change manifested in the form of, for example, increased variability and uncertainty, are not the main causes of large-scale population migration. Rather, they should be considered as push factor multipliers. Social, economic, and political factors will also affect the vulnerability

or resilience of communities. In regions, the ability to cope with climate change and water scarcity decreases, and the likelihood of migration increases, as a result of factors that include poverty, low levels of education, lack of skills, weak institutions, limited infrastructure, lack of technology and information, limited access to health care, poor access to resources, and the over-exploitation of resources, etc. Pull factors, such as a hope of a better life and employment, often combine to result in migration. Thus, blind "securitized" responses to water scarcity

also tend to lead to poor conclusions and policies being put in place. While it is tempting to make causal linkages in the context of a sober analysis, taking an inclusive approach of potential factors that lead to migration should be employed for improved policy development.

Disclaimer: The views expressed by Anders Jägerskog do not necessarily reflect the views of the Swedish International Development Cooperation Agency (Sida) or the Swedish Government.

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Connecting the 2030 Agenda and the Paris Agreement through water

By Karin Lexén

2015 was an important year for global agreements on sustainable development. The agreements reached must now lead to concrete, effective action, and implementation on the ground. This calls for multi-stakeholder collaboration at scale, as well as a holistic perspective across sectors and boundaries. The various agreements must be interlinked and integrated when actions are rolled out. The convergence of these processes presents opportunities for strengthened action through resilient development, operationalized at local, national and regional levels. It is vital that synergies are sought and used, and that trade-offs are highlighted, analysed and discussed.

Water is a cross-cutting resource. Access to reliable and safe freshwater is essential for human health, food security, sustainable economic development, social progress and sound ecosystems. Water thus has the potential to act as a connector between policy areas, economic sectors, and nations. In a world of growing demand for freshwater and increasing climate induced and water related hazards, integrating wise water resource management throughout the 2030 and climate agendas will be decisive for the success of their delivery.

The Sustainable Development Goals (SDG) framework is defined by 17 goals, 169 targets and over 230 indicators with the overarching objective to end poverty, to be fully implemented by 2030. The goals are ambitious, and inclusive. They are people-centred but also highlight the importance of the environment. The road map of global follow-up and review is now under development with the High-Level Political Forum (HLPF) as the main mechanism. The Forum is mandated to conduct national and thematic reviews of the implementation of the Agenda, with inputs from intergovernmental bodies and forums, relevant UN entities, major groups and other stakeholders. The first HLPF was held in July 2016 and is expected to provide political leadership, guidance and recommendations on the Agenda's implementation and follow-up; monitor progress; spur coherent policies informed by evidence, science and country experiences; as well as address new and emerging issues.

The Paris Agreement is the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by “keeping the increase

in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels” (Paris Agreement, 2015). The agreement was opened for signing on 22 April 2016 and it will be possible to sign until 21 April 2017. The agreement will enter into force after 55 countries that account for at least 55 per cent of global emissions have deposited their instruments of ratification. The agreement will come into force in 2020. An important dimension of the agreement is that it leverages bottom-up action through Nationally Determined Contributions (NDCs) that countries have submitted to the secretariat for the UN Framework Convention on Climate Change (UNFCCC) according to country priorities, capabilities and circumstances. These are backbones of the Paris agreement.

Water disasters account for more than 90 per cent of the natural disasters in the world and climate-driven water hazards, water scarcity and variability pose significant risks to all economic activity, such as food and energy production, manufacturing and infrastructure development, as well as political stability. This is also true for high income countries. For example, the four-year drought in California cost the state an estimated USD 2.7 billion in 2015 (Howitt et al. 2015), and it is steering local, state, and even national politics in the United States. Floods are creating a growing set of problems all over the globe. The World Bank has estimated economic damages and losses due to the flooding of seven major industrial estates in Thailand in 2011 at USD 45.7 billion (Haraguchi and Lall, 2014). Disruption to manufacturing supply chains affected regional car production and caused a global shortage of hard disk drives which lasted throughout 2012. In addition, a recent World Bank publication also indicated that water hazards and lack of proper water policies and management can account for more than six per cent loss in GDP in some countries (World Bank, 2016).

Over the past year, we have seen growing recognition of the key role water security plays for building resilience and securing sustainable growth. Water crises are ranked as the risk of greatest concern over the next 10 years in the 2016 World Economic Forum's Global Risks Report (WEF, 2016). The report highlights the close link between water and extreme weather events, and the need for climate change adaptation. Water is also closely connected to several other risks including food crises, interstate conflict, profound social instability and urban planning. This report is a survey of nearly 750 decision makers and experts, most of whom are drawn from the field of economics/business. The objective is to identify global risks, determine how they are connected, and assess potential consequences.

One significant example of the increasing recognition of the key role water plays for sustainability is the High-level Panel on Water (HLPW) with ten heads of state or

government that was launched in Davos in January 2016 by UN Secretary General Ban Ki-moon and World Bank President Jim Yong Kim. The aim is to mobilize global support in implementing the water-related SDGs. To be effective, the initiatives and the outcomes of the panel must reinforce national and regional implementation of the 2030 and climate agendas. SIWI is one of the expert organizations supporting the HLPW and the World Water Week will be a meeting place for this panel to share and discuss its findings.

High-level Panel on Water

The Panel will work to mobilize effective action to accelerate the implementation of Sustainable Development Goal 6 (SDG6) and other water related SDGs. It is co-chaired by President Ameenah Gurib of Mauritius and President Enrique Peña Nieto of Mexico. Among other actions, it will seek to:

- Motivate effective Action – Focusing public policy dialogue, private sector models and practices, and civil society initiatives towards the Water SDG; and
- Advocate on financing and implementation – Promoting efforts to mobilize financial resources and scale-up investment for the water SDG, including through innovative financing and implementation strategies.

The members of the High-level Panel on Water are expected to rally concrete action on SDG 6 and other water related SDGs and its related targets at national, regional and global levels, as well as leading by example, in close collaboration with partners and networks including civil society and the private sector.

On the ground, it is increasingly evident that water scarcity, water variability, and water pollution are fundamental challenges for poverty and hunger eradication, as well as for how to manage climate change. The implementation of the governmental global agreements on disaster risk reduction and climate change, as well as most of the SDGs, will to a large extent rely on freshwater to be achieved, even if explicit references to freshwater in the agreements are insufficient.

One may argue that what matters is substantive action on the ground, and that if a need for integrating water resources management in the food, energy, health, and other sectors exists, it will happen anyway. However, there are a number of challenges. For example, how the SDG targets and indicators are formulated will steer what is being monitored and reported. Access to clean and safe freshwater is a prerequisite to meet many of the SDG targets, but in many cases those indicators do not explicitly refer to freshwater. This dilemma might cause problems in planning, financing, and implementing strategies, as well as for making informed decisions

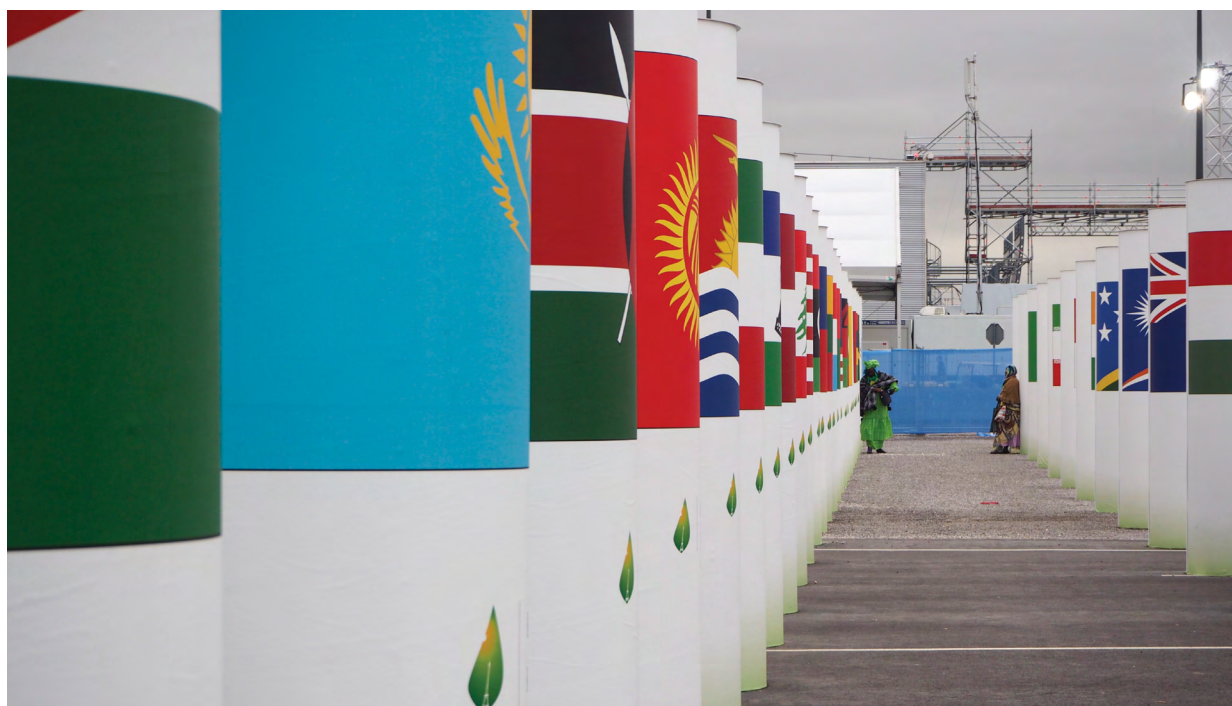


Photo: Anna Forslund

on trade-offs between different users. At present about a third of the world’s population lives in areas with physical water scarcity. According to the OECD, water demand will increase by 55 per cent between 2000 and 2050 (OECD, 2012). There is therefore an urgent need to develop and use efficient instruments to steer towards equitable and efficient water use.

It is crucial to obtain improved understanding of the importance of integrating water concerns in most goals for the fulfilment of the overall SDG agenda. The decision to devote one goal, goal 6 – “Ensure availability and sustainable management of water and sanitation for all” – to water was a critical step in properly addressing freshwater in the 2030 Agenda. It will be important to implement SDG 6 fully, but it is equally important to ensure that water is integrated into the implementation of the other SDGs. Work to identify the links and inter-dependencies between the targets in SDG 6 and related targets in the other goals is carried out by UN Water among others. This will be an important contribution to bridge between different sector “silos”.

How UN-Water supports an integrated approach to addressing water and sanitation in the 2030 Agenda for Sustainable Development

By Joakim Harlin

“Water is at the core of sustainable development.” This statement, contained in the outcome document of the UN Conference on Sustainable Development (Rio+20) in 2012, entitled “The Future We Want,”¹ was well reflected in the 2030 Agenda for Sustainable Development three years later. Sustainable Development Goal, (SDG) 6, a universal goal for water and sanitation that covers the entire water cycle from source to tap and back again, links all the economic, social and environmental dimensions of sustainable development. But beyond SDG 6, water and sanitation are explicitly mentioned in half a dozen other SDGs, and are, in fact, a key prerequisite or enabling factor for the implementation of all of them.

In line with UN-Water’s Technical Advice for a possible Post-2015 Water Goal, which was provided as input to the Open Working Group on the Sustainable Development Goals in 2014,² the 2030 Agenda now recognises the comprehensive and interlinked role of water, demonstrating the connections within water and sanitation, and how these underpin other areas such as health, food, energy, poverty elimination, economic productivity, equity, and access to education (SDGs 1 to 8 and 10). At the same time, the lack of sustainable access to water and sanitation also represents a key limiting factor to the implementation of other goals. For example, energy and food security, as well as economic growth and urbanization, (SDGs 2, 7, 8, and 11), are directly dependent on the availability of freshwater resources. Increasing production increases the generation of wastewater, which contributes to freshwater pollution, and in turn has potential negative impacts on ecosystems, (in direct contradiction to, for instance, SDGs 3, 14 and 15).

To better understand the implications of a number of water and sanitation interdependencies across the 2030 Agenda on achieving the SDGs, including the “Water, Energy and Food security” nexus, UN-Water has produced a new analytical brief on water and sanitation interlinkages across the 2030 Agenda, which it will be launching at the

UN-Water Stakeholder Dialogue during World Water Week in Stockholm. This publication aims to be of direct use for countries in their implementation of the 2030 Agenda, addressing linkages between water and other SDG targets within the social, economic, and environmental dimensions of the 2030 Agenda, as well as resilience in the face of increasing socio-economic development and a changing climate.

About UN-Water:
UN-Water was formed in 2003 as the UN’s inter-agency co-ordination mechanism for all freshwater-related issues, including sanitation. As of 2016, UN-Water comprised 31 UN agencies, funds and programmes as its Members, and 39 international organizations, primarily from the private sector and civil society, as its Partners.

1 “The Future We Want”, UN GA Resolution A/RES/66/288 11 September 2012. Available at http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E.

2 For more information on UN-Water’s technical advice for a water Goal in the Post-2015 Development Agenda, see <http://www.unwater.org/newsletters/newsletter-special-edition-post-2015/en/>

It will also be vital that the water community collaborate closely with other disciplines to secure a holistic and integrated approach for the implementation of the 2030 Agenda and the Paris agreement. In this context, it is critical that partnerships are built to operationalize the SDGs.

Strategic partnerships that leverage expertise and resources of individuals and organizations from a range of backgrounds will be vital in helping to achieve the SDGs. Goal 17 offers an interesting background to what can and should be done to achieve that. The theme of

the 2016 World Water Week, “Water for Sustainable Growth”, sheds light on the need to understand how water contributes to, and may be impacted by, the implementation of SDG 8: “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all and SDG 12”.

Growing number of private sector actors take action to address urgent water challenges

By Cate Lamb

New analysis by CDP, an international not-for-profit working to transform the way the world does business to prevent dangerous climate change and protect natural resources, indicates that companies took a financial hit of more than USD2.5 billion in 2015 alone due to detrimental impacts from water challenges. Companies as diverse as PepsiCo and Merck & Co have all been affected, and some, such as, Unilever are now telling investors that they are beginning to adapt to “new norms” in certain regions.

As they adapt, respond and report, many businesses are realising significant upsides. The Ford Motor Company has halved its water use over the past decade, and in some regions boosted production volumes by 40 per cent without increasing water use. And investors are looking favourably on these efforts. For example, US fund manager Calvert just launched a Global Water Research Index comprising companies dedicated to responsible stewardship, sustainability, and accessibility of water that will include, amongst others, corporate leaders in water efficiency. Current demands on water are many, urgent and growing. Future demands on water for food, energy, and urban needs are huge. And climate change amplifies the scale and speed of the

water challenge: managing our future water needs is, in effect, the ultimate climate adaptation challenge. This is why water matters. Investors are increasingly aware of this, and they are taking action: 647 investors with USD63 trillion in assets are requesting corporate water data through CDP this year. This is four times the number of investors who backed the request in 2010. In the US, water has been the subject of 110 shareholder resolutions filed by investors since 2011 at corporate annual general meetings. And this year, one of the world’s largest sovereign wealth funds, with EUR761 billion under management, Norges Bank Investment Management, set out its water management expectations for the boards of companies in which it invests.

A large and growing number of private sector actors are recognizing the considerable environmental, social, and economic value that is now at stake due to worsening water security and climate change.

In response, four organizations – CDP, the CEO Water Mandate, the World Business Council for Sustainable Development (WBCSD), and Suez – have formed an alliance to amplify the message from companies that coherent

efforts to embed water into the climate and the 2030 SDG agendas is critical to success.

By committing to action from this new coalition – the Business Alliance for Water and Climate Change – companies are also signalling their commitment to address urgent sustainable development challenges related to water and climate by measuring, managing, and reporting their water impacts. Launched as part of the Lima Paris Action Agenda day at COP 21 and supported by the UNFCCC, the coalition invites companies and business organizations to commit to improve water security. Companies, including Astra Zeneca, Suez and Tata, signing the declaration:

- Call for water to be taken into account in the global climate and SDG agendas
- Commit to improve water security. The declaration will provide direct input into the Lima-Paris Action Agenda during COP22 by demonstrating the contributions the private sector is already making to improve water security in support of a low carbon future. Private sector involvement is vital to solving the world’s growing water challenges. It is now time to pay back the debt, create the enabling environment for cash to flow, partnerships to flourish and our full potential to be realized.

When addressing the 2030 and climate agendas, trends in urbanization should also be analyzed, taking into account a water perspective. The global urban population is growing rapidly. Already, half of the world’s population live in cities. By 2050, that share is expected to have increased to 70 per cent (UNDESA, 2014). Urbanization puts water-scarce areas under pressure, and the rapidly growing urban centres need to think carefully about how they manage their water resources, to keep current residents and companies, and attract new ones. Furthermore, urban water footprint extends far beyond urban areas. Therefore, access to high quality water is a key condition for development and sustainable growth of urban areas.

It is also evident that integrating measures on SDG 6 and SDG 14 on oceans is vital to build resilience to climate change effects. The interconnection between the source, (freshwater ecosystems), and sea must be holistically addressed to avoid un-coordinated and even counterproductive measures.

The 2030 Agenda sets out a clear mission “to leave no one behind”. This means that in the implementation of the 2030 Agenda, equity - a pro-poor approach - is

a cornerstone. Implementing SDGs will be a social process. The measures taken must be anchored in participatory processes to create ownership of the population concerned, as well as long-term stable solutions. Communication about how SDG implementation benefits the broader public must be open and transparent. In general, communication should target understanding of the essential role water plays for human life and existence to create a momentum where not only government bodies, but societies are involved in the implementation of the SDGs. Solutions-oriented research can facilitate the emergence of innovative technologies and approaches towards the achievement of the water SDG and its targets and indicators.

Who is being left behind in the progress towards universal coverage of water and sanitation?

By Alejandro Jiménez and Moa Cortobius

Improved global monitoring of countries' progress enables identifying who lags behind. Only 20% of the top twenty Fragile States met the MDG on water, compared to 62% of low and middle income countries (IRC, 2015). With these trends, few fragile states will be able to reach universal coverage by 2030. At the same time, provision of basic services are a key element of state building, making all efforts to achieve this dual purpose vital.

Within countries, 8 out of 10 people without safe water live in rural areas, and 9 out of 10 practice open defecation (JMP, 2015). Digging further, disparities in access to and management of water are multi-dimensional:

- **Women** continue to be underrepresented in water management, but suffer most from lacking services. While many local water management organizations have equal male/female representation, women remain underrepresented at higher levels of policy and decision making (UN, 2015). Empowerment of women is critical to improve services and reduce inequalities¹.
- **Indigenous peoples** represent 5% of world population, but 15% of world's poor people, and suffer disproportionately from discrimination and disempowerment; also reflected in their access to water services. An intercultural approach in water management is key for indigenous peoples' equal participation².

- **People living with disabilities** amount to 15% of world's population; 80% of them living in developing countries (WHO/WB, 2011). Inclusion of these groups and adequate design of infrastructures is essential to provide inclusive access³.
- **People living in conflict situations** have great challenges to access services, increasing the risk of assault when looking for water and sanitation facilities (House et al., 2014).

Confronting inequalities within countries will require inclusive participatory approaches, true access to information and strengthened accountability mechanisms⁴, enabling all groups to claim their right to water and sanitation.

¹ Examples of lessons learned about gender programming in water is compiled under "Gender Practice in Water Governance Programmes – From Design to Results" <http://watergovernance.org/resources/gender-practice-in-water-governance-programmes-from-design-to-results/>

² See, for example, the Recommendations for Intercultural Approach in WASH, developed by the UNDP/SIWI Water Governance Facility

³ Several organizations have been developing methodologies for inclusion processes and development of adapted designs. A list of resources can be found at <http://www.inclusivewash.org.au/resource-library/people-with-disabilities>

⁴ A set of actions to improve Accountability that can be promoted by External Support Agencies can be found in the UNICEF/UNDP/SIWI publication about Accountability in WASH: <http://watergovernance.org/resources/accountability-in-wash-a-reference-guide-for-programming/>

The effects of climate change will be a top priority for actions on all levels for decades to come. The Paris Agreement will be legally binding, and review and follow-up mechanisms will be put into place. Therefore, it will be fundamental to identify and develop vehicles for integrating the implementation of the SDGs and the Paris Agenda. SDG 13 addresses the need to take urgent action to combat climate change and its impacts. The Paris Agreement states that it "Welcomes the adoption of United Nations General Assembly resolution A/RES/70/1, "Transforming our world: the 2030 Agenda for Sustainable Development". The Paris Agreement does not explicitly refer to freshwater. However, freshwater was addressed in the official agenda during the COP 21, namely during the Lima Paris Action Agenda Resilience Day. Further, freshwater is a top priority for a vast majority of those countries that included adaptation in their NDCs. Freshwater is also the explicit focus two out

of eight projects in the first phase of the Green Climate Fund and it is increasingly highlighted as a foundation for energy production. Hence, freshwater is bound to be included in national and local climate action but this needs to be carried out in a systematic manner and its presence must be clearly identified in the National Adaptation Plans.

The NDCs will be a major vehicle for the implementation of the Paris Agreement. However, the present suggested actions in the NDCs do not suffice to meet the objective of keeping the global average temperature to below 2°C above pre-industrial levels, much less so to the 1.5°C target. Therefore, greater emission reduction efforts will be needed. A review mechanism is being established with the purpose of monitoring improvements, and to gradually increase the measures, every fifth year. This provides opportunities for leverage of water and

climate links. The implementation of the SDGs and the NDCs will be a test on how the 2030 and climate agendas will be co-ordinated. SDG 6 is highly relevant for any adaptation plan and measures, but also for many mitigation measures – such as the development of renewable energy and sustaining carbon sinks, (forests and land). It will

be important to closely follow developments, to suggest measures that link action on SDGs with those on NDCs, and to present cases of success. In this, the water community has a real opportunity to very concretely come forward with innovative ideas on how water can become a useful connector in integrating the SDG and climate agendas.

Water a priority in countries' efforts to act on climate change

By Mélisa Cran and Héloïse Chicou

Not only did water become a core priority of the UN Agenda for Sustainable Development in 2015, but its importance to climate mitigation and adaptation strategies received increased attention.

As of March 2016, 162 Nationally Determined Contributions (NDCs) provided by countries for the COP21 were published on the UNFCCC website, (161 countries and the European Union). Only seven Parties did not participate in the process. Out of these contributions, 134 include a section on adaptation (83 per cent). Whereas all Parties of Africa and South and Central America have their NDCs refer to adaptation, most countries of Europe and North America chose to only focus on mitigation, thus showing that adaptation is a core issue for developing countries.

A UNFCCC synthesis report (October 2015) based on 119 NDCs, underlines that the first adaptation priority listed in the NDCs is water, followed by agriculture, health and ecosystems. The review provided by the French Water Partnership and Coalition Eau (March 2016) shows that water-related actions are included in 93 per cent of the adaptation section of NDCs. These actions cover a wide spectrum that include the following priorities:

- Water-related risk management (73 NDCs): against floods, droughts and desertification, rising sea levels, and changes in the rainfall cycle through hydrometeorological risk assessment, early warning systems, development plan responses to extreme events, and resilient infrastructure.
- Water for agriculture (67 NDCs): ensuring water availability and water-efficient irrigation are fundamental issues. Some countries also reported the need to address floods and the salinization of water, which are forcing them to adapt their crops.
- Integrated water resources management (63 NDCs): many Parties, (63 countries), mention the implementation of Integrated Water Resources Management, although this is often subject to technology transfer and financial support.
- Drinking water (55 NDCs): the focus here is often on improving the urban distribution network, (minimizing leakage, improved control of supply, etc.), but few NDCs address water quality in rural areas. The issue of sanitation is mentioned in fewer than half of the WASH action contributions. Other areas include: coastal management, water energy, aquatic ecosystem preservation, and water-related health. The level of details given to water actions in NDCs is uneven: some countries precisely detail their actions,

(for example Jordan, Moldova, Bolivia, Bangladesh, Morocco, Ivory Coast and Laos), whereas 25 countries announce water as a priority area without specifying the activities they seek to implement. The adaptation measures most often proposed consist of infrastructure, (33 per cent - wells, reservoirs, delivery channels, etc.), knowledge building measures, (24 per cent - monitoring, warning systems, awareness rising), and regulatory initiatives (20 per cent). Finally, implementing capacity building and green measures, (for example reforestation to preserve groundwater), feature more rarely: in 15 per cent and 8 per cent of adaptation measures respectively.

In conclusion, many of the contributions serve to highlight national sustainable development priorities, which encompass adaptation priorities and are directly linked to the Sustainable Development Goals Framework. Indeed, water actions mentioned in the NDCs not only relate to SDG Goal 6 on Water, but also to SDG 1 on Poverty, SDG 3 on Health, SDG 4 on Education, SDG 11 on Cities, SDG 13 on resilience, SDG 14 on Oceans, and SDG 15 on ecosystems. Finding linkages between climate negotiations, actions, and SDGs is thus essential and will be a major challenge in the years ahead.

In conclusion, the 2015 global agreements provide a plan to chart the future towards prosperity and sustainability. So far this is just a plan. To achieve the SDGs, and to combat climate change, this plan must be implemented with great commitment, effectiveness, and the recognition of the need to re-think unsustainable production and consumption patterns, as well as unfair distribution patterns and gender inequality. Naturally,

implementation will not be based upon a "one-size-fits-all" approach, as different regions and societies will need to address challenges differently, depending on their specific contexts. Regardless, managing freshwater, and making effective use of its full potential, will be decisive for the possibility to achieve the 2030 Agenda as well as efficiently address the climate change challenge.

Conventional water thinking - stumbling block for sustainable food production and urbanization

By Malin Falkenmark

The current concepts for water management and economic development have largely emanated in the well-watered north-western parts of our globe. In these humid regions, most of the interest and institutions around water deal with the horizontal flows of liquid freshwater. However, around half of the global landmass consists of drylands where the majority of the water movement is vertical, as rains and evaporation, with very little runoff generation. Some of these drylands are passed by transnational river corridors mountain ranges that rake rain from the skies to provide the populations downstream with at least temporal surplus of water, but for around 80 per cent of the future world population, the water needed for life and livelihoods mainly arrives as rain and vanishes as vapour.

While large portions of the globe struggles with the need to adapt their water use and management to a drier reality, these challenges are especially dire in the broad African dryland-crescent encircling the Congo basin. These drylands are today home to some 750 million people, expected to increase to some 1.6 billion - another India! - in only 35 years. Agricultural yields in this region are very low; typically only some 1 tonne/ha.

Besides the dry climate with limited rainfall under a hot and thirsty atmosphere, the region is exposed to multiple natural hazards in terms of variable and unreliable rainfall, frequent droughts and dry spells, and flood hazards and flash floods, all expected to sharpen with climate change. The demand for the limited liquid, or “blue” water resources in the form of surface and groundwater, already huge, is rapidly increasing from electricity production, manufacturing and urbanization. Therefore, infiltrated rain – “green water” – constitutes the major water resource accessible for food production. To meet and sustain the massive population

growth and strong economic development with local food, agricultural production would have to triple in just a few decades. This can be achieved by careful upgrading of crop production, seeking to close today's large yield gaps in smallholder agriculture through i.a. soil conservation with supplementary irrigation from harvested rain.

SDG's partial water blindness | Interestingly enough, the Sustainable Development Goal (SDG) document KEEPS COMPLETELY SILENT about the massive increase in water requirement, accompanying the food production for achieving hunger eradication. In terms of water, the global goals basically refer to water supply of population, industry and energy, all based on liquid blue water. The fact that the amounts of water needed for producing food for the global population are many times larger than the amounts of water required for health and economic development is not understood or acted upon. In spite of the, by itself laudable, collection of direct blue water uses under one separate goal (# 6), the SDGs are colour blind from a water perspective due to the inability to see and distinguish between the different types and functions of water for sustainable development.

Rain is the ultimate water source in dryland regions | A realistic water outlook on the future of the African savannahs, like earlier the American and Australian plains, will have to comprise a fourfold water security: huge amounts of water will be required for the dramatic increase of food production, for raw water supply of booming cities, for industrial development and for energy supply. In water-scarce regions, the policy challenge will, rather than conventional blue water sharing, be the even more difficult task of water shortage sharing. In a world with increasing demands and variability of water, we need to, in solidarity, share both the benefits of water and the

burden of not having enough. In water-short regions, a wise solution would be to reserve blue river- and groundwater for supply of the urban, industrial and energy sectors, while the increase in food production would be based on the rainfed soil moisture (green water). Water from heavy rains could be harvested and used for supplemental irrigation and stored underground or in small rainwater-fed dams.

For urban and industrial water security, both in the often transnational river corridors and on the vast savannah, the basic pathway includes water storage to compensate river flow seasonality; harvesting of rain, storm water and flash floods; wastewater treatment to enable reuse and reducing exposure of downstream cities dependant on the same river. Large variability will require the establishment of institutions and infrastructure that both satisfy demands during good times and guarantees fair and efficient water security during droughts.

Meeting all these parallel, direct as well as indirect, water demands to achieve the SDGs, will require an integrated approach with long term national planning of water-dependent production of food, industry and urban development.

Financing future food imports | Even if a considerable increase of food production could be achieved in the African dryland-crescent by closing the yield gap, it would not ensure food security for twice the inhabitants by 2050, and for the fourfold increase in population to 2100. Long-term food security will demand a complementary food import from water surplus countries. This would, in turn, mean that the long-term national planning will have to pay special attention to the country's need to generate foreign currency, based on production of export

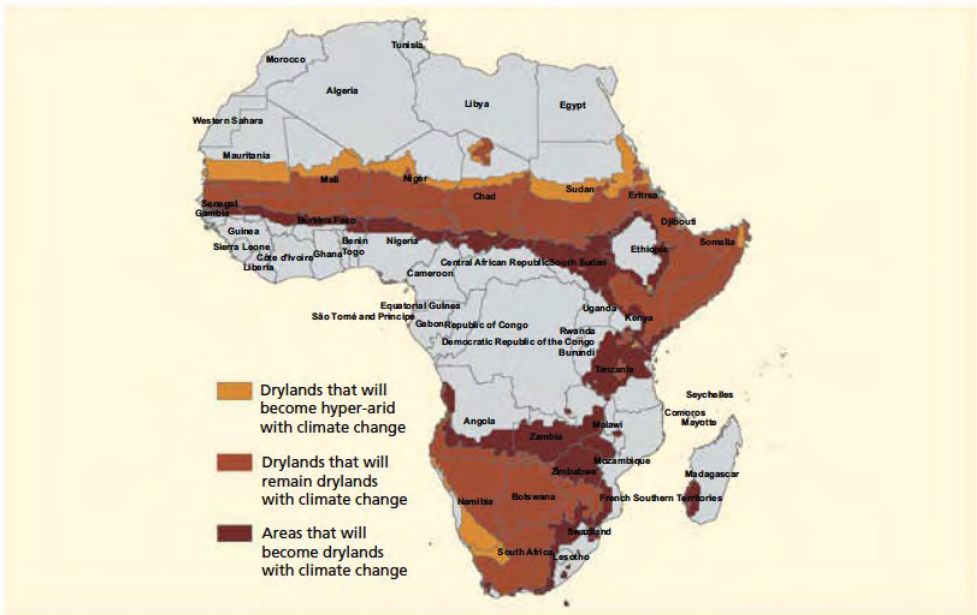
goods from sectors with comparative advantages.

This realization, that few dryland countries, if any, will be self-sufficient

in all the benefits of water; the food, health and industrial goods it provides, calls for a global understanding of how to use the different types of water in a truly water wise world. The SDGs could

have been this plan. For now, the world needs to understand that all the water, whether blue or green, is crucial for our well-being.

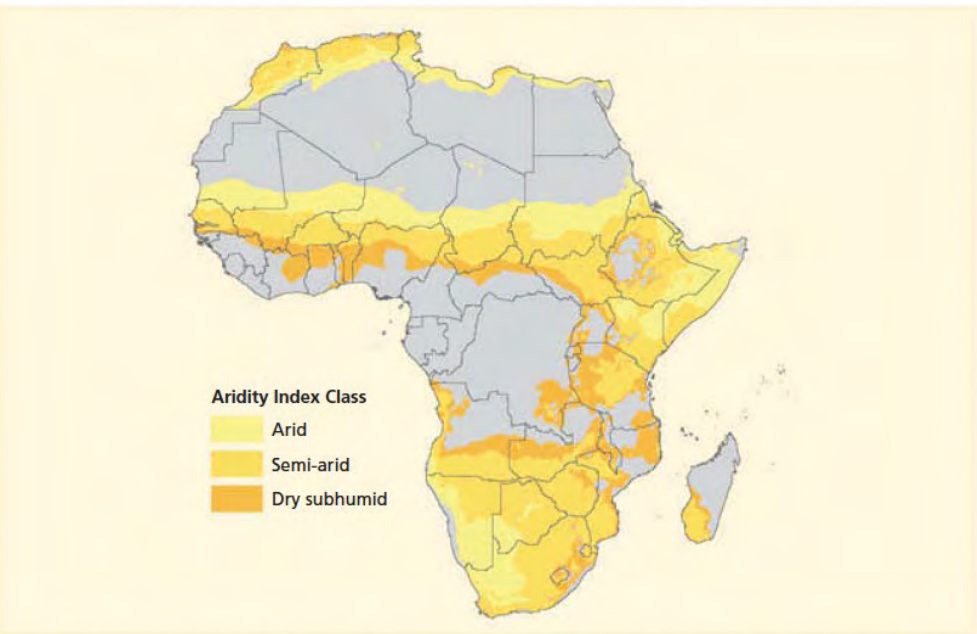
Map 0.2 Shift and expansion by 2050 of dryland areas due to climate change



Source: Estimates based on Intergovernmental Panel on Climate Change (IPCC) data.

Note: The map shows the extent to which drylands (defined to include all zones with an aridity index 0.05–0.65) could shift and expand by 2050 as a result of climate change. To visualize the largest possible impacts, the map reflects the fastest growth of GHG (greenhouse gas) concentration (RCP 8.5 [Representative

Map 1.1 Dryland regions of Sub-Saharan Africa, defined in terms of the Aridity Index



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Photo: iStock

Water for sustainable growth

By Eiman Karar and Torkil Jønch Clausen

The Sustainable Development Goals (SDGs) are aimed at setting the global development agenda for the next 15 years. The targets set are ambitious and progressive, and have people at the centre of their implementation and accountability. The importance of water as the connector for all elements contributing to human development and ecosystem needs is emphasized through the goal dedicated to water – SDG 6. However, water is key to achieving most of the 17 goals and their 169 targets, as described in *Connecting the 2030 Agenda and the Paris Agreement through water* chapter in this report, including SDG 8 to promote sustainable growth. Other recent achievements in recognizing the critical role of water are the UNFCCC COP 21 in which, water was seriously discussed, and the 2015 and 2016 World Economic Forum Global Risks reports, in which water was identified as the single biggest long-term threat facing the global economy.

While providing water alone does not necessarily result in economic growth, lack of water, or poor water quality can and does inhibit growth. As an input to almost all

production, water is a key driver for sustainable growth and contributes to agriculture, industry, energy, and transport; thereby creating jobs and alleviating poverty.

Growth, as a result of population increase, rapid urbanization and economic development, brings about changing consumption and water use patterns, putting considerable pressure on the availability and quality of water resources. Sustainable growth depends on water security attained through sustainable water resource management. A major challenge of economic growth is to follow a trajectory that emphasizes growth as a means of focusing on social and environmental goals, with increased production translating into increased demand for labour, generating real income that can contribute to reasonable public financing, and low inflation rates. Meeting the SDGs will require a better understanding of the role of water in sustaining such economic growth.



The impact of improved infrastructure of sanitation on economic growth and employment generation

By Maria Teresa Gutierrez

According to the ILO's World Employment Social Outlook trends 2016, poor job quality remains a demanding issue worldwide. Vulnerable employment accounts for 1.5 billion people, or over 46 per cent of total employment. In both southern Asia and sub-Saharan Africa, more than 70 per cent of workers are in vulnerable employment, having limited access to contributory social protection schemes, low productivity, and low, highly volatile earnings. There are also significant gender gaps in job quality. Women face a 25 to 35 per cent higher risk of being in vulnerable employment than men in certain countries in North Africa, sub-Saharan Africa and the Arab states.

The WWDR 2016 on Water and Jobs analyses the complexity of water, economic growth and employment dynamics to generate and support employment across all sectors of the economy. Notably water resources management and water infrastructure and services have the potential to develop this sector in an integrated approach, to fulfil the linkages between SDG 6 to ensure availability and sustainable management of water and sanitation, and SDG 8 to promote sustained, inclusive and sustainable economic growth, and full and productive and decent work for all.

One of the main challenges to achieve SDG 6 is to improve sanitation access. The Employment impact assessment, (EmplIA), studies, (ILO 2015), have demonstrated that infrastructure investment could make an important contribution to addressing employment challenges. Macro studies tend to estimate direct employment associated only with the construction activities. However, indirect employment created in the supply chain has a higher effect, (i.e. availability of local suppliers, local materials and manufacturers). The induced effect is significant since construction projects with high shares of unskilled workers which tend to consume local goods, thereby impacting the local economy through their increased household consumption.

The table to the right shows the potential of employment creation in MENA countries for a given level of investment, including indirect and induced numbers. Sanitation projects including wastewater collection and treatment centres have greater potential if projects and programmes are more labour intensive.

The study concludes that for Low Income Countries, (LICs), and Low Middle Income Countries, (LMICs), with slow economic growth, providing jobs for a

young workforce is a challenge. Thus, a balanced role for infrastructure investment is to include rural investment with a significant labour element in countries and regions in which rural underemployment is an issue and urban investments to address skilled, unskilled and female unemployment.

The demand of infrastructure for sanitation and water provision is still significant, in rural and urban areas, and public and private sector investments are needed to meet SDG 6. Therefore, the importance of well-managed infrastructure investment projects are crucial to complement private sector investment and productive activities to drive further investment and economic growth.

Infrastructure Sector	Average FTE Job Per USD Million
Energy	28
Transportation	59
Sanitations	81

Source: (ILO 2015) Table 4: Average FTE per million USD for sub-groups within the MENA results

Given that the world's population will continue to grow, it is essential to closely consider the pattern of this growth. By 2030, the target date for most of the SDGs, the number of youth is projected to stabilize in Asia, whereas Africa's youth will have increased by some 42 per cent, and an overall average increase of 7 per cent will have brought the total size of the global millennial generation (i.e. those who reached adulthood around the turn of the century) to 1.3 billion, (UNDESA, 2015). Some countries are currently struggling to educate and employ their youth, posing serious challenges to ensuring universal high-quality education, productive employment and decent work for all.

In addition to its direct production and service provision

functions, water may have indirect positive and negative effects on growth, such as contributing to migration from areas suffering from environmental degradation and water shortages, and causing the loss of jobs in sectors that – due to inadequate water allocations – relocate or reduce production. Other effects include a shift of jobs from rural to urban areas, or labour migration where growth is not inclusive. There is growing evidence that areas with the greatest rural poverty, malnutrition and food insecurity are also those with the greatest water and land degradation, resulting in local displacements exacerbated by environmental disasters linked to climate change, extreme events and conflict, (UNEP, 2014). Population migration is the subject of *Water, migration and how they are interlinked*, the first chapter of this report.

Continuing urbanization has led to the global urban population growing at a rapid rate, placing water-scarce areas under severe pressure. Cities under rapid urbanization face a range of challenges, including unplanned growth and unmet demand for basic services, as well as increased water consumption, waste generation and wastewater discharge. At the same time, urbanization offers opportunities for sustainable growth and job creation through innovative solutions encompassing the productive reuse of water, nutrients, organic matter and energy. City planners have recognized the need for an integrated

management approach to potable, waste and stormwater management, to enable cities to adapt and become resilient to the pressures which population growth, urban densification and climate change place on ageing and increasingly expensive water infrastructure. Sustainable urban water management can address key elements of SDG 6, and also link to a broader vision of inclusive, safe, resilient and sustainable cities, (SDG 11), in which opportunities provided by growth translate into universal and equitable water security and service provision.

cy in the use and reuse of water, waste and wastewater. Leaders in water stewardship are building strategies focused on supporting SDG 6 through innovations in water technology including treatment technologies, information/communication technologies and the Internet of Things, aligned action initiatives, entrepreneurship, and innovative public-private partnerships.

Making space for water in the new urban agenda

By Faraj El-Awar and Julie Perkins

Most cities generate wealth, but only certain patterns of urbanization bring inclusive jobs and sustainable growth. Water, and its integrated management, have a lot to offer in making cities safe, resilient, inclusive and sustainable; and they need to be embraced in the urbanization agenda that countries will adopt in Quito in October 2016.

The link between urbanization, employment and economic growth is widely accepted: the prospect of jobs is a key driver of urban migration, and there is a strong correlation between countries' level of urbanization and GDP. However, whether this leads to sustainable and inclusive growth is another question. While cities offer the possibility for shared prosperity, the current dominant style of urbanization is also bringing a host of social and environmental problems that, (beyond their direct impacts), negatively impact long-term productivity.

Sustainable and inclusive growth (SDG goal 8) is not a simple consequence of city growth, but of urbanization guided by smart strategies. The current laissez-faire urbanization patterns that dominate the world's fastest growing regions are resulting in sprawl and slums that aggravate social disparities, compromise environmental quality, and undermine the economies of agglomeration that normally give cities their economic advantage. However, compact, integrated and connected urban planning, combined with sound management, can foster just the opposite kind of development. Political, financial and technical choices determine whether cities work for people, the environment and the economy.

At the Habitat III Conference to be held in Quito, Ecuador in October 2016, UN member states will forge a new roadmap to guide urbanization over the next two decades to help them realize the vision of inclusive, safe, resilient and sustainable cities (SDG goal 11) they aspired to in SDG 11. The conference, which is led by UN member states, will adopt a forward-looking, action-oriented outcome document called the New Urban Agenda. Up until the conference, experts, stakeholder groups and member states continue to craft this shared vision for the world's cities, where more than a billion more humans will live by 2030.

What role will water play in this agenda? Cities and water are deeply connected. Water and sanitation services are critical to the health and dignity of urban populations and their ability to participate in urban life. Water in cities can also be a natural resource, an ecological service provider, a public space, a wildlife habitat, a transport route and a source of energy, nutrients and services – all uses that provide opportunity for employment and sustainable economic activity. Yet the multiple potential benefits of water in cities have often been overlooked, as have the many ways in which urban decisions impact the state of urban water. Rather than a nuisance, water – in its many forms and uses – needs to be looked at as an urban asset.

The New Urban Agenda presents an opportunity to promote policies and actions that enable sound integrated urban water management and water-sensitive design (GWOPA). Recognizing water's inherently cross-cutting nature and interdependence with other urban drivers, the New Urban Agenda needs to bridge the long-standing gulf between urban land use planning and water management. Above all, the foundation that sound water management provides for sustaining satisfying urban lives needs to be reflected in this framework that will guide urbanization in the coming decades.

2030 WRG - Catalyzing finance and partnerships for livelihood security

By Anders Berntell and Bastiaan Mohrmann

The creation of locally sustainable growth centres requires innovative financing and partnership models. Blended financing, public-private partnerships, and structured delivery models, such as custom hiring of water-efficient technologies, can support value chain enhancement in agriculture, while building adaptive capacity of communities to respond to climate change impacts.

The World Economic Forum's Global Risks Report for 2016 ranked failure of climate change mitigation and adaptation as the most significant risk by impact. To counter climate impacts, the Paris Agreement also urged developed countries to jointly contribute USD 100 billion by 2020, with a stronger emphasis on adaptation.

However, historical trends point to insufficient adaptation funding. In 2013, it is estimated that less than 20 per cent of total public climate finance, to the tune of USD 25 billion, was committed for adaptation (Climate Funds Update).

The adaptation funding gap is symptomatic of a larger technology, innovation, and capacity gap to sustain livelihoods. Addressing the financing and technology gap is crucial for sustainable rural growth, compounded at the intersection of the water-agri-energy nexus. The interplay of these factors provides an interesting case example in India, highlighting solutions based on public-private partnerships and innovative delivery models.

The state of Maharashtra in India has approximately three million cotton farmers, concentrated mostly in the rain-fed areas of Marathwada and Vidarbha. With high dependency on rainfall, (estimates of irrigation vary from four to 20 per cent, compared to 50 per cent in neighbouring Gujarat), and unsustainable water use aggravated by climate change, farmers are exposed to external variabilities, putting livelihoods at risk. Cotton productivity in this belt is approximately half that of Gujarat, with the highest percentage of suicides, estimated at two to three times the national average for the farming sector.

Rural livelihood promotion centres on opportunities for de-risking farmers and creating growth models through finance and market linkages. 2030 Water Resources Group's Maharashtra Platform is co-ordinating solutions for 500,000 such cotton farmers.

The engagement focuses on farm-level solutions for cost-effective water storage, promotion of climate-smart agriculture through water-efficient technologies, including solar pumps, micro-irrigation, hose reels, and better agricultural practices targeted at soil carbon content. Such solutions are co-ordinated through blended finance mechanisms pooling public, private, and community resources, including viability gap funding.

Considering a majority of farmers are smallholders¹, farm-level technology acceleration is facilitated through agri-water entrepreneurs, who provide water technologies to farmers for a fee. This custom hiring model enables finance facilitation for entrepreneurs as opposed to individual farmers, with tripartite arrangements for repayment between entrepreneurs, financial institutions, and farmers.

The partnership with global apparel brands and agri-business companies ensures off-take of sustainable cotton, and thereby livelihood security. With the growing global trend of migration of the rural population to urban centres, models such as these provide opportunities for creating local centers of sustainable growth.

1 Small farmers are defined as those with land holdings of 1-2 hectares/ 2.5-5 acres.

The concept of 'water as a financial risk' – primarily for the private sector, with potential business values at risk – needs to be turned around, and countries need to shape their growth trajectories towards sustainable allocation of water through new forms of policy, regulation and management. There are many approaches and instruments that can be mobilized to do so, such as a special focus on 'green jobs', which needs to include making current water-related jobs relevant for the future, and a stronger focus on technology and innovation as drivers for job creation. At the same time, 'systems thinking' calls for an increased focus on a circular economy, linked to efficient-

Despite the role of innovation and technology, it is crucial to recognize that implementing the SDGs is a social process – a process of development. As formulated in SDG 8, water shall promote "sustained, inclusive and sustainable economic growth." One cannot ignore recent pronouncements that the wealth of the richest one per cent of the global population is now equal to the wealth of the remaining 99 per cent. This highlights the fact that it is not only the issue of scarcity that needs to be dealt with, but also the unfair access to and distribution of resources, focusing in particular on the plight of women and children. Equity in access to water needs to be addressed in such a way that water allocations and the accompanying benefits of growth are shared in an equitable and reasonable manner, thus contributing to poverty reduction and a narrowing of the gap between rich and poor everywhere. Being the largest user of water, agriculture has a considerable social dimension that impacts not only food prices but also has an important employment dimension. Questions need to be asked about the likely social impact of the transition of some emerging economies from being agriculture-dominated towards being more industrialized and manufacturing-based.

Many countries are undergoing economic policy reform processes, which involves issues of legislation, political will, price setting structuring, subsidiarity issues etc. While prices often are being determined by supply and demand in a market, water needs to be handled differently. For water, market mechanisms tend to refer mainly to tariffs, fees and charges that are administratively determined by authorities reflecting cost recovery for managing water rather than giving a price for water per se. Rolling out new policies that include the ability/revenue generated from water users and appropriate allocation decisions and their implications on new basin organisations from a financial viability point of view are essential support instruments to decentralization and the operationalization of Integrated Water Resources Management (IWRM). This does not deny other aspects of economic efficiencies such as ring-fencing water revenue in water services and sanitation for enhanced services from public sector institutions as well as the regulator role played in the case of public-private partnerships (PPP). The design of water

pricing instruments may be conducted in number of different ways: the challenge remains in using water pricing to achieve goals of sustainable growth, environmental sustainability and social justice.

The growing gap between supply and demand, exacerbated by climate change could demand substantial capital investments in water treatment technologies and distribution infrastructure to reduce these imbalances. Aging infrastructure and bursting or leaking pipes are the cause of most unaccounted water, which often averages between 40 and 60 per cent (McKenzie et al., 2012). This opens the door to a number of investment opportunities to supply, distribute, conserve and treat water. However, investing in the water sector can be complex. It would require analysis of local socio-economic and political conditions to make decisions around cost and benefits of water infrastructure developments where equity is a central aspect in developing contexts.

Traditional communities, often active only in the informal sector of the economy, are wholly dependent on local ecosystems and find themselves increasingly marginalized as they bear the brunt of ecological degradation without any recourse to remedies. Sustainable growth implies, importantly, that economic growth and human development are de-coupled from negative environmental impact, including ecosystem degradation, and – vice-versa – that the impacts of ecosystem degradation on economic activities are minimized. The development and extension of water services infrastructure has been a key foundational element of industrialization and urbanization since at least the ‘great sanitary awakening’ of the mid-19th century. Commitments by businesses and governments worldwide to invest in water infrastructure is commendable, but needs to also include water resources using innovative ‘natural infrastructure’ approaches. Mainstreaming natural infrastructure into decision-making can benefit from a nexus approach to achieve coordinated and integrated planning and decision-making. The conundrum of sustainable development with prosperity for all, as envisaged by the SDGs, cannot be addressed without revisiting water and ecosystem management from ‘ridge to reef’, or ‘source to sea’, including a focus on economic growth and water’s role in healthy ecosystems and dignified and productive livelihoods for all.

By 2030, SDG 6 aims to “implement integrated water resources management at all levels, including through transboundary co-operation as appropriate.” Polycentric, inclusive and transparent decision-making is central to

sustainable growth. This, along with better alignment of policies and implementation between various water-related sectors and SDGs, particularly food and energy, poses new challenges – and opportunities – to good water governance. At the apex, global water governance, made up of myriad organizations, programmes, projects and individuals, requires cooperation between all of these in order to effectively review and refine the existing global and regional water governance regime in support of sustainable growth. The numerous joint institutions that have been set up between countries sharing transboundary water sources and courses have in most cases not materialized. Several problems persist, with ecosystem degradation not being reversed, joint investments in water infrastructure not materializing, and joint management organizations failing to attract significant long-term support from their respective basin states. At the national level, and in many water-stressed catchments around the world, companies, governments, civil society organizations and NGOs are increasingly seeing the benefits of working together in order to share information, collaborate and manage water resources. This is a new form of public–private–civic partnership, since it involves collaborative relationships and, in some cases, coordinated decision-making and implementation done by a variety of actors including governments. Good water governance needs to include all sectors and stakeholder groups, and recognize the vital role of new public–private–civic partnerships underpinning innovation and technology development for job creation and growth.

Financing water for sustainable growth

By Xavier Leflaive

The international community acknowledges that investment in water security drives sustainable growth. However, investment in water infrastructure and services falls short of needs globally. How then to funnel appropriate levels of finance to investments that contribute to water security and sustainable growth? The OECD and its partners work towards concrete recommendations.

The international community is aware of the critical contribution of water to sustainable development. Sadoff et al., (2015), have established that water insecurity acts as a drag on growth and strategic investment in water security could avoid costs of USD 500 billion annually. The Sustainable Development Goals include a dedicated goal on water and sanitation, and explicitly refer to water in relation to several other goals on natural disasters, food security, health and cities. The Addis Ababa Action Agenda acknowledges that financing water will contribute to delivering essential public services for all and to bridging the infrastructure gap, thus contributing to sustainable growth. Water-related investments will also be critical to our ability to adapt to

the adverse impacts of climate change and foster resilience, a key aim of the Paris Agreement reached at COP 21 in December 2015.

Investment in water security, however, falls short of global needs. While the water sector attracts sizeable volumes of finance, the prevailing modes of financing water infrastructure fail to deliver the appropriate amount of finance at the appropriate time and place. The report *Water: fit to Finance?* argues that this situation does not derive from a shortage of available finance, but from how water projects are structured, the business models that are in place, the relatively low return on investment in water infrastructure and services, and the complex nature of water challenges.

The OECD Policy Perspectives on Water, Growth and Finance (2016) contends that financing investment in water security and sustainable growth combines four sets of actions:

1. Maximise the value of existing investments in water security.
2. Select investment pathways that reduce water risks at least cost over time.

3. Ensure synergies and complementarities with investments in other sectors.
4. Scale-up financing through improved risk-return allocation schemes.

In 2015, the OECD, the Netherlands and the World Water Council set up the Roundtable on Water Finance. The Roundtable will leverage policy, economic and finance expertise, and provide a global platform for engaging with leaders within the private sector, government and regulatory institutions, academia and civil society. The Roundtable will also directly inform related key international initiatives, including the joint UN and World Bank Heads of State High-Level Panel on Water; the OECD Centre on Green Finance, Investment and Policy, which helps catalyse the transition to a green, climate-resilient economy; the Netherlands Climate Expertise Centre; the annual Financial Times Water Summit, founded by the WWC; the G20, through a number of working groups.



Photo: iStock

From Source to Sea

By Karin Bjerner and Aditi Mukherji

Water is ranked as having a very high potential impact on economies over the coming decade. Climate change, together with increased demand for and pressure on water, is putting this essential resource under extreme pressure. Coherent management of fresh and marine water caters for maintained ecosystem services, and is crucial for sustainable economic growth and sustainable development more broadly. Such a management approach will not only contribute to achieving the Sustainable Development Goals related to fresh and marine water, (SDG 6 and 14), but also to economic growth, food security, poverty eradication, health, etc.

In a source to sea continuum, key flows connecting systems start in mountainous areas and continue all the way to the sea. Worldwide, these mountainous areas cover nearly a third of the Earth's land surface and play a crucial role in ensuring water, food, energy and ecological security for billions of people from their sources, where rivers originate, to the seas, where rivers drain. The Hindu Kush Himalayas, (HKH), straddles eight countries from Afghanistan to Myanmar and is home to 210 million people. In the HKH, as in most other mountains, there is unmistakable evidence that glaciers are retreating and communities in upper mountains who depend on glaciers for water are directly affected. However, climate change predictions suggest that even though glaciers are melting, annual river flows may not be greatly affected. Higher rainfall will compensate for declining snow and glacier contribution, but in the dry season it will most likely be reduced; while extreme weather events will lead to increased floods. These changes in flows and supply will not only have implications for people living in mountainous areas, but also have far-reaching consequences for downstream users. The HKH is the source of ten major glacier- and snow-fed perennial rivers: the Indus, Ganges,

Brahmaputra, Irrawaddy, Salween, Mekong, Yangtze, Yellow, Amu Darya and Tarim. These rivers, in addition to serving the people of the HKH region, also serve an additional 1.3 billion people living downstream and support livelihoods and create millions of jobs from the source to the sea.

Downstream deltas and estuaries in river basins are important from economic, social and ecological perspectives. A large proportion of the world's population lives in delta and coastal areas and is directly dependent on the ecosystem services provided by the rivers. The rivers form the basis for livelihoods and food security and opportunities such as agriculture, industry, hydropower, irrigation, navigation, mining, tourism etc. for people living along the mainstream and the tributaries. For example, the ten rivers that originate from HKH have the potential to generate 500 GW of electricity that can make the region not only energy secure, but also create opportunities and jobs along the rivers. However, developing hydropower is also connected with ecological risks that may have the opposite effect on livelihood aspects further down the river system. Hence an integrated approach between different sectors and users is a necessity to ensure that the values that the rivers provide and the potential economic growth is preserved and long-term sustainability is achieved. The Mekong River, which runs from the Tibetan Plateau in China through Myanmar, Thailand, Lao PDR and Cambodia to Vietnam, and descends into the South China Sea, is one example of the importance of co-operation across national borders, and points to the inevitable trade-offs between upstream development and downstream users that may have significant impacts on possible sustainable economic growth in the region. Across the four member countries of the Mekong River Commission, (Thailand, Laos, Cambodia and Vietnam), between 50-70 per cent of the population is

engaged in activities or employment in sectors related to the river. The basin's production contributes to substantial agriculture exports, and generates a trade surplus of billions of US dollars. Furthermore, the Lower Mekong Basin yields about 4.5 million tons of fish and aquatic products annually. It is estimated that more than two thirds of the region's rural population is engaged in fishery, which contributes significantly to diversified livelihoods for many people, particularly the poor.

To secure these opportunities it is vital that the river flows and water quality are sustained. Even though the river creates different opportunities for economic growth, these opportunities and developments may at the same time cause negative consequences in terms of pollutants, scarcity and/or floods, change in sediment flows, nutrients, loss of biodiversity and connectivity, erosion etc. These challenges, together with climate change and increased future, food and energy demands, call for new forms of holistic and integrated management approaches that take the whole continuum from source to sea into consideration. Policies and management systems need to allocate water between sectors and downstream/upstream users, secure reliable delivery and adequate water quality, and protect people and the environment from hazards and degradation of ecosystems that constitute a prerequisite for sustainable development. Hence, integrating complex economic, social and environmental aspects is necessary, and the relationships between upstream pressures and downstream effects in a source to sea perspective highlight the importance of integrating measures to achieve Agenda 2030.

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To read more about the theme of 2016 World Water Week – Water for Sustainable Growth – please go to <http://www.worldwaterweek.org/programme/#thematic-scope>

List of authors

Foreword

Torgny Holmgren | Executive Director of SIWI and Publisher of The Water Report.

Editors' introduction: Water's role in a sustainable future

Anders Jägerskog | Counsellor for regional water issues in the Middle East and North Africa for the Embassy of Sweden in Amman, Jordan.

Karin Lexén | Director of World Water Week, International Policy and Prizes at SIWI.

Torkil Jøneh Clausen | Chairman of World Water Week Scientific Programme Committee, Senior Advisor to DHI Group and Global Water Partnership.

Victoria Engstrand-Neacsu | Acting Communications Director, Writer and Editor at SIWI.

Reflection: Out of sight – out of mind?

Jens Berggren | Director of Stockholm Water Prize at SIWI.

Water, migration and how they are interlinked

Anders Jägerskog | Counsellor for regional water issues in the Middle East and North Africa for the Embassy of Sweden in Amman, Jordan.

Ashok Swain | Professor of Peace and Conflict Research and Director of Research School of International Water Cooperation at Uppsala University, Sweden.

How changing water supplies can contribute to food insecurity

Andrew Maddocks | Outreach and Development, Aqueduct, World Resources Institute.

Betsy Otto | Global Director, Water Program, World Resources Institute.

Tianyi Luo | Associate, Water Program, World Resources Institute.

Water shortages resulting in displacement and misery inside Syria

Noosheen Mogadam | Protection and Advocacy Advisor, Norwegian Refugee Council.

Thomas Whitworth | Shelter and WASH Specialist, Norwegian Refugee Council.

Impact of Syrian refugees on Lebanon's water resources

Nadim Farajalla | Faculty Research Director, Climate Change and Environment, Issam Fares Institute for Public Policy and International Affairs, American University of Beirut.

Water scarcity as a long-term driver of rural-urban migration in Syria

Francesca de Châtel | Director, Revolve Water.

Connecting the 2030 Agenda and the Paris Agreement through water

Karin Lexén | Director of World Water Week, International Policy and Prizes at SIWI.

How UN-Water supports an integrated approach to addressing water and sanitation in the 2030 Agenda for Sustainable Development

Joakim Harlin | Chief, Freshwater Ecosystems Unit, UNEP (former Senior Water Advisor, UNDP).

Growing number of private sector actors take action to address urgent water challenges

Cate Lamb | Head of Water Program, CDP.

Who is left behind in the progress towards universal coverage of water and sanitation

Alejandro Jiménez | WASH Specialist at SIWI.

Moa Cortobius | Water and Gender Specialist at SIWI.

Water a priority in countries' efforts to act on climate change

Mélisa Cran | Policy Officer, French Water Partnership.

Héloïse Chicou | Deputy Director, French Water Partnership.

Conventional water thinking - stumbling block for sustainable food production and urbanization

Malin Falkenmark | Senior Scientific Advisor at SIWI and Professor, Applied and International Hydrology, Stockholm Resilience Centre.

Water and sustainable growth

Eiman Karar | Executive Manager, Water Resources Management, Water Research Commission.

Torkil Jøneh Clausen | Chairman of World Water Week Scientific Programme Committee, Senior Advisor to DHI Group and Global Water Partnership.

The impact of improved infrastructure of sanitation on economic growth and employment generation

Maria Teresa Gutierrez | Technical Specialist on Employment Intensive Investment of the International Labour Organisation (ILO) and Gender Specialist on Public Works.

Making space for water in the new urban agenda

Faraj El-Awar | Head GWOPA Secretariat, UN-Habitat.

Julie Perkins | Coordinator of Knowledge Management Unit, GWOPA Secretariat, UN-Habitat.

2030 WRG - Catalyzing finance and partnerships for livelihood security

Anders Berntell | Executive Director, World Resources Group (WRG).

Bastiaan Mohrmann | Co-Head Asia and Middle East, World Resources Group (WRG).

Financing water for sustainable growth

Xavier Leffaive | Environment Directorate, Organisation for Economic Co-operation and Development (OECD).

From Source to Sea

Karin Bjerner | Senior Analyst, International Affairs, Swedish Agency for Marine and Water Management (SwAM).

Aditi Mukherji | Theme Leader, Water and Air, International Centre for Integrated Mountain Development (ICIMOD).



About SIWI Report no 37: The Water Report 2016

The Water Report follows and analyses current and long-term issues that are central to building a water-wise world.

The Water Report 2016 discusses Water and Migration, Water in the 2030 Agenda and the Paris Agreement, as well as Water for Sustainable Growth.

About SIWI reports

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