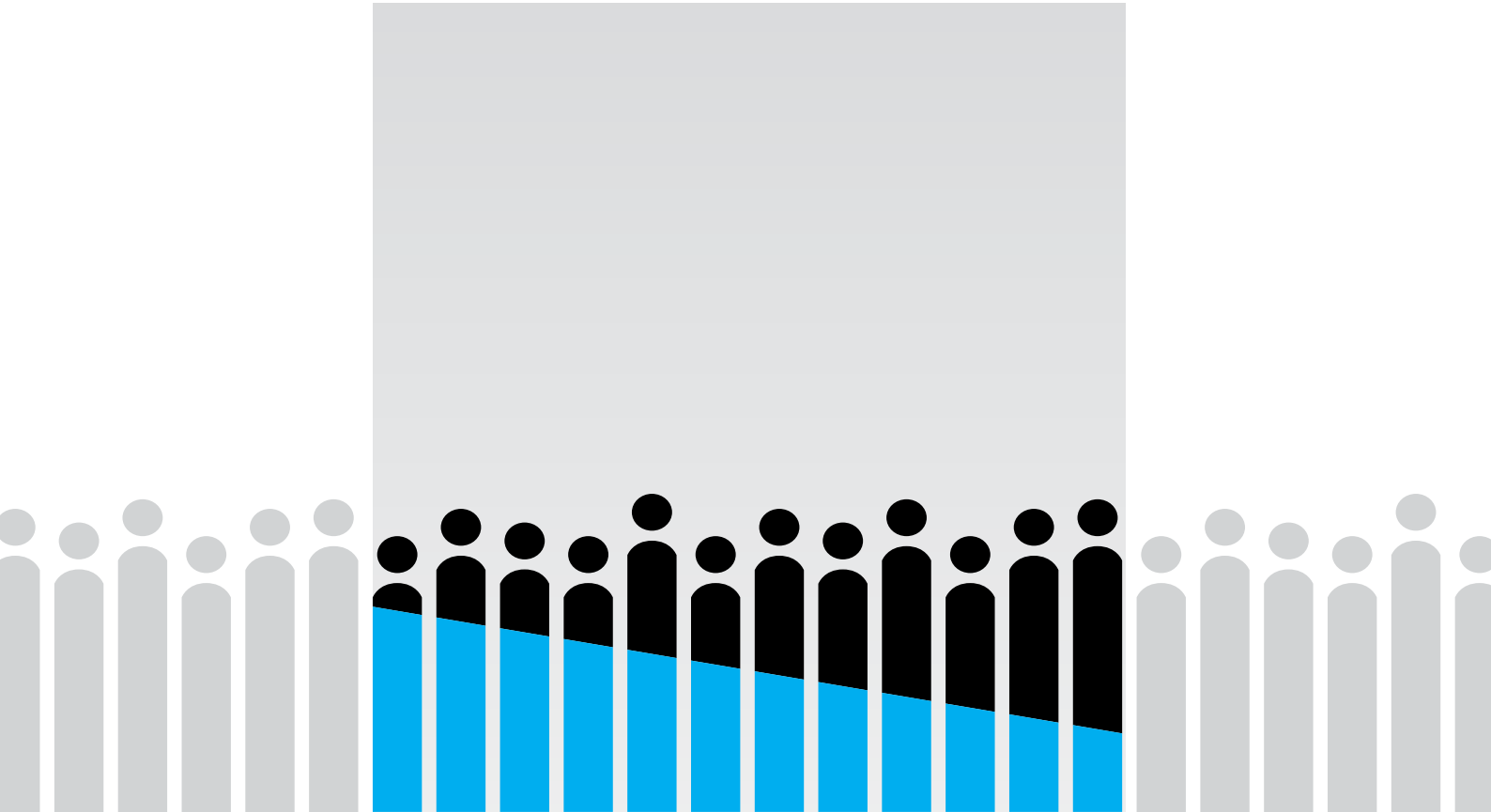


THE HYDRO-INSECURE

CRISIS OF SURVIVAL IN THE MIDDLE EAST



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CRISIS OF SURVIVAL IN THE MIDDLE EAST



With support from

Swedish International Development Cooperation Agency, Sweden

With input from

High Level Forum on Blue Peace in the Middle East



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FOREWORD



The study by Strategic Foresight Group, “The Hydroinsecure: Crisis of Survival in the Middle East”, is very timely. More than 40 million people in Iraq, Jordan, Lebanon, Syria and Turkey are highly insecure in terms of effective access to water. They are located in 30 governorates across the 5 countries. They make for 1/7 of the population of Turkey, more than 1/4 of the population of Lebanon and Jordan, more than 1/3 the population of Iraq and almost half the population of Syria.

The phenomenon of hydro insecurity results from natural factors such as drought and crop failure as much as human factors such as mismanagement. It results in migration, displacement and refugees. Conversely the internally displaced people and transboundary refugees increase pressure on water supply systems. Such a vicious cycle leads to social unrest and produces crisis of survival in the region.

It is more than urgent for all countries in the region and the international community to address the plight of the hydro insecure people. Since 13 out of 30 hydro insecure governorates in the 5 countries share borders with each other, the crisis have international implications.

Our failure to manage our water resources in a sustainable and collective manner is giving rise to internal as well as regional catastrophe, which none of us will be able to escape.

I hope the report “The Hydroinsecure: Crisis of Survival in the Middle East” will wake us up from our inertia and force us to take collective and constructive measurements. We all owe our gratitude to the Strategic Foresight Group for highlighting this issue and warning us to act before it is too late. Act we must and from today. We cannot afford to wait even for a single day.

A handwritten signature in black ink, appearing to read 'El Hassan bin Talal'.

HRH El Hassan bin Talal

PREFACE

Water diplomacy is an intensely technical subject. It is also a sensitive political subject. Monitoring of river flows, harmonization of standards, adjusting national security interests appear to be complicated challenges. Only diplomats and experts may tread this space. Occasionally heads of governments or their ambassadors and plenipotentiaries intervene.

Strategic Foresight Group participates in this process. But it is acutely aware that amidst all the talk of national sovereignty, technical arguments and treaties, we should not forget the people who are at the core of this sphere. These people face the crisis of survival. Sometimes they walk for a few miles to fetch a bucket of water. Sometimes they pay through their nose for what is increasingly considered an essential human right. Sometimes they leave their homes and wander in search of a few more drops. These people are the hydro insecure.

If we really want to understand what hydro diplomacy is all about, we must first try to understand the plight of the hydro insecure. Who are these people? Where do they live? How do they live? Or indeed do they live at all, though exist they surely do! Statistics helps. Cynics may argue that statistics are just about numbers, and not depiction of life. But sometimes numbers also tell a tale. And the number of the hydro insecure in the Middle East is alarming. We estimate them to be around 40 million spread across 30 governorates of Iraq, Jordan, Lebanon, Syria and Turkey.

Their tale is worrying. It is a story that not only may result in tragedy for them but also for the region at large, including the elite. Out of the 30 affected governorates, 13 are close to national boundaries. As a result, it is easy for crisis to spill over from one country to another.

The story of the hydro insecure is a testament to the centrality of water in our life. One does not become hydro insecure simply on account of shortage of water. Hydro insecurity is about the inability to face crisis arising out of hydro dynamics. These include availability and access to water as well as disasters, both natural and man-made. Persistent drought, violent conflicts in the neighbourhood, unsustainable use of ground water, and imbalance of power between genders all contribute to hydro insecurity.

Sometimes there is a vicious cycle. Shortage of water displaces people. They become refugees in another district, putting pressure on water availability in the host district. This can lead to tension, conflict and violence. Sometimes the circle spins in the opposite direction. Violence breaks trust in the society and forces people to flee to another district or another country, increasing pressure on the supply of essentials there, particularly water.

We have studied the hydro insecure in the context of the five countries in the Middle East mentioned earlier. However, their grim reality, with some local differentiation, can be found in many other parts of the world.

We owe a debt of gratitude to HRH Prince Hassan bin Talal of Jordan for encouraging us to keep our feet on the ground while intervening in water security discourse at the higher end of the diplomatic process. He urged us to bear in mind the subtle, and sometimes not so subtle, linkages between water insecurity and social unrest, increasingly transcending into trans-boundary conflicts.

We must thank the Swedish International Development Cooperation Agency (SIDA) for supporting our work in water diplomacy in the Middle East and particularly our intention to study ground realities that lead to the crisis of survival for 40 million people in the region.

We are also grateful to a number of experts and practitioners in the region who provided intellectual input to this paper in the course of the High Level Forum on Blue Peace in the Middle East and in other interactions.

Even though we were fortunate to have such wide ranging cooperation to examine the plight of the hydro insecure in the Middle East, resulting in this publication, we are humbly aware that this is only work in progress. Much more in-depth analysis is required and we hope that other institutions will be encouraged to build further on this work.

There are no quick fixes. We have emphasised the need to involve the affected people and local authorities in addressing this problem. We have also argued that the focus on the bottom of the pyramid does not lessen urgency to promote trans-boundary cooperation at the highest level. In fact, the two aspects are interdependent. However, we have deliberately not attempted to provide any detailed solutions.

The problem of the hydro insecure has so far not received much attention. It is necessary to understand it with all its nuances and linkages to other problems before we devise policy responses. Of course, critics may argue that we do not have the luxury of time. We need to find solutions at the earliest.

Strategic Foresight Group is committed to contribute to the discourse on water diplomacy in the Middle East. We hope that a focus on those in whose name water diplomacy is conducted, and our understanding of their crisis of survival, will make us all more determined to pursue our endeavours.

Sundeep Waslekar
President, Strategic Foresight Group

Mumbai, December 2014

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Foreword by HRH El Hassan bin Talal of Jordan

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EXECUTIVE SUMMARY

1. Middle East is a water scarce region. Its populations face significant water stress which is exacerbated by drought, climate change and pollution. While the region as a whole is hydro-insecure, there are certain areas and certain sections of the population in the region that face more water vulnerability than the others.
2. More than 40 million people in Middle East are hydro-insecure. They are spread unevenly across a total of thirty governorates located in Iraq, Jordan, Lebanon, Syria and Turkey. Out of these 40 million people, about half of them are located in the hydro-insecure governorates of Iraq and Syria alone.
3. Hydro-insecurity is interdependent on drought. Droughts adversely impact all of these governorates, causing crop failure, loss of agricultural income, and human displacement. Some of the hydro-insecure governorates have significant irrigation infrastructure, yet they continue to face the adverse impacts of continual droughts. The hydro-insecure regions within each country host at least a fifth of the total rural and agricultural populations of the country. These populations are directly affected by droughts and the consequent decrease in water availability.
4. Hydro-insecurity is also closely linked to the violence in the region. Beneath the layers of sectarian, religious, ethnic and political issues, low level of development emerges as the fundamental reason of conflict. This is especially evident in Iraq, Jordan and Lebanon. Climate change and poor water management lead to water scarcity, which intensifies the struggle to gain access to and control the resource, resulting in discrimination and violence.
5. The severe drought between 2006 and 2010 and the consequent water shortage have been a trigger to the Syrian civil war. The IS has risen in eastern Syria and western Iraq strategically around water resources and storage structures. For the IS, water has functioned as an effective tool that can be wielded as a weapon against opponents, and a pressurizing tactic in case of governments and civilians. The control of water has given them the control of economy, power, sanitation, security and stability in their occupied territory.
6. Cooperation across boundaries is indispensable as 13 out of 30 hydro-insecure regions of Middle East share international borders with each other. They are Al Anbar and Nineveh (Iraq), Mafraq (Jordan), all four hydro-insecure governorates of Syria, and Hatay, Kilis, Gaziantep, Sanliurfa, Mardin and Sirnak (Turkey). These governorates are largely poor and host about 3.4 million or 80% of the total displaced/refugee population of the thirty hydro-insecure governorates, with some of them facing active war conditions. In addition, all of them face high drought risk, aridity and desertification. The water resources and populations in these governorates need special attention. In the long term, as conditions permit, cross border cooperation can also be beneficial.
7. Developmental issues coincide with water risks in all of the thirty hydro-insecure governorates. Across the hydro-insecure governorates of all five countries, water vulnerability does not occur in isolation. It is accompanied by one or more developmental issues such as poverty, war and conflict, low women's development and environmental degradation. Most of these governorates have access to surface or ground water sources yet, they classify as hydro-insecure. In such cases, structural factors such as inadequacies of infrastructure and governance contribute as well.

8. Poverty and low rates of labour force participation are particularly strongly linked with hydro-insecurity. Out of the thirty hydro-insecure governorates, twenty-four governorates feature in the top one-third governorates with highest poverty rates in their respective countries. In Syria and Turkey, all of the governorates feature in the top one-third. In case of labour force participation rate, twenty three governorates feature in the bottom one-third governorates in their respective countries.
9. The domestic/drinking water pricing in the five countries has considerable impact on the populations in the hydro-insecure governorates, especially the low income groups. Water pricing in all five countries is subsidized and does not cover full costs. The proportion of income allotted to buying domestic/drinking water in the hydro-insecure governorates of Iraq, Lebanon, Syria and Turkey is zero or close to zero. It is slightly higher in the hydro-insecure governorates of Jordan (3-7%). However, some hydro-insecure communities often pay private contractors and end up spending up to one-third of their income on water.
10. Metering of consumption is not widespread. Where it is present, it is shared by poor families, which are typically large in size. They register high consumption on the metre, but the actual per capita consumption is low. This is particularly evident in Jordan. Irrigation tariff structures are based on size of land rather than actual consumption of water. They do not provide any incentive to conserve water and grow water-efficient crops.
11. The most affected populations are largely rural, agricultural and poor. Nevertheless, they tend to cultivate water intensive crops like wheat, exacerbating their problems in the future. Wheat is cultivated in most of the hydro-insecure governorates across all five countries. It is water intensive, significantly dependent on rainfall, and a staple food item within the country as a whole. Any harm to the production of this crop directly affects food security in the whole region. Iraq and Syria are particularly affected. Their wheat-growing governorates are also among their hydro-insecure governorates, and are prone to droughts. Considerable portion of their production is rainfed. The impact of droughts on wheat production has been serious, and turned Iraq and Syria into wheat importers.
12. There is a growing phenomenon of 'water refugees'. The hydro-insecure regions in all five countries have faced a drought period in the year 2013-14, and their overall predilection to drought is significant. 12% of the displaced population in Iraq and 57% of the displaced population in Syria have migrated due to droughts. The phenomenon of water refugees is the direct result of droughts, climate change, poor water management and imbalance of population/resource ratio, and is on the rise in the region, particularly around the Euphrates-Tigris (ET) basin.
13. The five countries have been witness to a series of conflicts and seen considerable displacement, with major conflicts post-2000 including the invasion of Iraq in 2003, the sectarian conflict in Iraq in 2006-2007 and the Syrian civil war since 2011. The Syrian civil war is considerably increasing the size and proportion of displaced population in the neighbouring countries. In the conflicts in Syria and Iraq, cutting off water supply and flooding of dams have been used as weapons to cripple the opponents and terrorize civilians.
14. In specific governorates like Kilis (Turkey), Aleppo and Deir ez Zor (Syria), Bekaa (Lebanon) and Jarash and Mafraq (Jordan), the proportion of displaced/refugee population is equal to or more than a quarter of the local population. Mafraq in Jordan and Bekaa in Lebanon have the largest proportion of displaced/refugee populations at more than 50% and 80% respectively. The presence of displaced/refugee population is seen to be larger in governorates with lower

domestic/drinking water availability per capita. There is a resultant increase of population pressure on the already scarce local water resources. Water aid provided to refugees living in camps is limited. The most affected are off-camp refugees who rely on the local public system, and the local population which shares the system with them.

15. In the hydro-insecure governorates of all five countries, the position and functions of women in society are more or less similar. Women are primarily responsible for providing water to the household, and they are also important contributors to agricultural activities. However, the society grants the authority to take decisions regarding water purchase and allocation to men. The gender roles are mismatched and create obstacles in water management for women. Especially in the hydro-insecure governorates, women face more and complex difficulties due to the low level of their overall development.
16. Women face significant obstacles in water management in the hydro-insecure governorates. The resultant effect is dual: women's development has remained low, and water management has not attained optimum levels of efficiency. Apart from war-like conditions, insecurity and social constraints, low levels of labour force participation, employment and wages play an important role in restricting women from acquiring authority to take decisions regarding water management and their rights regarding water use. Among the female population, the displaced/refugee women, and women heading refugee households are the ones most at risk. Also, for those who have lost their homes and all their belongings, survival, stability and security supersede proper management and efficient use of water.
17. It is necessary to provide urgent policy response to the problem of hydro-insecurity. It is, first of all, necessary to recognise the phenomenon of hydro-insecurity and its close links to drought, refugees, inefficient agriculture, flawed pricing and gender inequality. Secondly, it is essential to involve affected governorates and local civil society groups in situation assessment, training and capacity building. Thirdly, reforms of pricing, agriculture and irrigation are essential. Finally, as thirteen out of thirty governorates are in the border areas, regional cooperation is essential.



Introduction

This study focuses on the hydro-insecure populations in the Middle East. The main objective of the study is to identify, locate and examine the conditions of these populations. The region has been facing numerous developmental and environmental difficulties, and in order to devise specific solutions, a micro-approach towards first identifying the most vulnerable and insecure has been adopted.

The scope of the study encompasses five countries in the Middle East, namely Iraq, Jordan, Lebanon, Syria and Turkey. Together, they are host to more than 40 million people who identify as hydro-insecure. These people are distributed across thirty hydro-insecure governorates in the five countries.

The term 'hydro-insecurity' denotes not only current issues in water availability and supply, but also includes the concept of water vulnerability. Water vulnerability is the extent of weakness or inability of a population to face water-related disasters occurring in combination with poverty, unemployment, human displacement, droughts, and low women's development already prevalent in the region. The concept of vulnerability extends beyond the current situation and includes the aspect of future risks (i.e. weakness in coping with water issues in the future). As a whole, hydro-insecurity includes both current and future risks. In this study, hydro-insecurity in a governorate is determined in terms of water availability per capita, predilection to drought and prevalence of rural and agricultural population.

There are certain governorates in the five countries which currently face significant developmental issues, with water deficiency being one of them. However, they have not been included because they do not fulfil more than half of the factors mentioned in the definitions above. Since the study includes a comparative aspect in identifying the governorates, these governorates have been excluded.

The five countries included in the study and the region as a whole experience hydro-insecurity at various levels. However, by bringing into focus those specific sections of the population that are comparatively more hydro-insecure than others, the study hopes to facilitate more refined policies and give further impetus to regional cooperation in the Middle East.



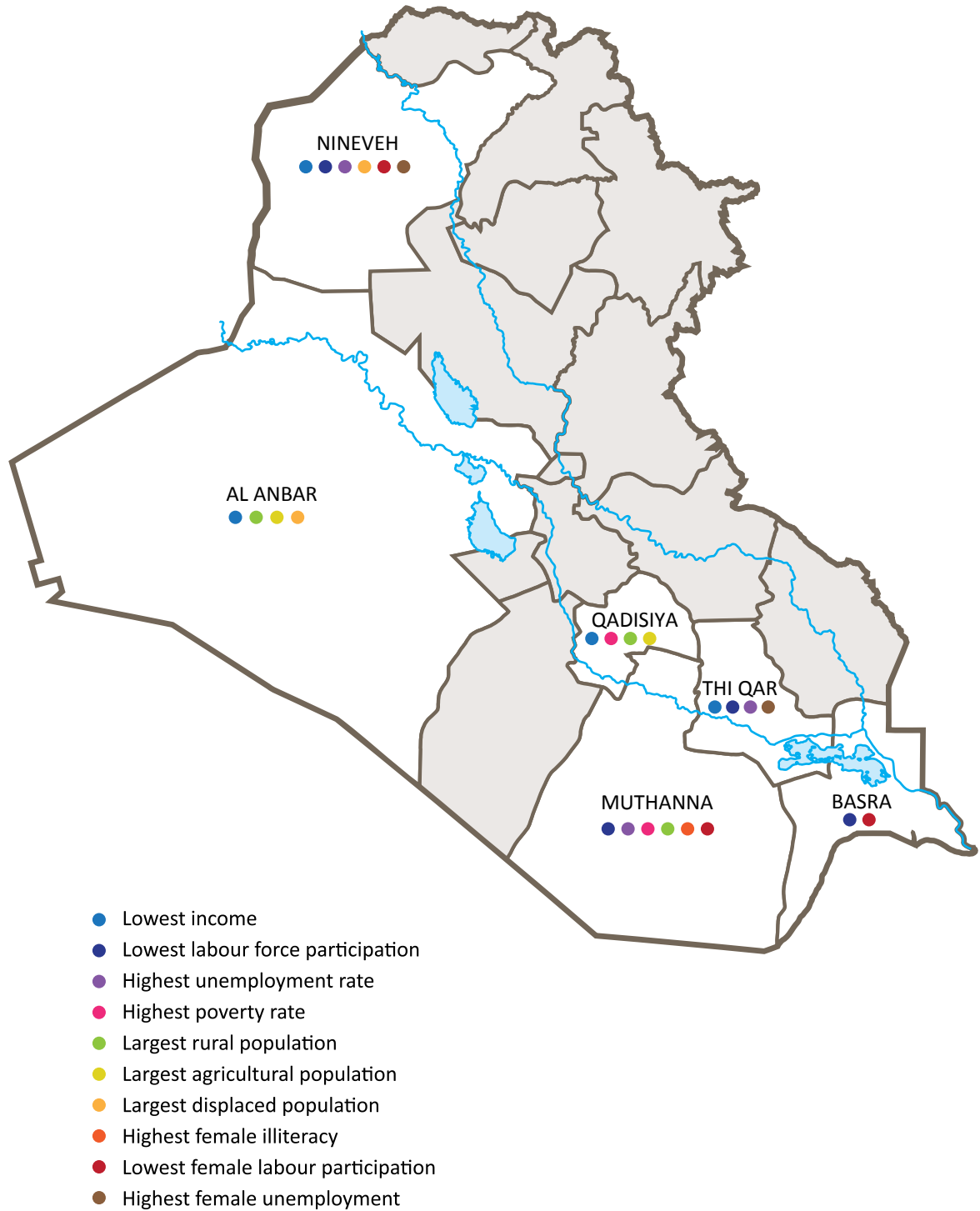
Governorates	Lowest Income/ expenditure per capita	Lowest Labour force participation	Highest Unemployment Rate	Highest Poverty Rate	Largest Rural Population
Iraq					
Al Anbar	●				●
Basra		●			
Muthanna		●	●	●	●
Nineveh	●	●	●		
Qadisiya	●			●	●
Thi Qar	●	●	●		
Jordan					
Irbid		●			
Jarash		●		●	●
Mafraq	●	●		●	●
Tafiela	●		●	●	
Lebanon					
Bekaa		●			●
Syria					
Al Hasakeh	●		●	●	●
Aleppo	●	●		●	
Deir ez Zor	●	●	●	●	
Idlib	●	●		●	●
Turkey					
Adiyaman	●	●	●	●	
Agri	●	●	●	●	●
Bingol	●		●	●	●
Bitlis	●	●	●	●	
Diyarbakir		●	●	●	
Elazig		●	●	●	
Gaziantep		●	●	●	
Hatay				●	●
Kilis		●		●	
Malatya		●	●	●	
Mardin	●	●	●	●	
Sanliurfa	●	●	●	●	
Siirt	●	●	●	●	
Sirnak	●	●	●	●	
Sivas				●	
Total	18	23	18	24	11

Largest Agricultural Population	Largest Displaced Population	Highest Female illiteracy	Lowest Female Labour force participation	Highest Female unemployment	TOTAL
●	●				4
			●		2
		●	●		6
	●		●	●	6
●					4
				●	4
	●		●		3
●			●		5
	●	●	●		7
		●		●	5
●	●	●	○	●	6
	●	●	○	●	7
	●	●	○		5
●	●	●	○		7
●	●		○		6
	●	●		●	7
		●			6
		●			5
		●	●		6
		●	●	●	6
		●	●	●	6
	●	●	●	●	7
●	●				4
	●	●	●		5
	●		●		5
	●	●	●		7
	●	●	●		7
		●	●		6
		●	●		6
					1
7	16	19	16	9	

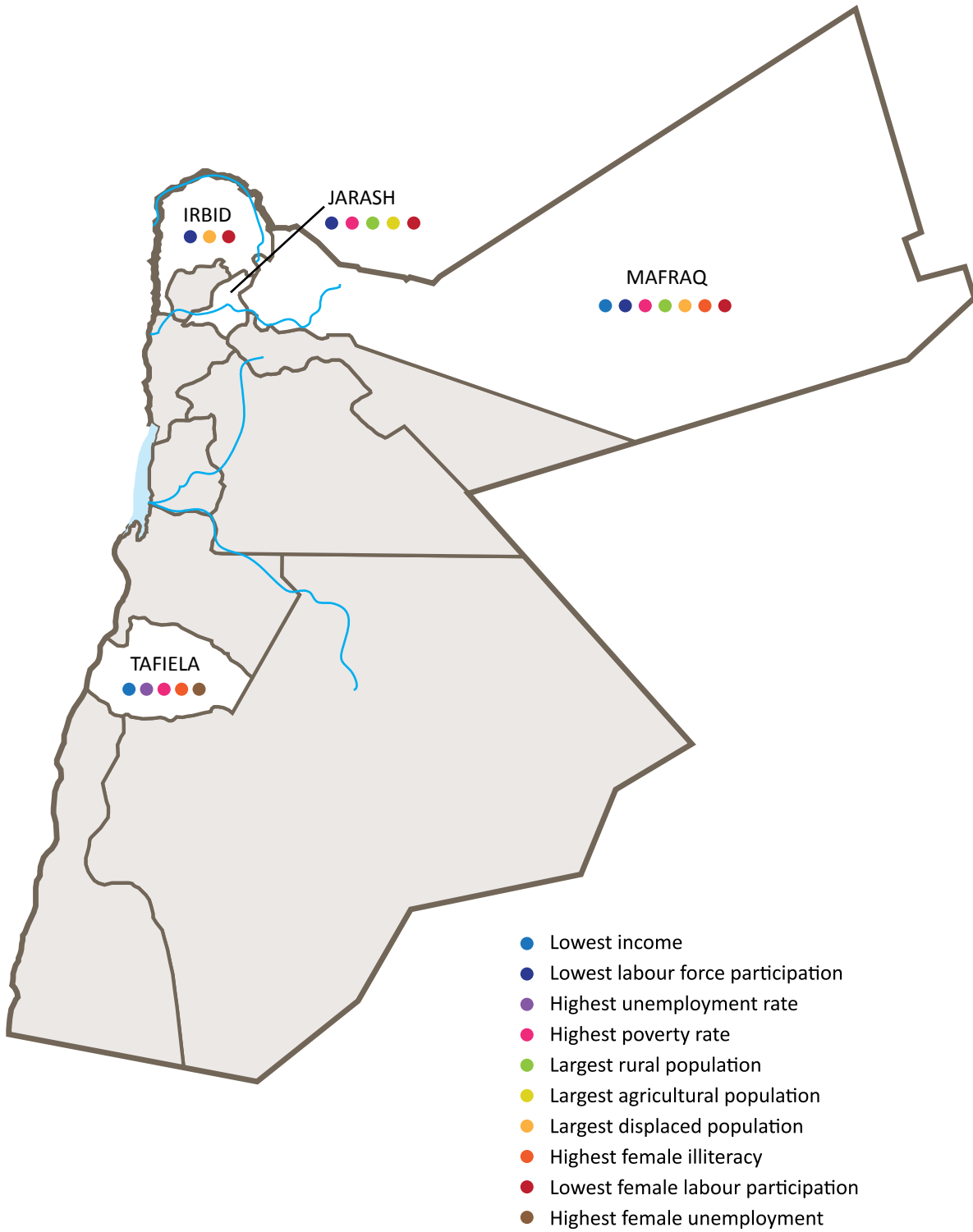
□ Vulnerable governorate sharing international border with another vulnerable governorate.

○ Female labour force participation rates for Lebanon and Syria shown as NA because national level rates have been used due to lack of governorate-level data.

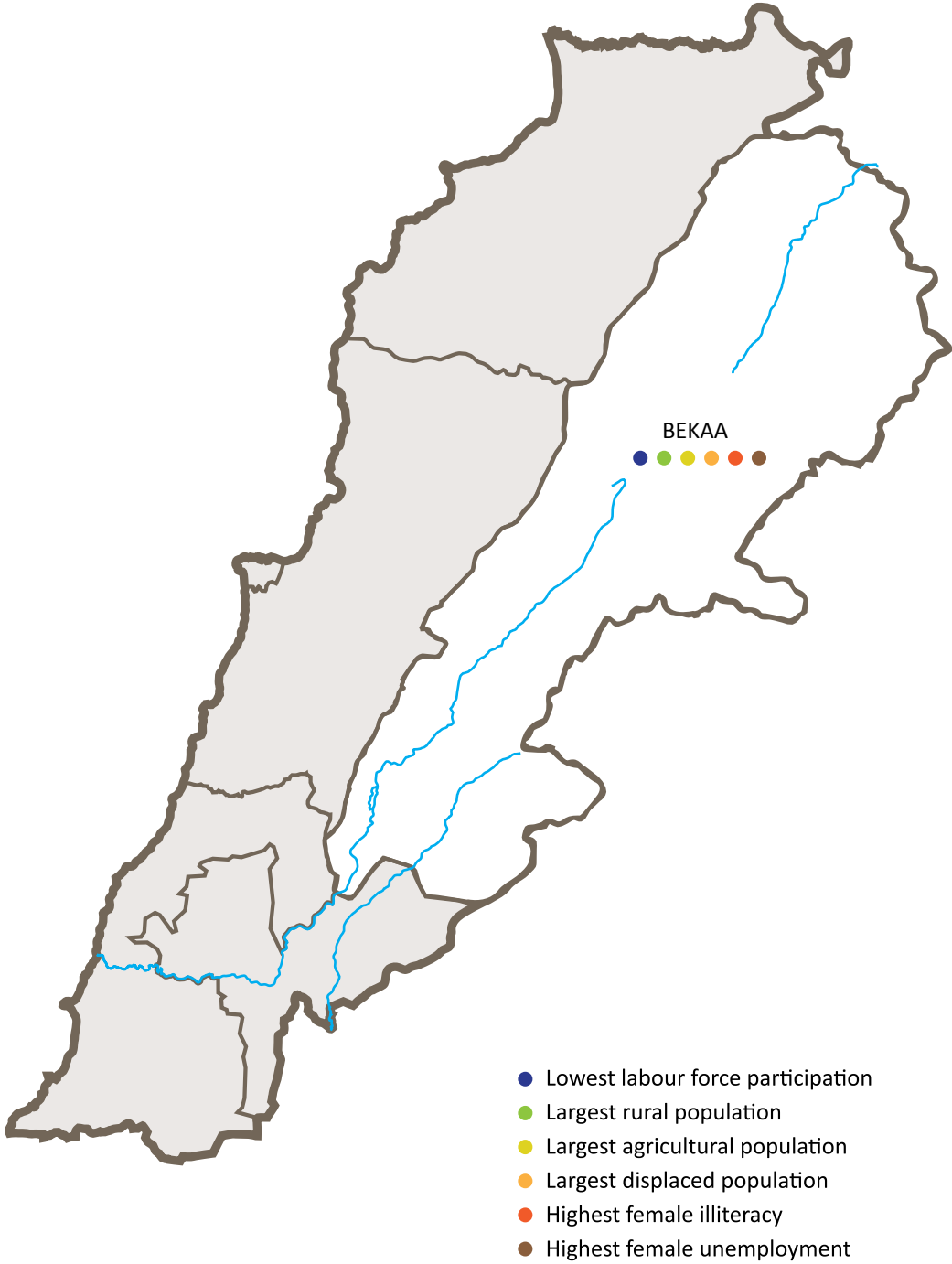
IRAQ: Hydro-insecure Governorates



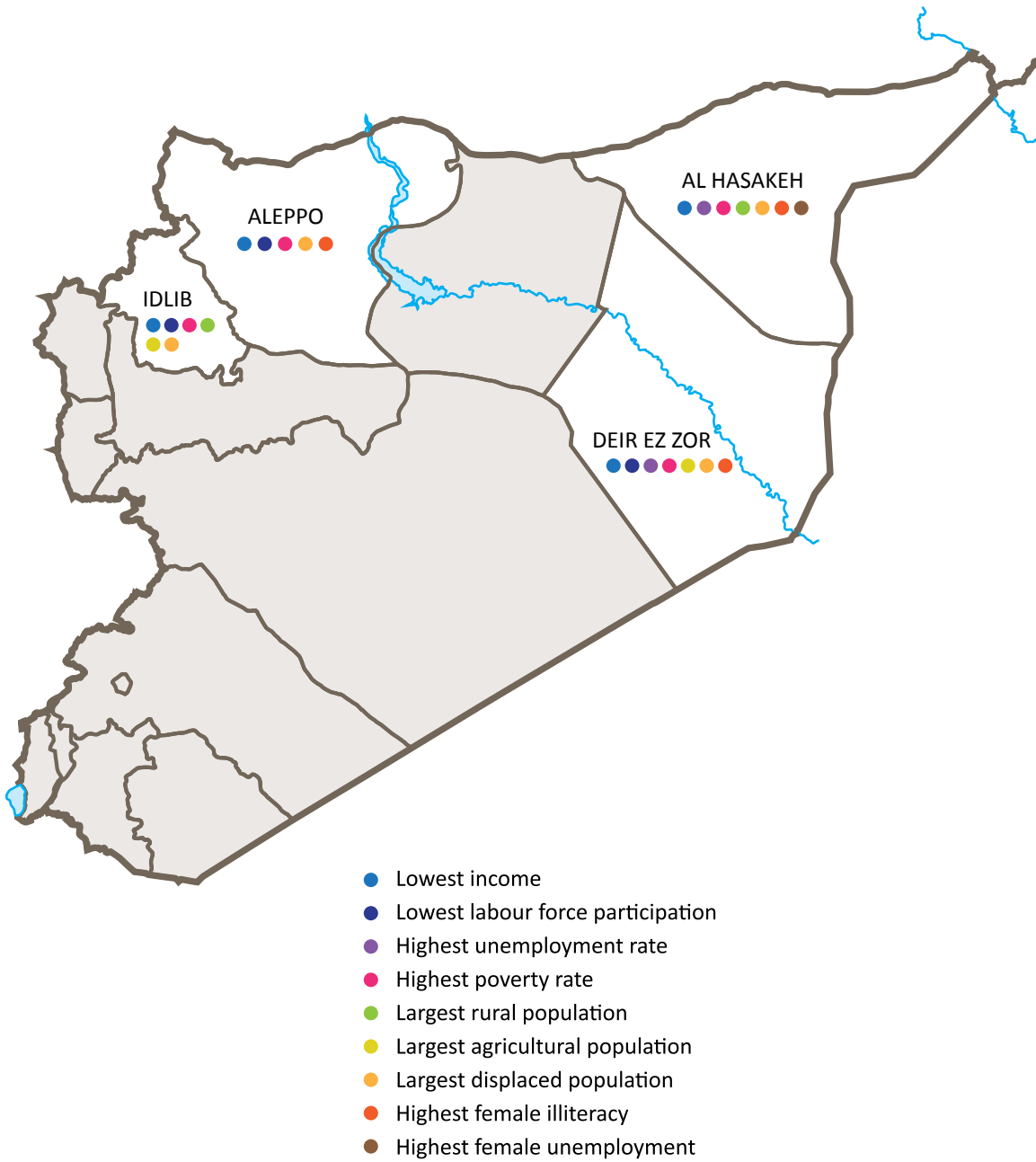
JORDAN: Hydro-insecure Governorates



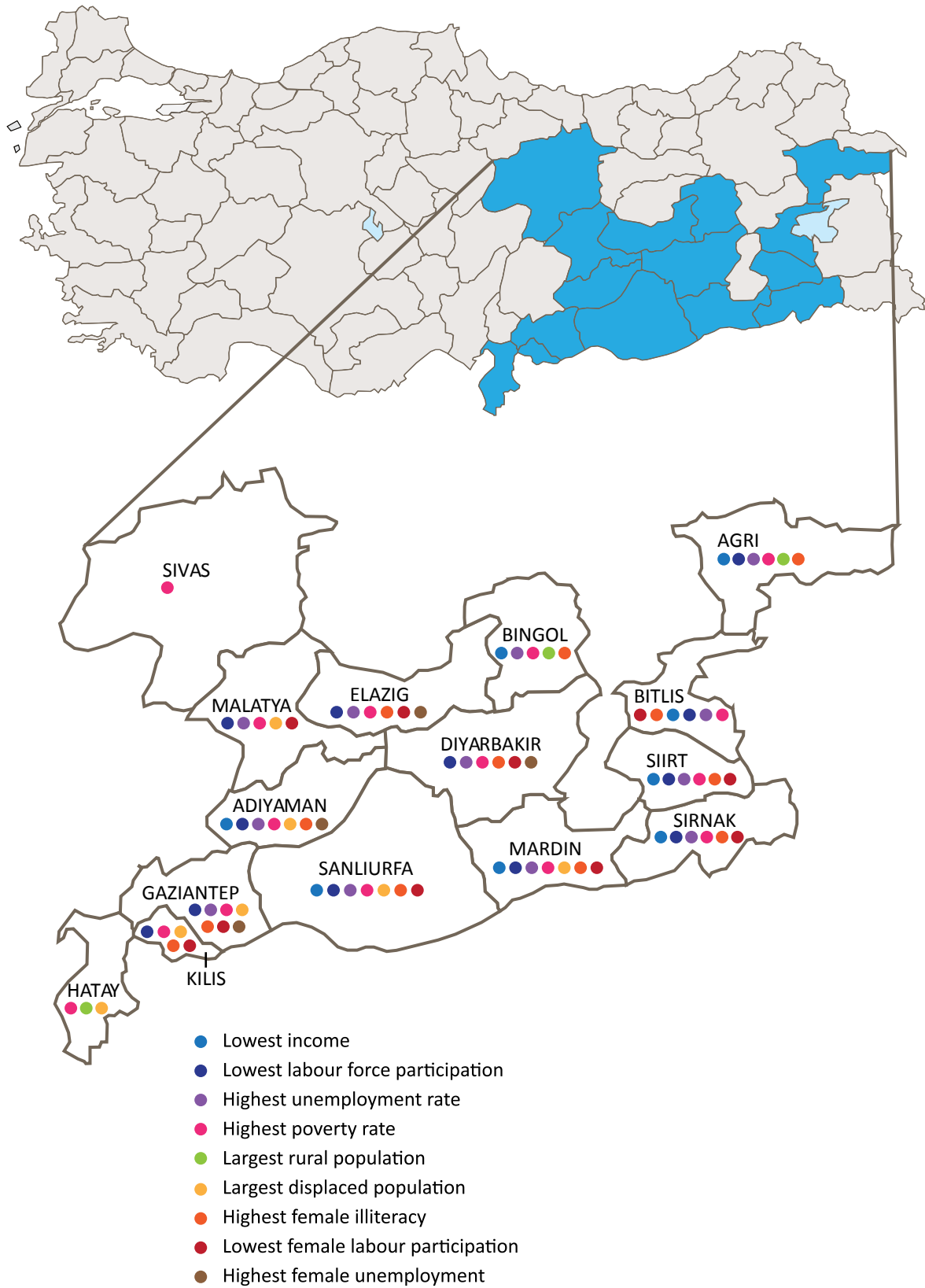
LEBANON: Hydro-insecure Governorates



SYRIA: Hydro-insecure Governorates



TURKEY: Hydro-insecure Governorates





CHAPTER I

Mapping the Hydro-Insecure

Introduction

There are about 40 million people living in the thirty hydro-insecure governorates/provinces identified across Iraq, Jordan, Lebanon, Syria and Turkey. Apart from water vulnerability, they broadly face the same developmental problems such as poverty, unemployment, climate change, desertification, and conflict.

Demography and Regional Features

IRAQ

Hydro-insecure governorates - Nineveh, Thi Qar, Muthanna, Al Anbar, Qadisiya and Basra

Geography

The west is largely an arid desert, with little or no cultivation or grazing. The southern and southern central regions lie in the Euphrates-Tigris (ET) and Shatt Al- Arab basins. Basra governorate has access to sea.

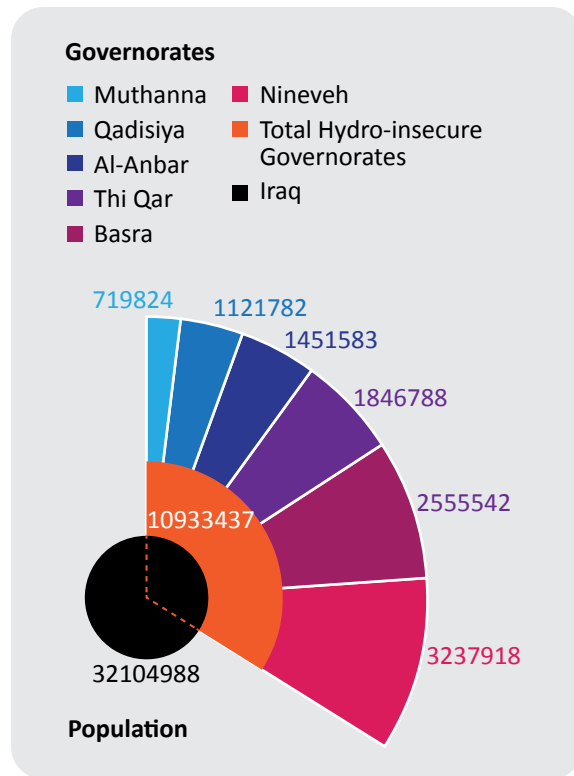
Ethnic and Religious Division of Population

Almost all of the 10.9 million people are Muslim. Among them, the majority



are Sunnis in Al Anbar and Nineveh while in the south, Shia Arabs are in majority. There are small pockets of Yazidis in Nineveh. Christian settlements can be found in Nineveh, Thi Qar and Basra.

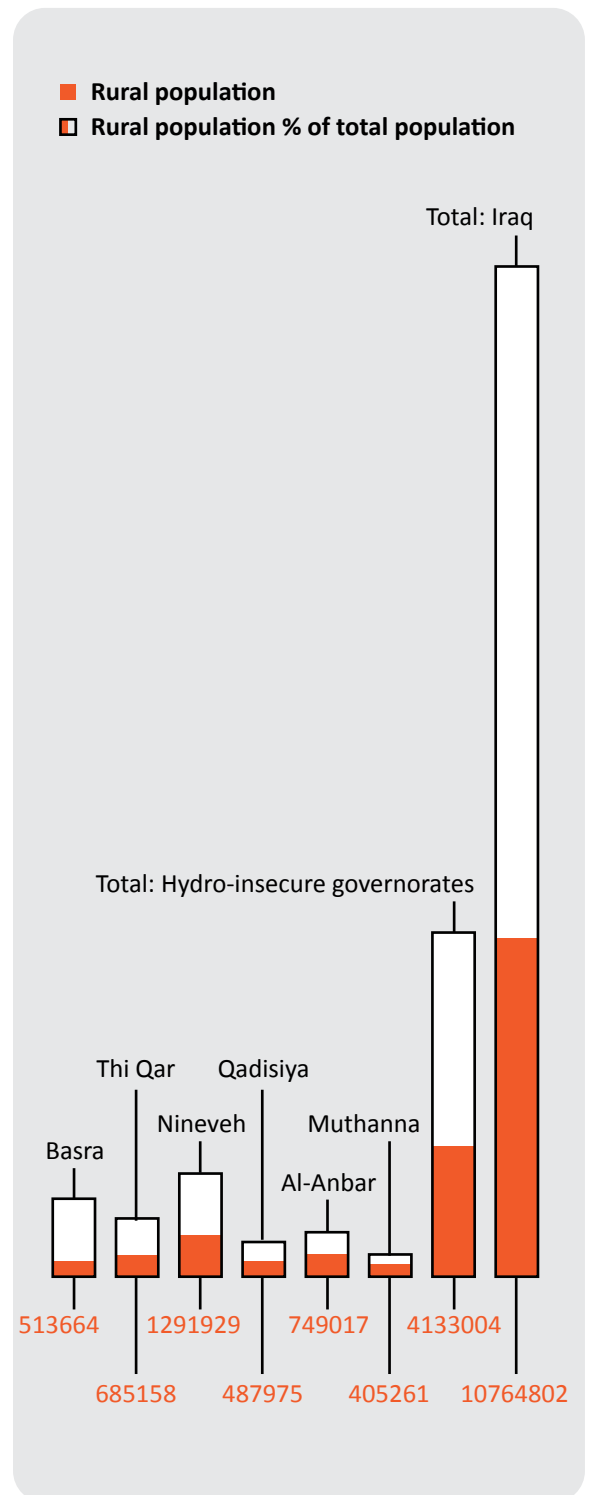
Population of the hydro-insecure governorates of Iraq



There are Turkmen and Kurdish groups living in Nineveh. The population in the rest of the governorates is largely of Arab ethnicity. Iranian settlers are located in the ET Basin, especially in the far eastern parts of Al Anbar.

Nineveh, Qadisiya and Thi Qar are well placed in terms of natural resources like fertile land and water but dense population, overuse of land and water, and over dependence on the ET basin make them vulnerable to any water and development related disasters. The ethnic diversity across the governorates is a sensitive factor in the sharing and development of natural resources.

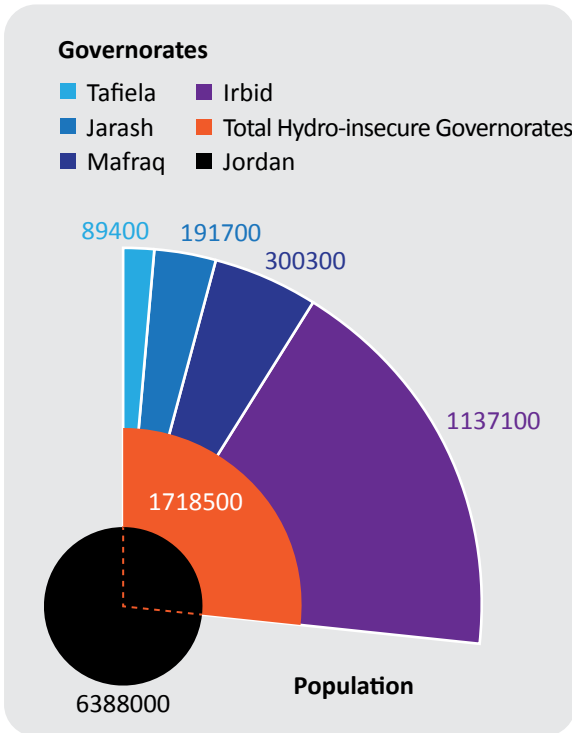
Rural Population in the hydro-insecure governorates of Iraq



JORDAN

Hydro-insecure governorates – Mafraq, Irbid, Jarash and Tafila

Population of the hydro-insecure governorates of Jordan



Geography

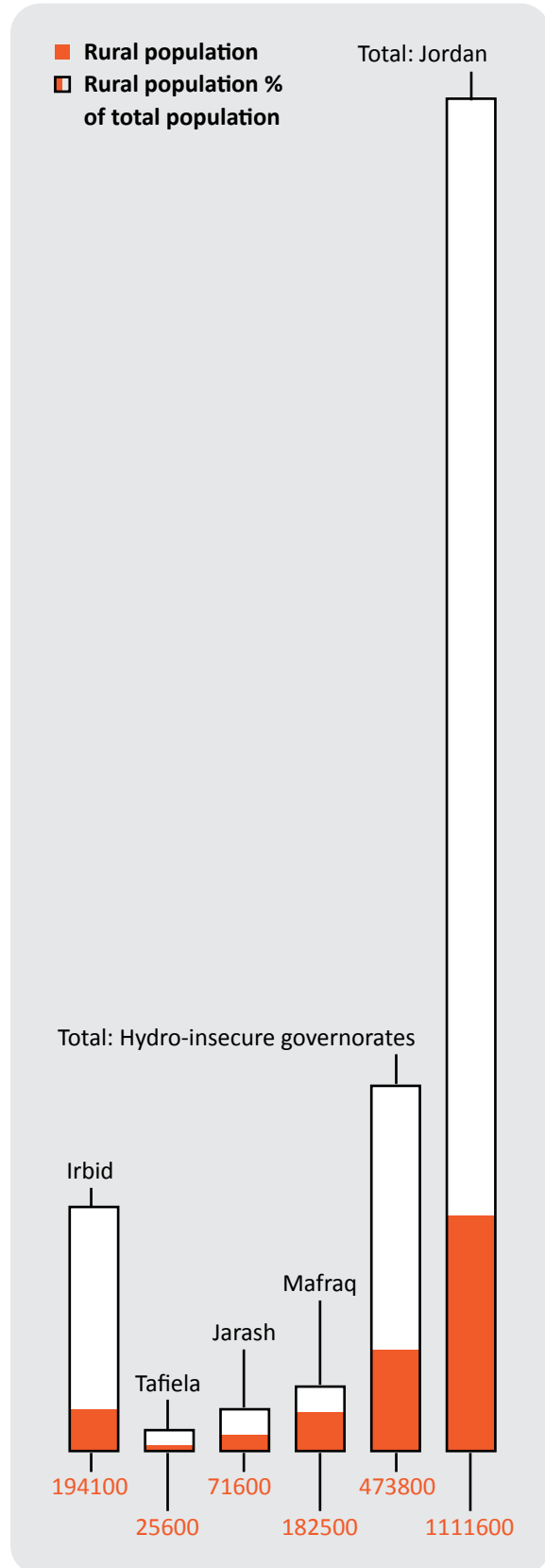
Both western and north western Jordan are cultivable, and a small region of north west Jordan, or the eastern bank of the Jordan river sees intensive agriculture, both irrigated and unirrigated. Eastern Jordan, i.e. most of Mafraq, is arid and uncultivable.

Ethnic and Religious Division of Population

Most of the hydro-insecure population comprises of Arab Sunni Muslims, with some Arabic speaking Christians and small pockets of the Circassians and the Kabarda located along north western Jordan, namely in the governorates of Irbid and Jarash. The Druze community also has small settlements on the borders of Zarqa and Mafraq, and at the northern border, in northern Irbid and Mafraq.

Rural Population

Rural Population in the hydro-insecure governorates of Jordan



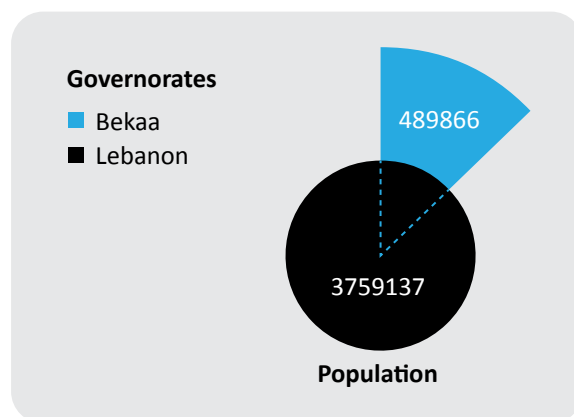
Due to geographical conditions, the distribution of population is highly uneven and most of the population is concentrated in the western and north western areas of Jordan. The hydro-insecure population faces the problems of urban poverty, dwindling soil fertility due to agricultural pressure and influx of refugees. The brunt of these problems is directly borne by rural populations and the urban poor who tally more than 650,000.

The segment of rural population spread over arid, desert regions with large tracts of land devoid of any water bodies (especially in Mafraq) is at high water stress and risk levels. The rural population on the eastern side of the Jordan River and on its tributaries face the same problems but for different reasons- due to high concentration of agriculture and grazing activities.

LEBANON

Hydro-insecure governorate – Bekaa

Population of Bekaa and Lebanon



Geography

A small part of Lebanon, in the Bekaa valley, is irrigated while a long stretch on the borders between North Lebanon, Mount Lebanon and Bekaa is barren land. Bekaa has a unique and diverse environment as it has fertile land, rivers, barren land, forests, and snow-capped mountains, all within its territory.

Religious Division of Population

The population of Bekaa is diverse. A large share of the population consists of Shia Muslims along with considerable proportions of Sunni Muslims, Druze, Maronites and Christians (Greek Catholic, Greek Orthodox and American Catholic and Orthodox).

Rural Population

About 13% of the Lebanese population (488,700 individuals approx.) is rural. Bekaa hosts a significant proportion of the rural population. The rural population consists of small farmers, herders and artisans. Since 2011, rural population of Bekaa has experienced growth in size due to the arrival and assimilation of refugees fleeing the civil war in Syria.

Bekaa faces varied problems such as poverty, ruined infrastructure due to conflict, and heavy influx of refugees. Bekaa has access to both ground and surface water but has been unable to tap them. Ethnic and religious diversity in the region is also a sensitive factor to sharing of resources and overall development.

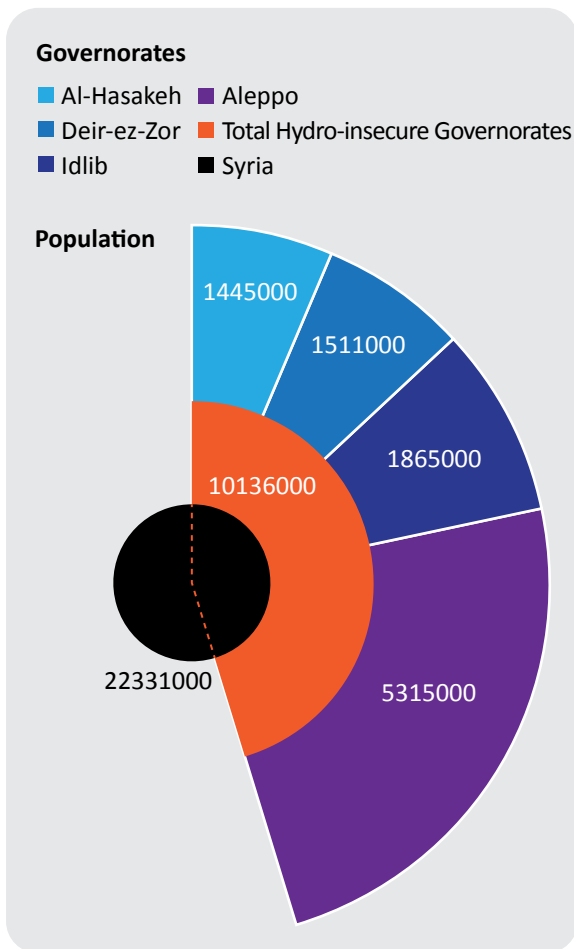
SYRIA

Hydro-insecure governorates – Al-Hasakeh, Deir ez Zor, Aleppo and Idlib

Geography

Syrian land is fertile on its northern borders. There is Steppe grazing land in the east. The southern parts of Al Hasakeh and Deir-ez-Zor are desert. The Euphrates cuts through Aleppo and Deir-ez-Zor, the Khabour river cuts through Al-Hasakeh and the Orontes flows through Idlib. The north, northwest and northeast see intense concentration of agricultural activities.

Population of the hydro-insecure governorates of Syria



Religious Division of Population

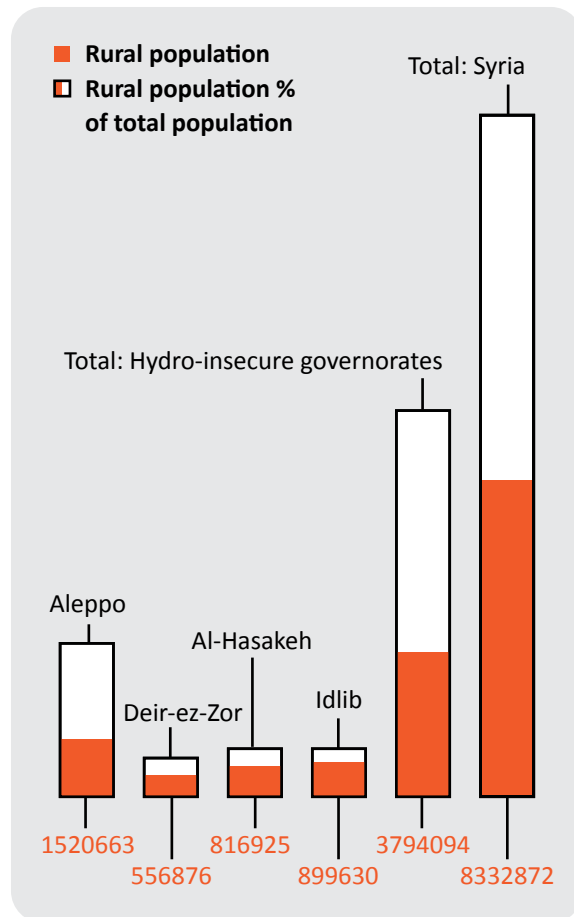
The majority population in the eastern part of the hydro-insecure region is Sunni Muslim, with a small concentration of Christians and Yezidi near the border in AL-Hasakeh and Deir-ez-Zor. The north western region has a considerable Shia population with small Christian settlements.

Rural Population

Heavy agriculture in the hydro-insecure governorates is draining the water bodies and putting the local populations at considerable water deficiency risks. As Syria is a lower riparian to both the Tigris and the Euphrates, the populations are vulnerable to actions of upper riparian countries as well. The hydro-

insecure governorates have also been host to a considerable proportion of the 3.1 million refugees, mostly from Iraq and Palestine who have been doubly affected by their refugee status and the civil war.

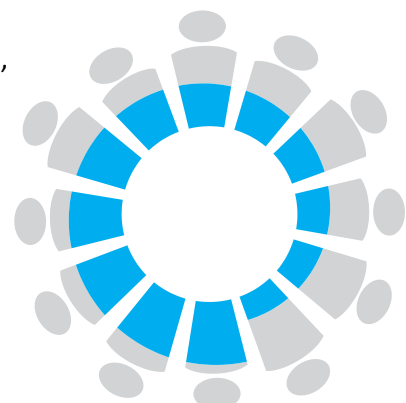
Rural Population of the hydro-insecure governorates of Syria



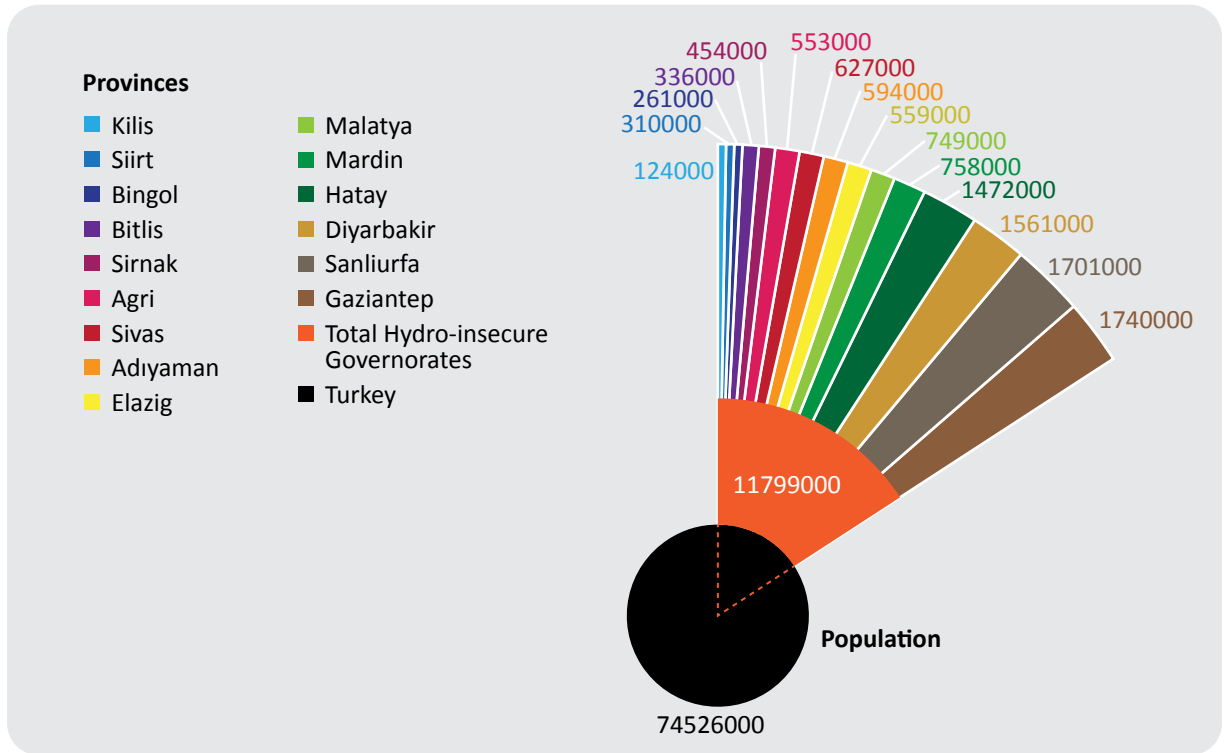
TURKEY

Hydro-insecure governorates – Adiyaman, Agri, Bingol, Bitlis, Diyarbakir, Gaziantep, Elazig, Hatay, Kilis, Malatya, Mardin, Sanliurfa, Siirt, Sirnak and Sivas

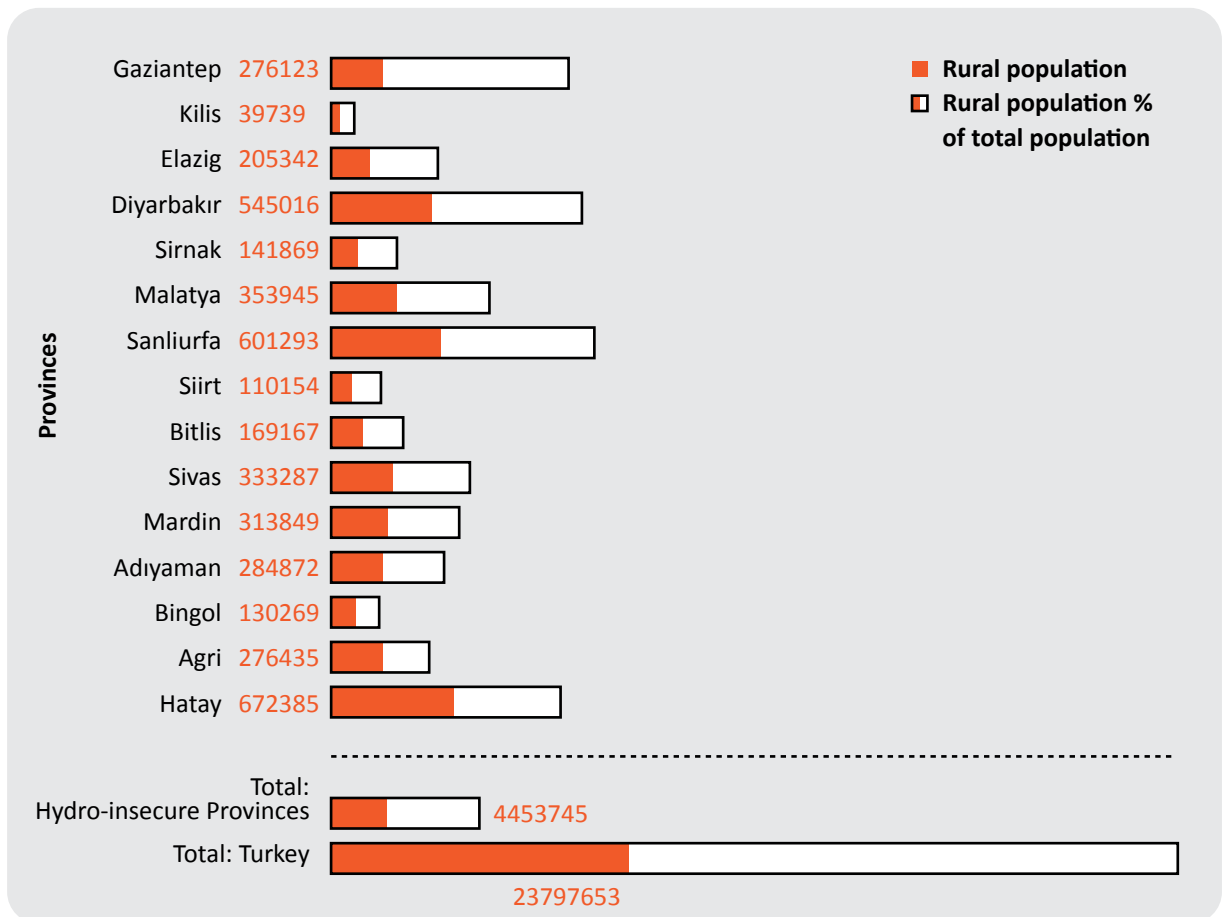
Except for Hatay and Sivas, the rest of the provinces fall in the regions of South Eastern Anatolia and Eastern Anatolia. Adiyaman, Diyarbakir, Gaziantep,



Population of the hydro-insecure provinces of Turkey



Rural population in the hydro-insecure provinces of Turkey



Elazig, Kilis, Mardin, Siirt, Sanliurfa and Sirnak-fall in South Eastern Anatolia. Agri, Bingol, Bitlis, Elazig and Malatya fall in Eastern Anatolia.

Geography

The region is highly mountainous, and has large tracts of grazing lands and pastures otherwise. Despite high concentrations of agricultural populations, very few areas are under cultivation due to the rough and mountainous topography. Some parts of South Eastern Anatolia have forest areas.

Ethnic and Religious Division of Population

The majority of the population is Sunni Muslim. In E Anatolia, there are some Alevi settlements.

The Kurdish community is the largest in the hydro-insecure provinces, with some presence of Turkish and Arab communities, notably in the provinces of Hatay, Kilis, Adiyaman, Malatya and Sivas. Near the eastern border of Turkey and southern Gaziantep, one can find small settlements of Turkmens. The province of Mardin has a few pockets of Circassians.

Rural Population

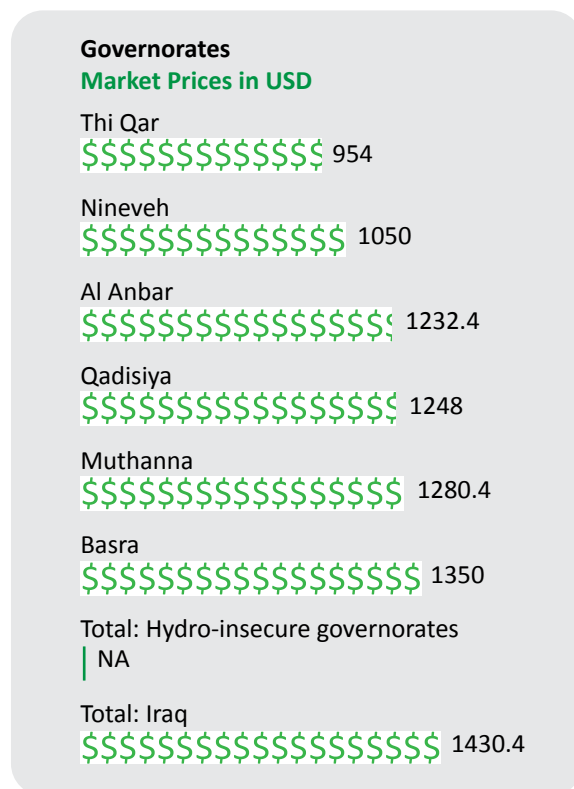
Due to the uneven population distribution and uneven growth, the region and especially the rural areas suffer from a variety of developmental problems such as poverty, low level of education, and conflict. Also, the difficult terrain is not naturally conducive to extensive cultivation or industrialization, which has limited employment and growth opportunities. As a result, the hydro-insecure provinces lag behind other regions. Within these provinces, the gap between urban-rural development is wide.

Poverty and Unemployment

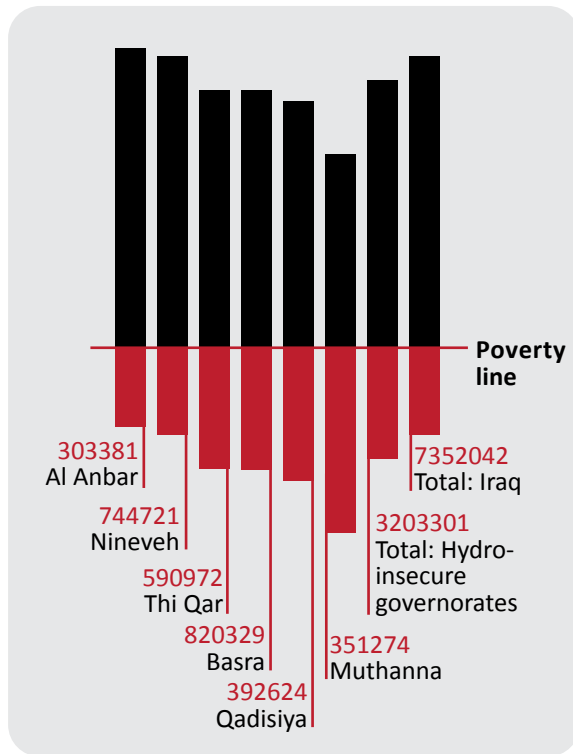
IRAQ

Lack of employment has hit the youth and the rural regions the hardest, and the private sector has been unable to provide any substantial relief. Agriculture is highly dependent on the ET Basin as well as heavy irrigation, which makes it susceptible to droughts and climate change. In addition, it suffers from land and soil degradation, poor water management, destruction of vital infrastructure due to conflicts and population pressure.

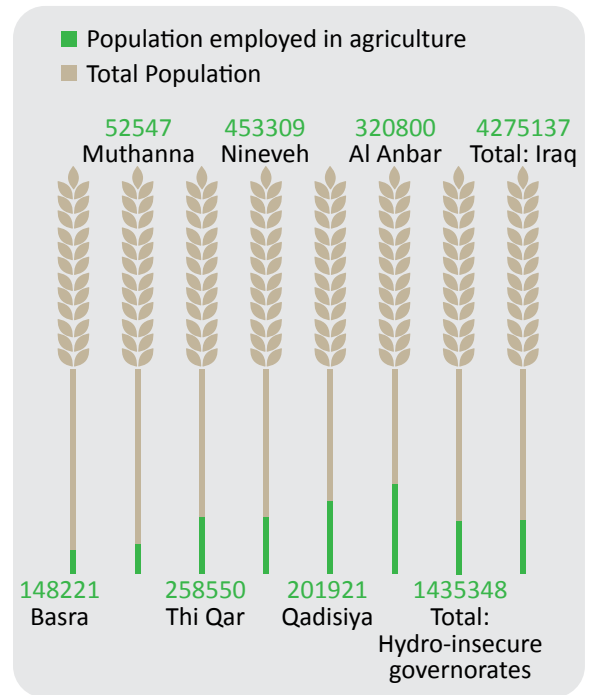
Annual per capita income (2009) in the hydro-insecure governorates of Iraq



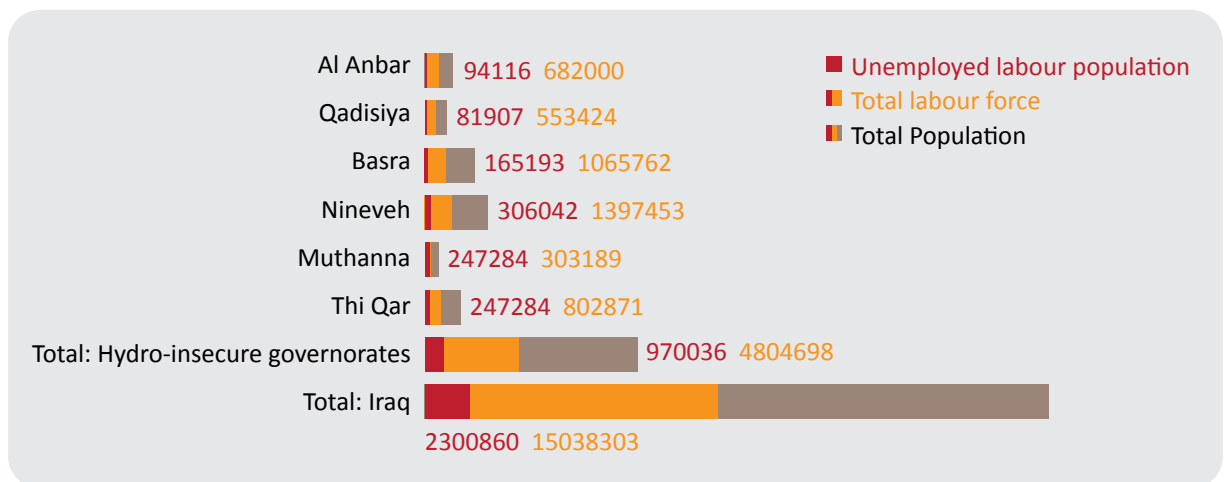
Poverty rate and poor populations in the hydro-insecure governorates of Iraq



Population directly employed in agriculture in the hydro-insecure governorates of Iraq



Labour force and Unemployment in the hydro-insecure governorates of Iraq

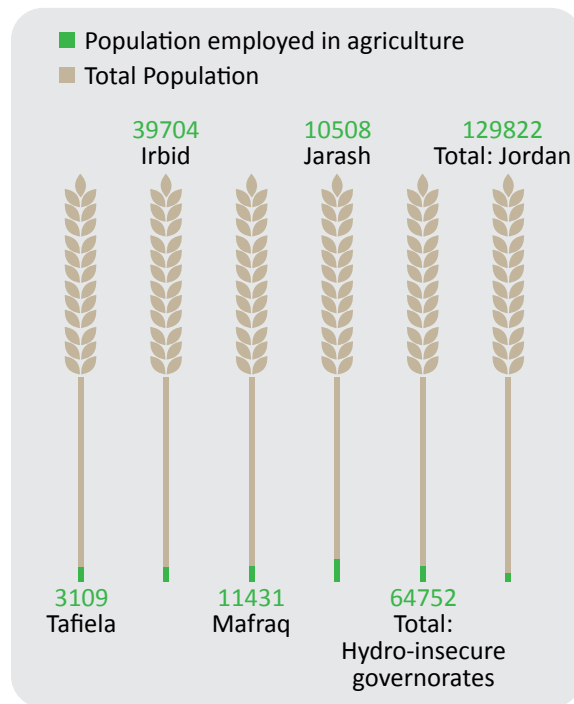


JORDAN

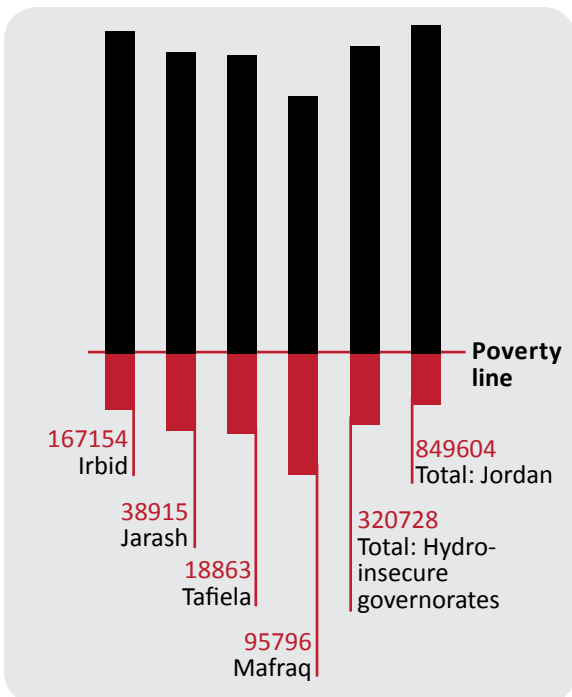
Annual per capita income (2008) in USD in the hydro-insecure governorates of Jordan



Population directly employed in agriculture in the hydro-insecure governorates of Jordan

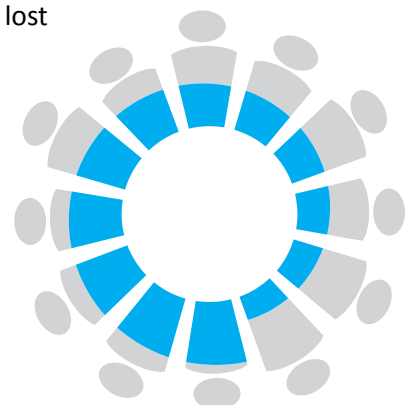


Poverty rate and poor populations in the hydro-insecure governorates of Jordan

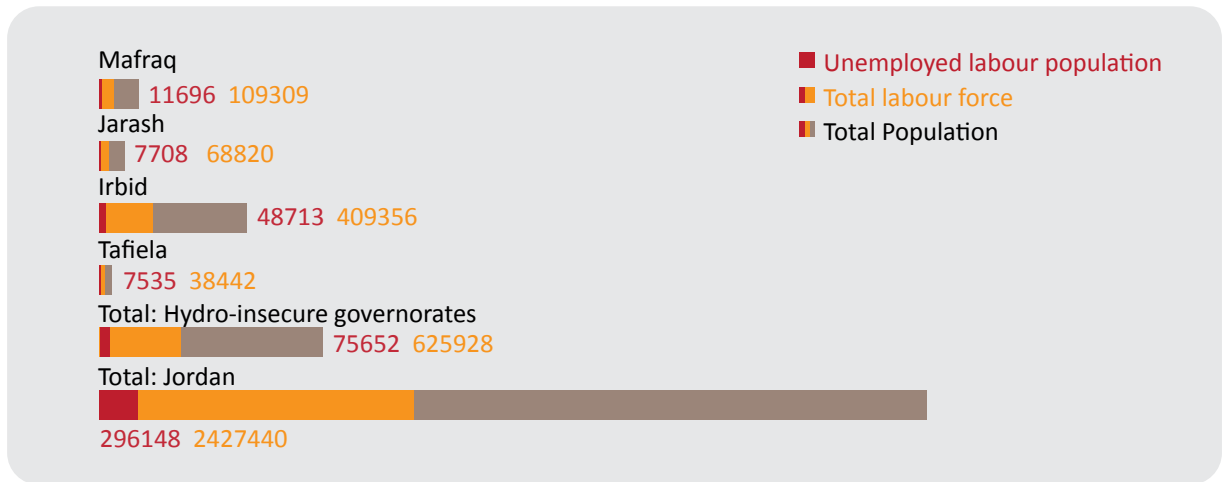


About 20% of the workforce is migrant labour, which leaves many locals unemployed. Many of the unemployed are highly skilled but the job market does not offer many skilled jobs. When the economy opened up in the 1990s, it was expected to create more high skilled jobs but instead, it lead to proliferation of small firms whose capacity to generate employment was limited. As a result, unemployment and underemployment among the educated population increased.

Less than 5% of Jordanian land is arable, and the country is chronically water scarce. Given the high concentration of farming activities, the scarce water resources of the region already face exploitation and pressure. The conflicts in neighbouring countries also play an important role; as a result of the civil war in Syria, Jordan's agricultural sector lost USD 30 million in 2012.



Labour force and Unemployment in the hydro-insecure governorates of Jordan

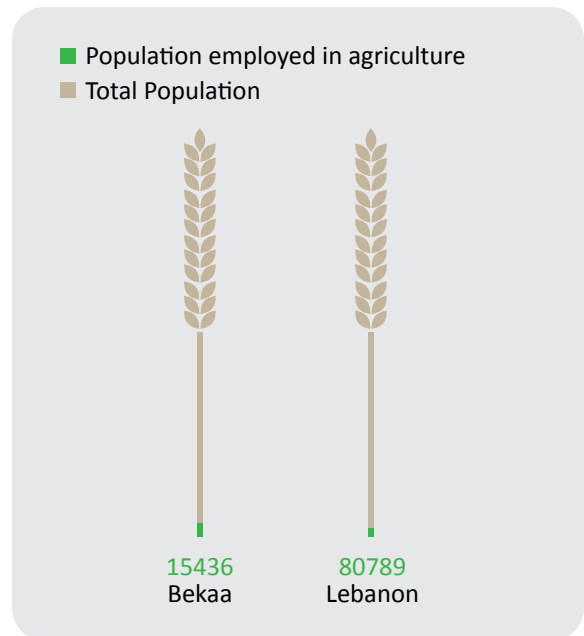


LEBANON

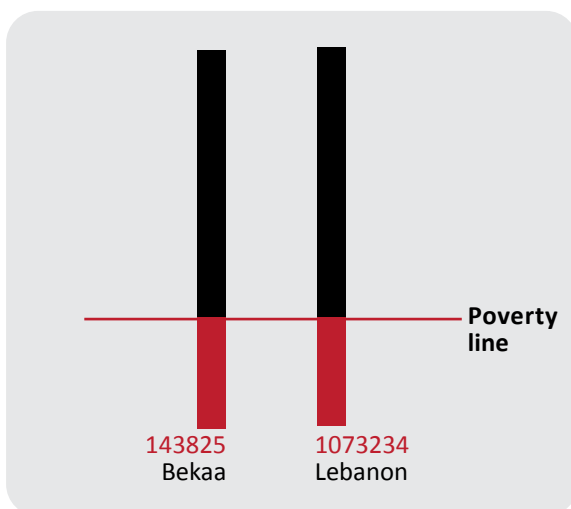
Annual per capita consumption (2008) in USD in Bekaa, Lebanon



Population directly employed in agriculture in Bekaa, Lebanon

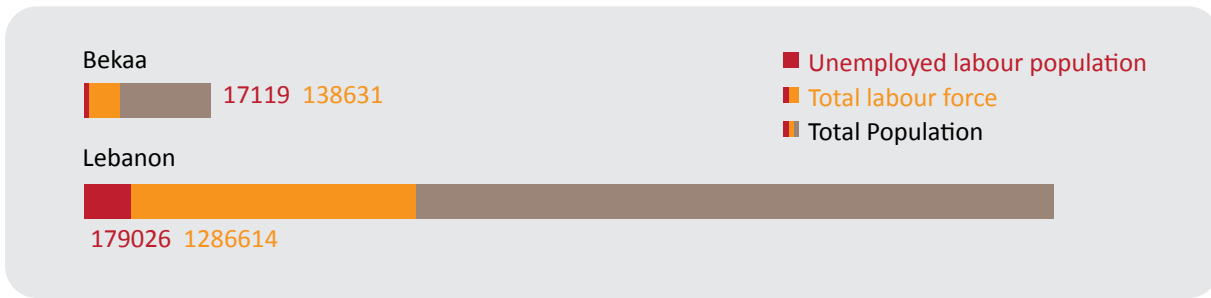


Poverty rate and poor population in Bekaa, Lebanon



While Bekaa hosts about 13% of the country's population, it also hosts 13% of the country's 1 million poor, and 17% of the country's extremely poor. The impact of the on-going conflict in neighbouring Syria and the consequent influx of Syrian refugees can push tens of thousands of Lebanese into abject poverty. Up to 170,000 Lebanese could slide into poverty due to the conflict next door, while unemployment could increase by as much as 10% by the end of 2014, according to a World Bank report.

Labour force and Unemployment in Bekaa, Lebanon



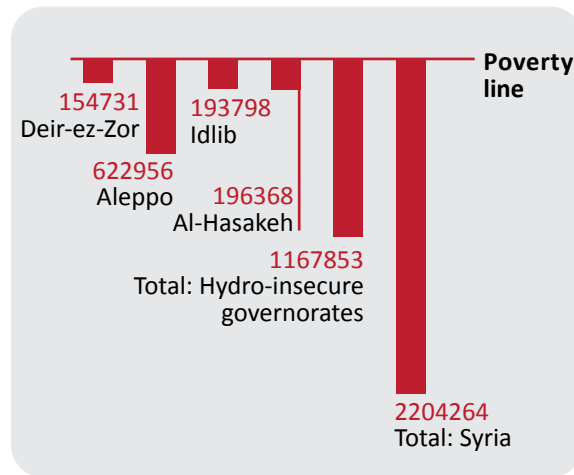
SYRIA

Annual per capita expenditure (2007) in USD in the hydro-insecure governorates of Syria

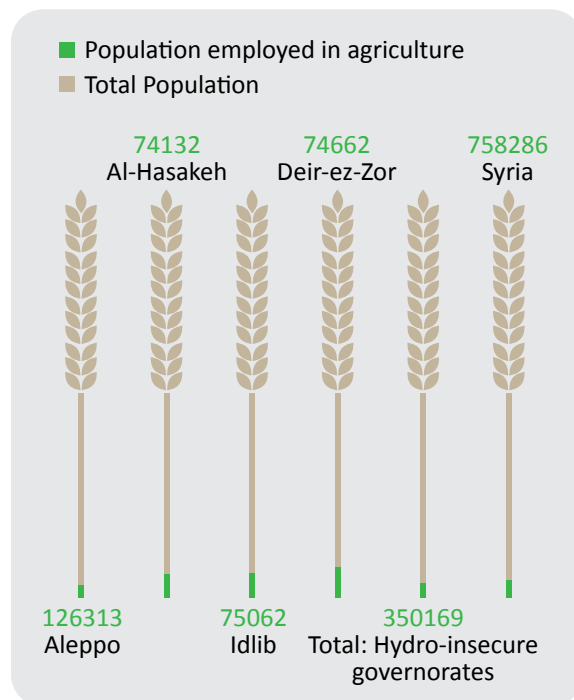


‘Extremely’ poor population is generally defined as that population which is unable to obtain even the most basic nutrition and non-nutrition needs, namely clothing and shelter. The overall extreme poverty rate for the hydro-insecure governorates in Syria is 15.4%. The national rate is 12.3%. Individual rates for each governorate have been difficult to find.

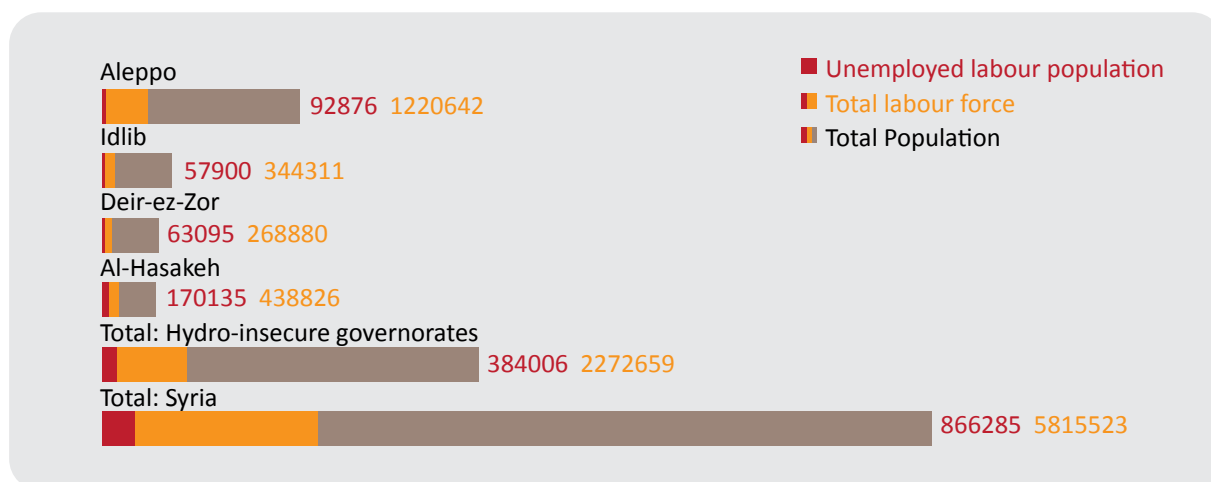
Poverty rate and poor population in the hydro-insecure governorates of Syria



Population directly employed in agriculture in the hydro-insecure governorates of Syria



Labour force and Unemployment in the hydro-insecure governorates of Syria



The hydro-insecure governorates of Syria are also its poorest. The rate of extreme poverty in the region is 15.4%, while that in its rural areas is 22.7%. 53% of Syria’s extreme poor live in these governorates.

Almost half of the total Syrian agricultural population resides in the hydro-insecure governorates. Farmers in Syria suffer from a variety of problems ranging from small and fragmented land holdings and inability to access credit markets to shortages of water and lack of appropriate technology. Recurring droughts can cause delays in implementing vital projects like modern irrigation while the civil war has been a contributor to the already dilapidated sector.

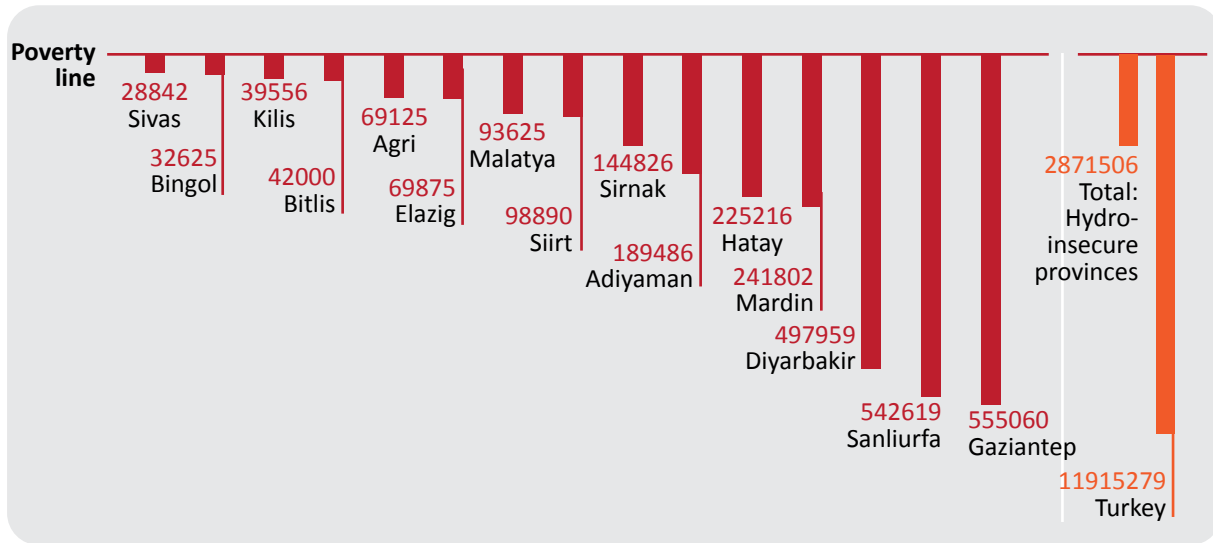
The economy of Syria does not have a strong industrial sector which could have contributed to reducing the high unemployment rate. While agriculture employs a rather small proportion of the total population, it is the only source of livelihood for many in the hydro-insecure regions, which makes it a risky sector. The civil war has disrupted the economy, bringing more people under risk.

TURKEY

Annual GDP per capita in the hydro-insecure provinces of Turkey

Regions	Provinces	Regional GDP per capita (USD, 2011)
Eastern Anatolia - East	Bitlis	6776 \$\$\$\$\$\$!
North Eastern Anatolia - East	Agri	7748 \$\$\$\$\$\$!
South Eastern Anatolia - Middle	Sanliurfa, Diyarbakir	8327 \$\$\$\$\$\$!
South Eastern Anatolia - East	Siirt, Mardin, Sirnak	9146 \$\$\$\$\$\$!
South Eastern Anatolia - West	Adiyaman, Gaziantep, Kilis	9603 \$\$\$\$\$\$!
Eastern Anatolia - West	Bingol, Malatya, Elazig	11286 \$\$\$\$\$\$!
Mediterranean region - East	Hatay	11332 \$\$\$\$\$\$!
Central Anatolia - East	Sivas	12778 \$\$\$\$\$\$!
Total: Turkey	-	17836 \$\$\$\$\$\$!

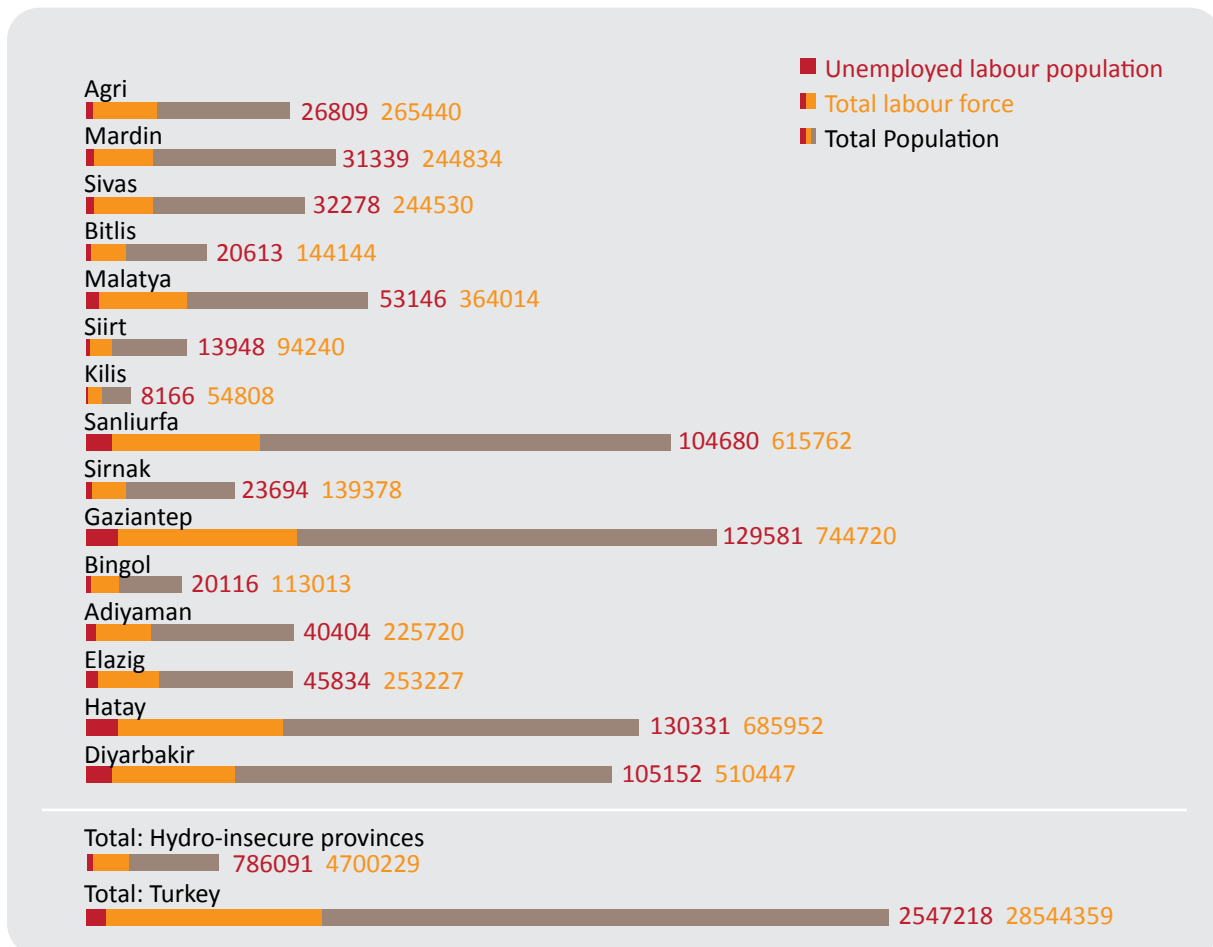
Poverty rate and poor population in the hydro-insecure provinces of Turkey



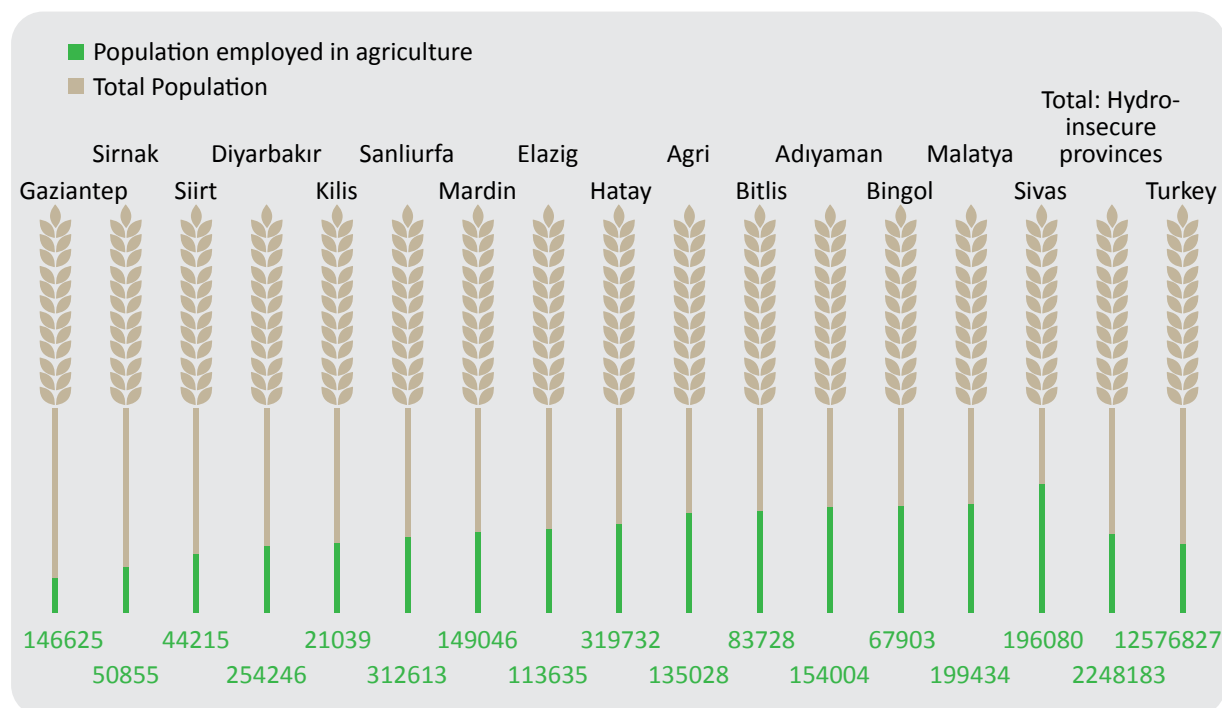
Note: The poverty rate for South Eastern Anatolia is 31.9% while that for Eastern Anatolia is 12.5%. Sivas lies in Central Anatolia which has the poverty rate of 4.6%. Hatay lies in the Mediterranean Region which has the poverty rate of 15.3%.

About a quarter of Turkish poor population lives in the hydro-insecure provinces of Turkey.

Labour force and Unemployment in the hydro-insecure provinces of Turkey



Population directly employed in agriculture in the hydro-insecure provinces of Turkey



The continued effects of high agricultural involvement and relatively less fertile land can be a major factor contributing to low income. The absolute poverty line for Turkey was US \$4 per capita per day. The agricultural workers are the poorest (with a poverty rate of 46.6%) and are located in the hydro-insecure provinces of Turkey.

Most of the eastern and south eastern provinces fall under grazing areas and despite the presence of the Euphrates-Tigris Basin, agriculture is scant. However, all the hydro-insecure provinces are heavily involved in agriculture and home to more than 2.3 million people working directly in the agricultural sector. The migrant seasonal farm workers are the most vulnerable of all, as they are usually caught in the vicious circle of poverty, exploitation and peasantry.

The economic transition happening in some of the hydro-insecure provinces is having an adverse impact on the agricultural and human resource sectors of the region, which are unable to keep pace with it. Water development projects such as the South-

eastern Anatolian Project (GAP) are reaching out to the socio-economic aspects of the populations; however, there are many factors which are affecting their performance such as internal and neighbouring conflicts and droughts.

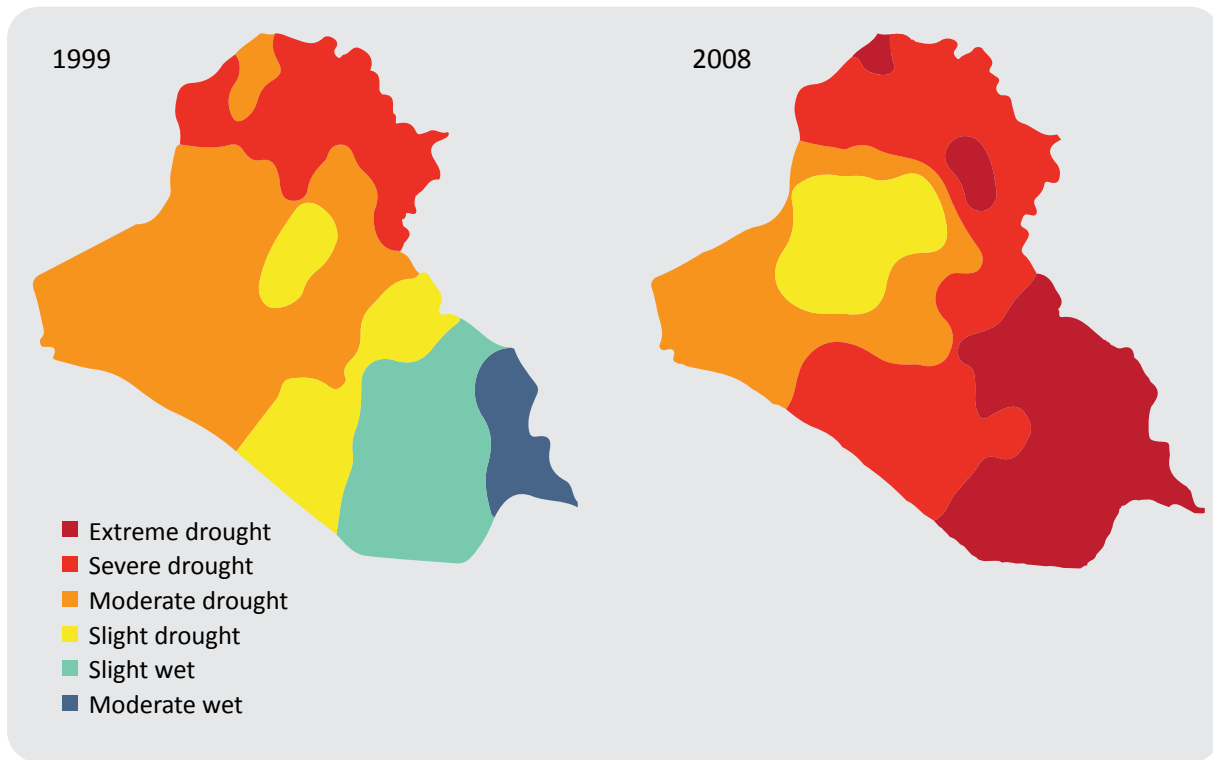
Natural Disasters

IRAQ

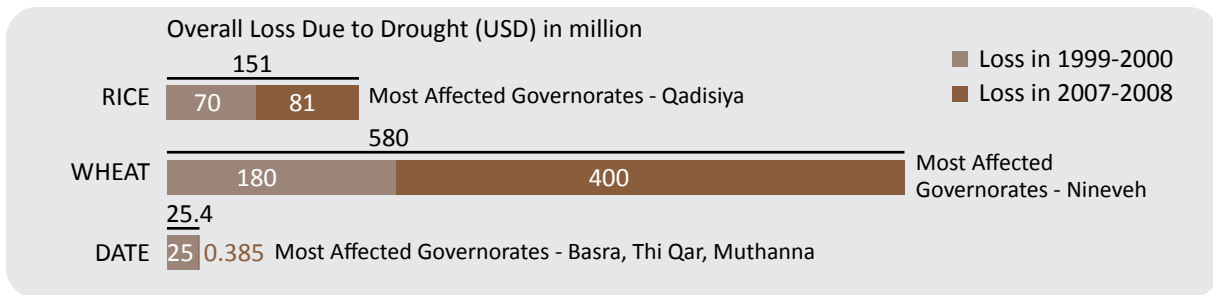
The droughts of 1999-2000 and 2007-2008 affected Nineveh, Thi Qar, Basra and Muthanna. Muthanna, Al Anbar and Thi Qar are those regions that face the largest and most varied impacts of droughts. The situation in these governorates is exacerbated by poor rainfall, land degradation and desertification. A study shows that Muthanna received minimum levels of precipitation below 100 mm over the period of 31 years. Salinity and land degradation are high in Nineveh and Thi Qar.

Al-Anbar is largely a desert. The fragile marshes in Basra and Thi Qar are still recovering. The combination of droughts, land degradation

Drought severity over Iraq



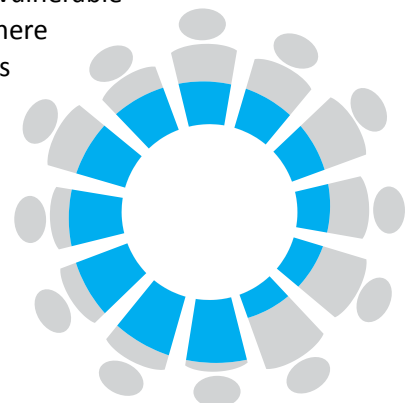
Major agricultural losses due to droughts in Iraq



and salinity is worsening the conditions in Al-Anbar, Basra and Thi Qar. Overall, however, the governorate of Nineveh has the highest drought risk.

The effects of drought on rice production were aggravated by salinity, a prominent feature of land degradation in southern Iraq. Dates have been a major exportable crop and the second most exported product after oil. Cultivated mostly in Basra, Thi Qar and Muthanna, date production faced a major setback after the drainage of the marshes, and was recovering when it was hit again by the two droughts of 1999-2000 and 2007-2008. While immediate post-drought periods have not recorded

huge losses, the middle years have recorded significant losses, peaking at USD 75 million in 2004, right after the US invasion in 2003. Loss in vegetation cover is one of the major reasons for these losses, which can be indirectly attributed to droughts and land degradation. Nineveh alone accounts for a quarter of the production of wheat. The bulk of it is rainfed which makes it all the more vulnerable to droughts. Central Iraq, where wheat fields get irrigation, was comparatively less affected by the drought. The GDP of Iraq was not much affected by droughts and the agricultural losses have



been largely masked by oil revenues.

Exploitation, political friction, and lack of coordinated management have added to the frequency of droughts and adversely impacted the hydro-insecure populations of Basra and Thi Qar. While the efforts to restore the Marshlands have been in full swing with positive outcomes, droughts have resulted in a continual decline in water flows in the lower Tigris and Euphrates that has led to the infiltration of salt water from the Persian Gulf into the Shatt Al-Arab region.

Droughts are leading to desertification of hydro-insecure governorates, with the largest impact on agricultural populations concentrated in the region. The consequent desertification especially in eastern Al Anbar has been aggravated by damming of the ET Rivers upstream in Syria and Turkey which has reduced the volume of water flowing into Iraq which traditionally sustained agriculture and local populations even during droughts.

The drought of 2013-2014 in Iraq is likely to persist in the long term. This will heavily impact cultivation of food crops and will force Iraq to rely on food imports. About two-thirds of the arable land has already been affected and combined with governorates civil conflict and lack of adequate and efficient storage water facilities, the situation has deteriorated for about one-third of the population, an overwhelming majority of which is situated in the hydro-insecure governorates.

JORDAN

During the past 40 years, the regions of Irbid and Mafraq experienced three extreme droughts out of which the droughts in Mafraq were unpredicted. Extended droughts, a frequent feature of the region, are a source of great worry for Mafraq which is mostly arid with little to no water resources.

In 1999-2000, cereal production was extremely low and could not cover the needs of even 1%

of the population. Wheat production fell by almost 90%. Rainfed fruit production dropped significantly, and rainfed vegetable production was almost zero. Irrigated vegetable harvests were down by 23% and meat and dairy production dropped by 40%. The drought of 2007-2008 was so severe that despite having dams and canals, the flow of water reduced to such an extent that no irrigation could be provided. The snow blizzard which followed had severe effects on the forestry sector in Irbid and Jarash.

In 1999-2000, most of the drought-struck areas were also the impoverished areas of Tafila and Jarash. The drought of 2007-2008 caused considerable shrinking of the Jordan River which reduced the supply of water to the Dead Sea, causing serious environmental repercussions. The tourism sector was affected adversely as well. Israel faced similar conditions and the stress on both countries created significant diplomatic tensions between them.

Jordan is facing a drought in 2013-14. The precipitation levels are not even a third of the long term average and Jordan's dams are only 42% full. The irrigated agriculture in the Jordan Valley, and consequently the farmers, are at huge risk. In addition, Jordan currently gives asylum to over 600,000 Syrian refugees, almost 2 million Palestinian refugees, and 30,000 Iraqi asylum seekers, mostly in and around Mafraq, Irbid and Jarash. These populations are the most vulnerable, and the most severely affected, being the victims of human conflicts and natural disasters at the same time.

LEBANON

The droughts experienced in Bekaa are characterized by quantitative reduction in the water sources. The situation is aggravated by a rapid population growth, urbanization, industry, and irrigation developments. Lebanon like Iraq and Jordan faced a drought in the period of 1999-2000 and 2007-2008. The drought of 2007-2008 principally affected the Bekaa valley.

In 2007-2008, over 5000 acres of agricultural land remained unused. Farmland in northern Bekaa with better irrigation was used for cultivating hashish, a water-intensive but economically profitable crop, as the region suffers from acute poverty. Also, the water which was available was of poor quality; about 70% of wastewater was dumped untreated, polluting groundwater resources.

In 1999-2000, due to water shortages, farmers in northern areas of Bekaa had to resort to pumping water from wells. The poor farmers took a heavy financial blow as they had to pay a high price to farmers with wells for the water supply. Rural areas also suffered badly as drinking water was delivered only once in every ten days. In 2007-2008, the drought had similar effects on about 11,000 people in the Bekaa valley. At the same time, the region also saw ethnic and religious disputes between Shia Muslims and Christians over irrigation.

The refugee camps, especially in the hydro-insecure governorates of Northern Lebanon and Bekaa, are the areas where the drought effects are felt the hardest. The refugees are compelled to buy water from private vendors as the locally available water is usually unfit for human consumption and for irrigation purposes. The cost of water has increased by almost 25% in the past few years, making the refugee populations and other poor in Lebanon extremely vulnerable to water shortage.

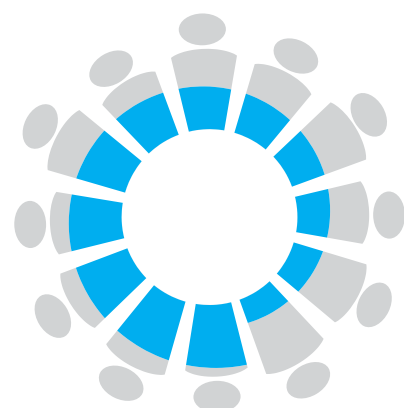
Lebanon is facing a drought with its cumulative precipitation at a 140-year-low in 2013-14. Bekaa has received only a fifth of its mean annual rainfall. The lake of the Qaraoun Dam has shrunk from a volume of 220 MCM to 20 MCM. The urban regions of Bekaa are stressed due to drinking water shortages. Moreover, the country has had an influx of a million plus Syrian refugees which has put severe pressure on the already parched water resources. From a water surplus country in 2012-13, Lebanon has gone to be a water-deficit country in 2013-14. The Bekaa valley is also a hub for skiing which provides seasonal income for the locals. Due

to lack of snowfall this winter, the skiing sector has suffered and caused reduction in income for the locals.

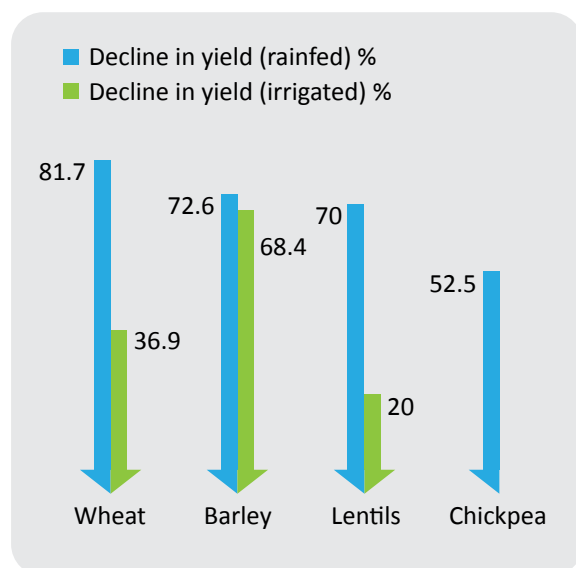
SYRIA

The drought of 1999-2001 lasted for three years in Syria. Among the hardest hit were Deir ez Zor and parts of Al-Hasakeh. The drought of 2007-2008 adversely hit northern, southern and eastern Syria. It lasted for more than three years, well into the year 2011. Rainfall in eastern Syria fell to 30% of the annual average in 2008 – the worst drought for 40 years –and al-Khabour dried up adding to the distress of the already hydro-insecure and poor governorates of Al Hasakeh and Deir ez Zor. Al-Shadadi district of Al-Hasakeh was one of the worst-affected areas.

In 1999-2001, there were severe yield reductions as well as crop failures, both in rainfed as well as irrigated systems, with wheat being the hardest hit (more than 50% decline for irrigated crops and complete crop failure in 1999 for all rainfed crops), followed by barley (13-47% decline). The multiyear drought of 2007-2008 caused a complete failure of wheat and barley cultivations. The provinces primarily affected by poor rainfall included the top four wheat producers, which account for 75% of total wheat production in Syria (three of which are Al-Hasakeh, Aleppo and Deir ez Zor). Food production by farmers relying on rainfed agriculture was much lower than in previous years (zero or close to zero), particularly in villages in Al-Hasakeh. Once a large wheat exporter, the country was forced to import the staple to meet local consumption.



Decline in productivity levels of basic crops in drought year 2007-08 (compared to 2006-07) in Syria



The drought also adversely impacted livestock, bringing herders, largely Bedouins, under high risk, with fewer options to migrate to and less land available for each herding family with their animals. In some Bedouin communities, 70-80% of the families had to abandon their traditional livelihood and migrate to other locations and occupations. Other herders and small farmers also had to leave their local surroundings in search of jobs, especially in the industry and low-skilled service sector. Rural communities became severely food insecure, especially the most hydro-insecure groups in the Badia and north-eastern regions. Rural populations that relied on the production of water from their own wells were most affected by drought. In some areas, the production of drinking water reduced 10 litres/ capita/ day when the average norm for rural areas was 125 litres/ capita/ day. As a result, most rural populations had to resort to buying drinking water or having it transported by tanker from available water sources nearby; both expensive options.

In the near future, the northern governorates of Idlib and Aleppo are likely to suffer the most due to the drought. Syria is facing a drought in the year 2013-14. The Syrian governorates that are suffering the most include the war-

torn Aleppo and Al-Hasakeh Provinces, which together account for more than half of Syria's wheat production. Agricultural losses have been 33% and 14% for wheat and barley respectively. About 3.7 million people are on food aid, while another 500,000 are still off it, and suffering from the drought. Over a million people have left their homes; only 10% of rural homes in the drought affected regions are occupied, mostly by children and old people. The overall social and environmental hazards being caused are not being documented and analysed effectively due to war conditions.

TURKEY

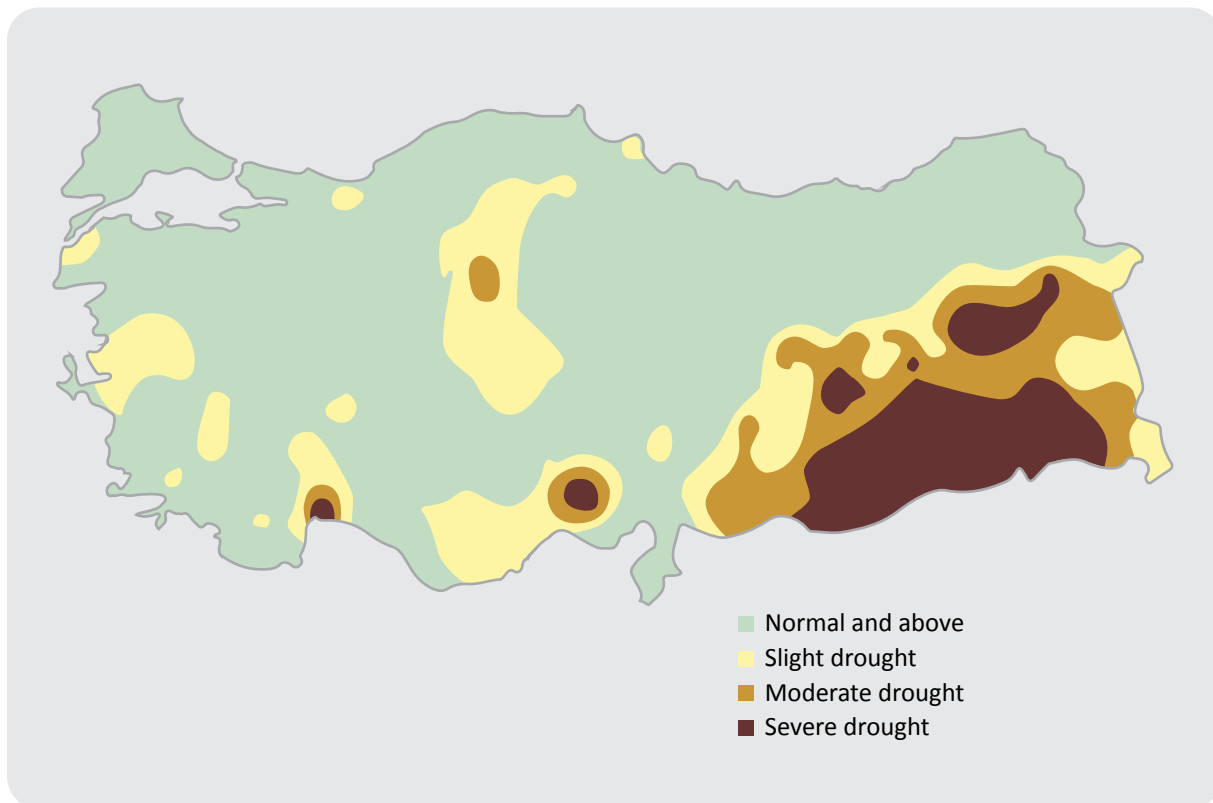
South Eastern Anatolia traditionally received very less rainfall, which was one of the main reasons for the GAP (South Eastern Anatolia Project). The GAP initially was an irrigation and hydroelectricity project on the Euphrates and Tigris rivers which then expanded into agriculture, infrastructure, forestry, education and health sectors for South Eastern Anatolia.

The winter and spring seasons of 1999 and 2000 saw severe drought conditions in the hydro-insecure provinces which impacted not only agricultural produce but also electricity generation. Turkey experienced a nationwide drought in the year 2007 which impacted the hydro-insecure region significantly, though the hardest hit (agriculture wise) was Central Anatolia.

In 1999-2000, the overall agricultural losses in Turkey were USD 0.96 trillion. This figure also included debt rescheduling of farmers as 140,000 ha of farmland had been destroyed due to droughts and heatwaves, and insurance companies did not provide cover for drought and flood damage. State aid covered only those farmers whose losses were more than 40% of their property, which meant that a large chunk of the agricultural sector went uncovered.

The drought in 2007 caused a direct and immediate impact on agriculture. Corn and

Intensity of drought across Turkey in the year 2007-2008

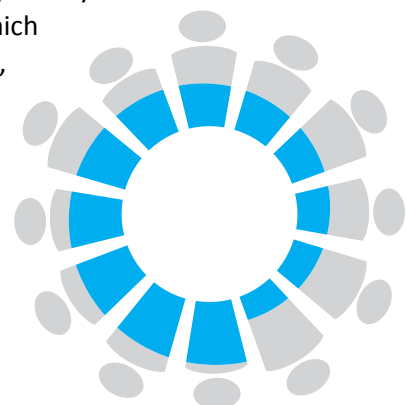


wheat, two of the principal crops grown in the hydro-insecure provinces suffered a setback-production was negatively affected in the range of (-) 4.5%- (-) 15.3% -and their prices shot up between 6.5%-34.7%. The production of lentils, a large share of which takes place in South Eastern Anatolia, reduced by 40%. About 2500 km² of land under wheat dried up in Diyarbakir while in Sanliurfa, 5000 km² of cultivated land did not produce anything at all. Prices of bread and other staple food increased by as much as 50%. While those who relied on rains had zero gains, those with irrigation were able to save only 10% of their harvest. The disaster pushed these regions, all already poor and rural, towards high food and poverty risk levels.

In 1999-2000, local populations faced scarcity of electricity supply. The Keban, Karakaya and Ataturk Dams on the Euphrates could produce only 70% of the annual average hydroelectricity amount and by June 2000, the water was so low that electricity could be produced only till mid-July.

In the winter of 2013-14, rainfall feeding the Tigris and the Euphrates in the mountains of Eastern and South Eastern Anatolia did not reach its average levels. Eastern Anatolia saw a 45.9% decrease in the amount of precipitation received, while for South Eastern Anatolia, the decrease was about 30.4%. The provinces most affected in South Eastern Anatolia were Sanliurfa and Mardin. While irrigation was available in some places, many farmers there replaced wheat with cotton, which led to a decrease in the overall production of the staple food crop.

The region had been facing dry, drought-like conditions since 2012, and was expecting good rainfall in the winter of 2013-2014. Instead, a dry winter was followed by heavy snow and frost in spring, which severely distorted crop cycles, especially of fruits and vegetables, causing a 25% rise in their market prices, as many orchards and gardens saw losses equal



to or more than 80%. The hardest hit areas were Central and Western Anatolia, however, the high incidence of poverty and dense rural concentrations augment the intensity of effects of drought in the hydro-insecure provinces.

Man Made Disasters

IRAQ

Displaced/refugee populations in the hydro-insecure governorates of Iraq

Governorates	A) Registered refugees	B) IDPs as of 2013	C) Registered returnees	A)+ B) + C)
Muthanna	-	7049	-	7049
Qadisiya	-	14731	-	14731
Thi Qar	-	27195	-	27195
Basra	462	31503	10540	42505
Al Anbar	4782	44365	21040	70187
Nineveh	12265	206785	10860	229910
Iraq	220210	1131810	42440	1394460

Out of the million internally displaced people, more than 427,000 people have been displaced due to the armed conflict in Al Anbar governorate which started in December 2013. About 80% of them are still in Al Anbar while the rest have fled to other parts of the country.

Barring Al Anbar, the other governorates are largely located in the ET basin. Nineveh and Basra are home to most of the hydro-insecure population of Iraq and in little shape to accommodate and protect the refugees, while Al Anbar, beset with internal armed conflict, is unable to sustain either its local populations or the inflowing refugees or returnees.

JORDAN

Displaced/refugee populations in the hydro-insecure governorates of Jordan

Governorates	A) Registered refugees	B) IDPs as of 2013	C) Registered returnees	A)+ B) + C)
Tafiela	2468	-	-	2468
Jarash	55126	-	-	55126
Mafraq	157536	-	-	157536
Irbid	187377	-	-	187377
Jordan	962153	-	-	962153

Jordan hosts the highest number of Palestinian refugees in the region. In addition, the conflicts in Iraq and Syria have increased the influx of refugees and asylum seekers from those countries as well.

A quarter of the 350,000+ Palestinian refugees in Jordan live in the refugee camps in Jarash and Irbid- both with hydro-insecure populations. Most of the Syrian refugees are living in refugee camps and settlements in the poorest governorates of the northern border areas such as Irbid and Mafraq. The

governorates of Irbid and Mafraq also host transit centres for refugees and consequently see a lot of movement.

The hydro-insecure governorates are facing a direct impact of the neighbouring conflicts, which is putting pressure on the local resources and pushing the local populations to higher levels of risk and deprivation. This has created the very real possibility of negative sentiment within the local population towards the refuge-seeking population.

LEBANON

Displaced/refugee populations in Bekaa, Lebanon

Governorates	A) Registered refugees	B) IDPs as of 2013	C) Registered returnees	A)+ B) + C)
Bekaa	419329	-	10000	429329
Lebanon	1579395	-	50000	1629395

The total number of Syrian refugees (registered and unregistered) in Lebanon crossed the 1 million mark in early/mid 2014. Bekaa hosts not only the largest number of Syrian refugees in the country, but also 8,500 PRS (Palestinian Refugees from Syria) and over 10,000 Lebanese returnees.

SYRIA

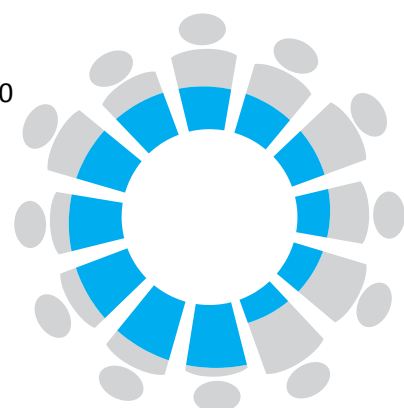
Displaced/refugee populations in the hydro-insecure governorates of Syria

Governorates	A) Registered refugees	B) IDPs as of 2013	C) Registered returnees	A)+ B) + C)
Al-Hasakeh	-	207000	-	207000
Idlib	-	300000	-	300000
Deir-ez-Zor	-	517000	-	517000
Aleppo	26500	1250000	-	1276500
Syria	590000	6500000	-	7090000

The hydro-insecure governorates host a third of the internally displaced population. Many of them are returning economic migrants who had fled the country during the drought only to return to fresh violence and unrest. Idlib and Aleppo also host many refugee camps, especially for Palestinian refugees. However, due to the civil war, the returnees are facing insecurity and instability and the refugees in Syria, mostly from Palestine and Iraq, are becoming second-time or third-time refugees.

TURKEY

According to UNHCR data, at the beginning of the crisis in Syria in 2011, over 500,000 Syrians sought protection in Turkey. There are currently 23 camps in ten provinces hosting more than 200,000 Syrian refugees. The number of off-camp refugees is almost three times the number of on-camp refugees. Another 300,000-400,000 Syrians are residing in Turkish cities, mostly in the provinces of Hatay, Gaziantep and Sanliurfa.



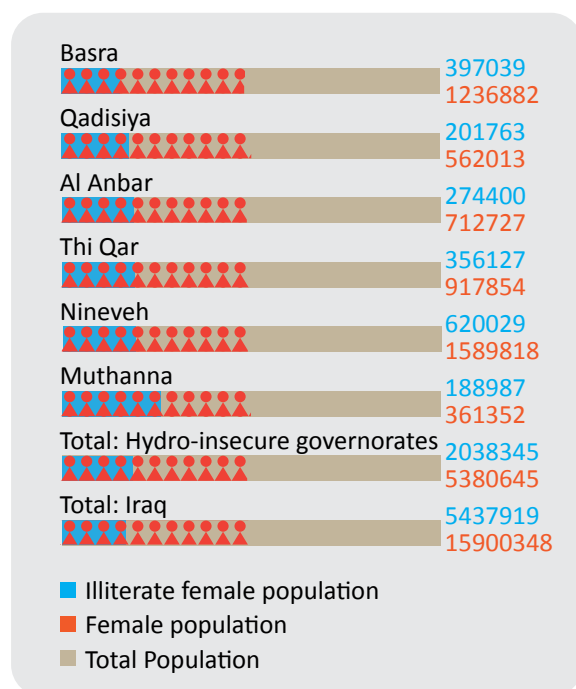
Displaced/refugee populations in the hydro-insecure provinces of Turkey

Governorates	A) Registered refugees	B) IDPs as of 2013	C) Registered returnees	A)+ B) + C)
Malatya	8142	-	-	8142
Adiyaman	12283	-	-	12283
Mardin	47429	-	-	47429
Kilis	83024	-	-	83024
Hatay	148741	-	-	148741
Sanliurfa	179138	-	-	179138
Gaziantep	199511	-	-	199511
Turkey	799291	-	-	799291

Gender Statistics

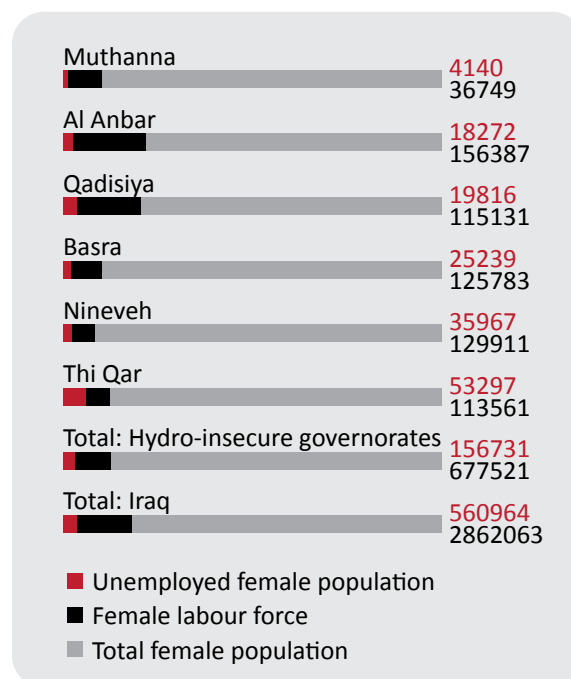
IRAQ

Female population and illiteracy in the hydro-insecure governorates of Iraq



The literacy rates are much higher than labour force participation rates. This essentially means that the potential of the female labour force in Iraq in general and in the hydro-insecure governorates in particular is not fully utilized, and more women can enter the labour market.

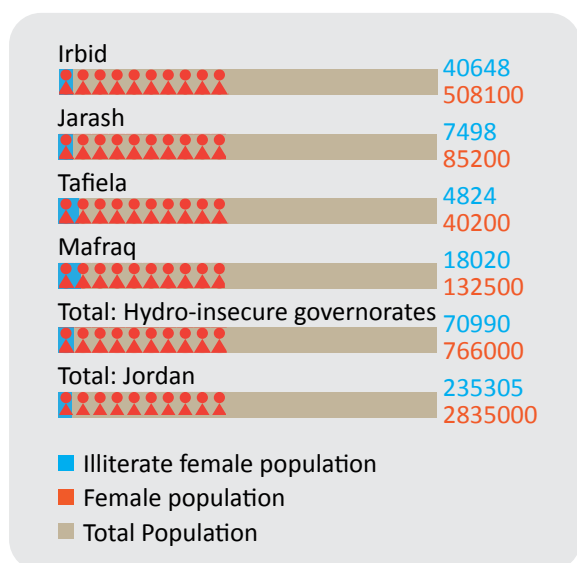
Female labour force participation and unemployment in the hydro-insecure governorates of Iraq



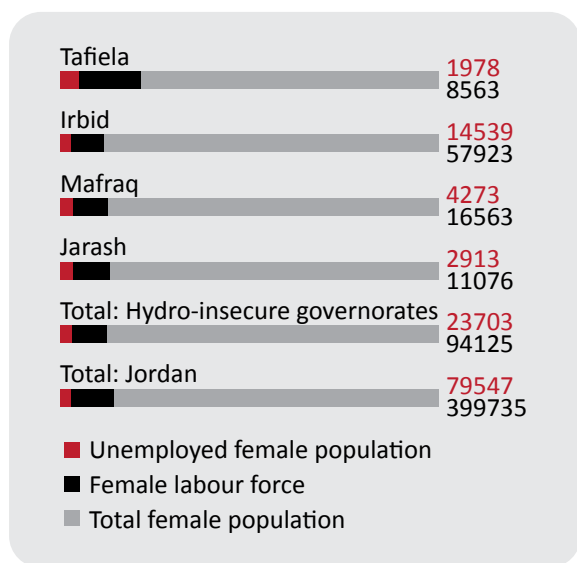
JORDAN

A high literacy rate combined with low labour participation rates means that Jordanian women are an untapped potential for the economy, especially in the hydro-insecure governorates.

Female population and illiteracy in the hydro-insecure governorates of Jordan



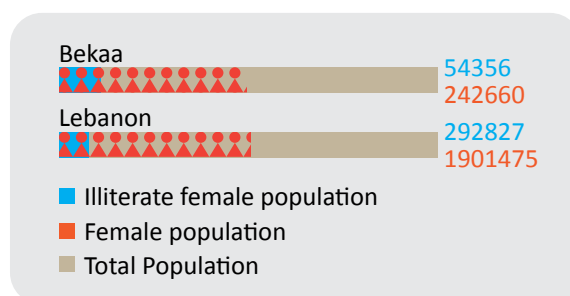
Female labour force participation and unemployment in the hydro-insecure governorates of Jordan



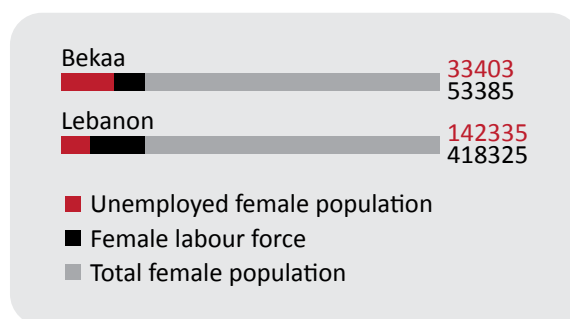
LEBANON

Female labour participation rate for Bekaa has been taken the same as female labour participation rate at national level as the data was difficult to find. The hydro-insecure population of Lebanon exhibits a similar pattern as that of Jordan; while almost 80% of the women are literate, the labour force participation and employment are very low.

Female population and illiteracy in Bekaa, Lebanon

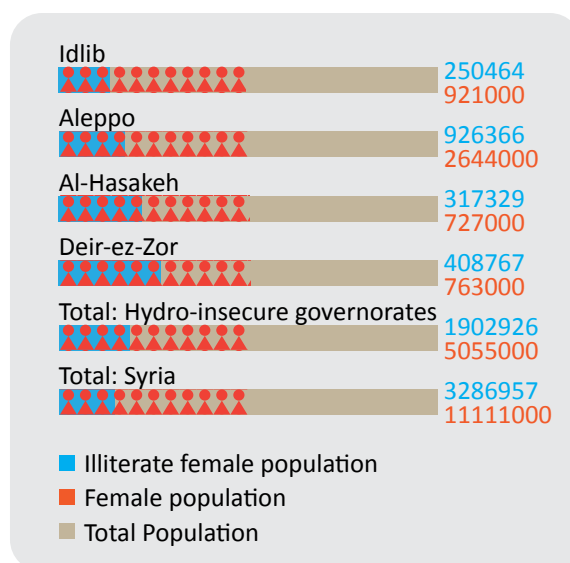


Female labour force participation and unemployment in Bekaa, Lebanon



SYRIA

Female population and illiteracy in the hydro-insecure governorates of Syria

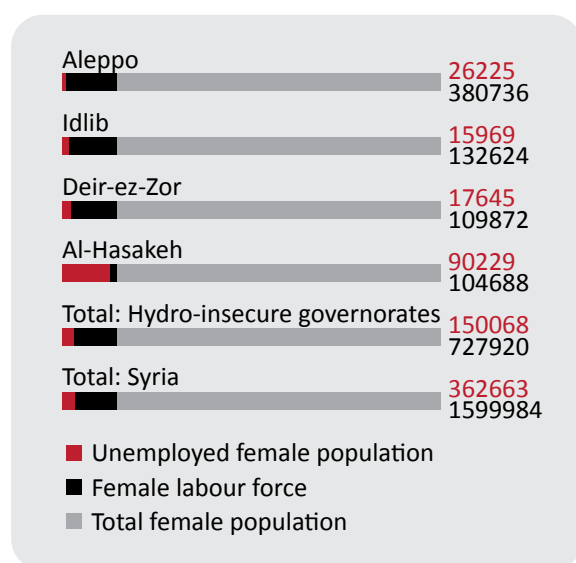


Female labour participation rates for the hydro-insecure governorates have been taken the same as their



total labour participation rates (14.4%) as the data was difficult to find. Consistently low literacy rates, labour participation rates and employment rates increase the risk levels for women by reducing their purchasing power and control over resources.

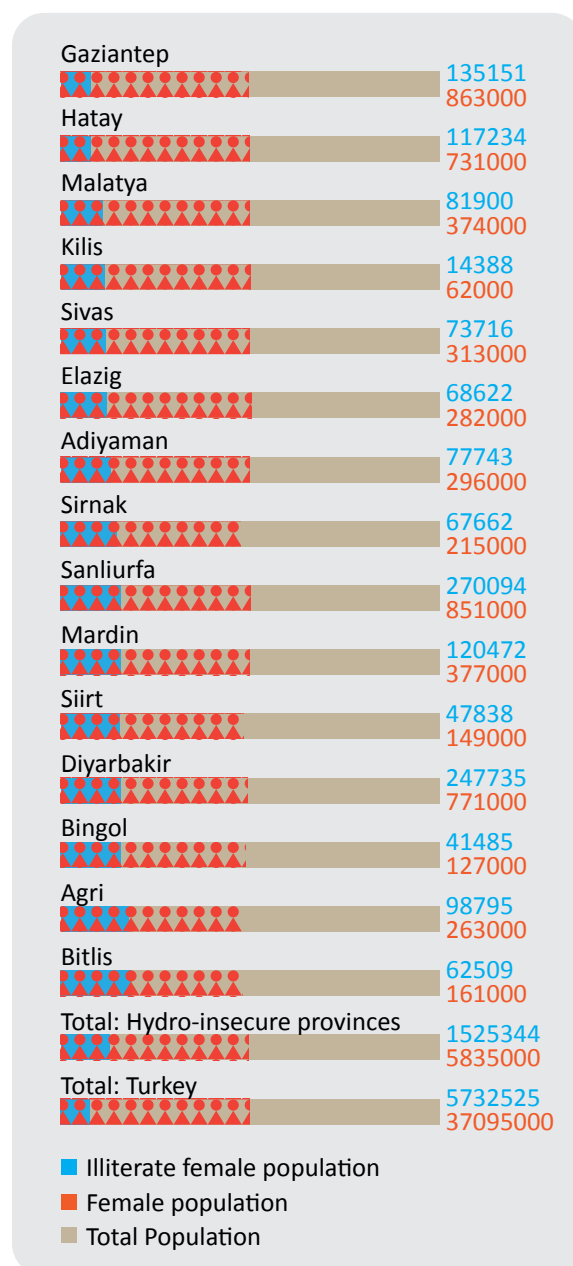
Female labour force participation and unemployment in the hydro-insecure governorates of Syria



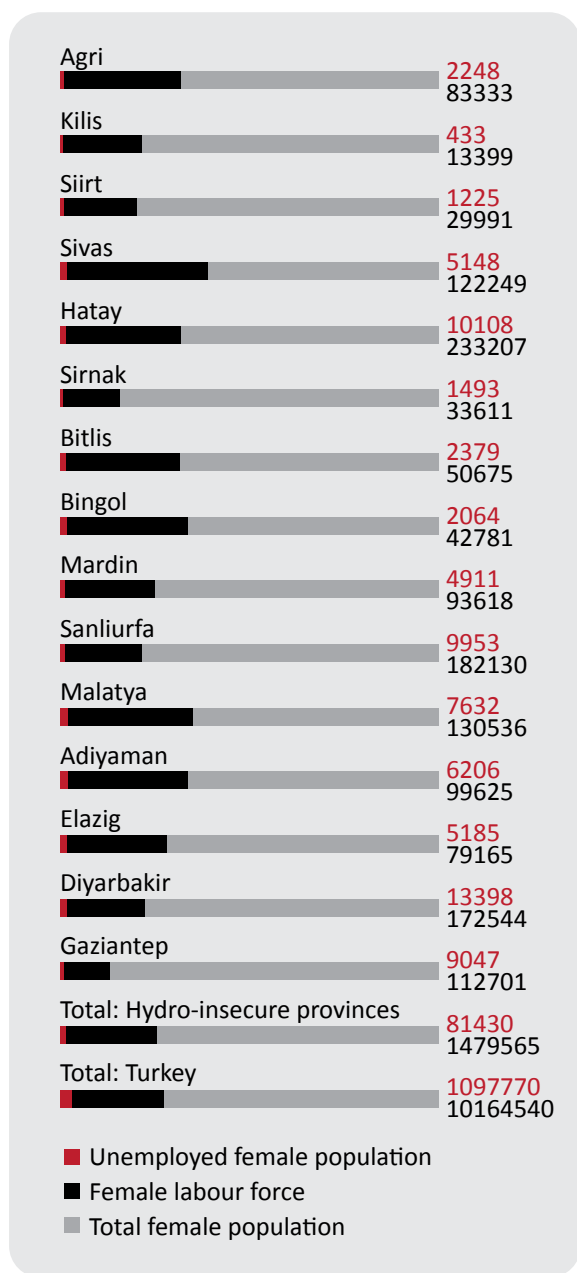
TURKEY

Considerable female population in the region is literate, but a large proportion is inactive in the labour force. Due to low female labour participation rates, the significance of low employment rates is reduced as most women do not form a part of the labour force in the first place. As the region is transforming from an agricultural economy to a service/industry based one, the women have potential access to a wider number of education and employment opportunities.

Female population and illiteracy in the hydro-insecure provinces of Turkey



Female labour force participation and unemployment in the hydro-insecure provinces of Turkey



increased. However, the recharge rate of the aquifer is low (0-20 mm/year) hence over abstraction must be avoided. The location of Rutba is strategic and risky due to proximity to Syrian border, making it a refugee settlement and transit point and putting population pressure on the aquifer.

The Umm er Radhuma-Dammam Aquifer System (shared with Saudi Arabia and Kuwait) lies in southern Al-Anbar, Muthanna and western Basra. The recharge rate for the aquifer system is very low (0-20 mm/year). It faces over abstraction. Due to high salinity levels, it cannot be used for drinking. The aquifer is close to the Persian Gulf and suffers from salt water intrusion as well.

Currently, groundwater resources provide about 0.9 BCM of water annually to most of western, central and southern Iraq which include hydro-insecure governorates like Al-Anbar, Nineveh and Basra.

Several large wadis like the Ubaiydh, Amij, Ghadaf, Tubal, and Hauran flow through western Iraq, mostly Al Anbar, and discharge into the Euphrates.

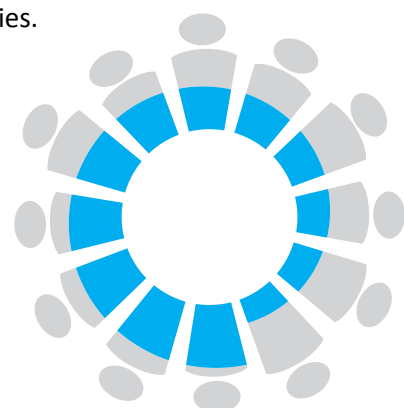
Both the Euphrates and the Tigris originate outside Iraq's borders (in Turkey, and in case of Tigris' tributaries, Iran), thus giving Iraq a high dependency ratio of 60.83. Dependency ratio is an indicator expressing the percentage of total renewable water resources originating outside the country. A country with a dependency ratio equal to 0 does not receive any water from neighbouring countries. A country with a dependency ratio equal to 100 receives all its renewable water from upstream countries, without producing any of its own. This indicator does not consider the possible allocation of water to downstream countries.

Water Availability and Access

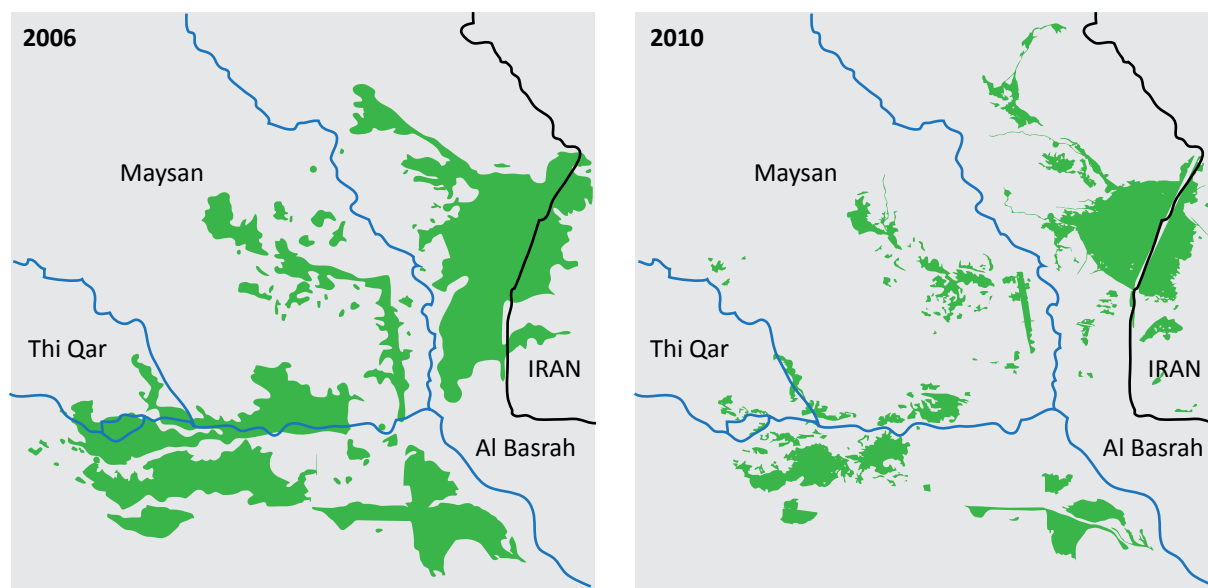
IRAQ

The Wasia-Biyadh-Aruma aquifer (shared with Saudi Arabia) is located in the western desert region of Al Anbar, specifically the district of Rutba. The aquifer has limited current use, about 30-35 MCM/year, which can be

The artificial Saddam River includes Qadisiya, Thi-Qar and Basra in its scope. The Euphrates (average annual runoff: 25 BCM) flows in



Marshlands land cover in 2006 and 2010



eastern Al-Anbar, western Qadisiya, eastern Muthanna and western Thi-Qar and the Tigris (average annual runoff: 26 BCM at Kut) flows through central Nineveh.

The marshlands in the south are still recovering and will need a regular supply of 10-16 BCM of water per year for recovery.

On an average less than 10% of the population of the hydro-insecure region has access to proper sanitation facilities; many sewage treatment plants do not function properly and as a result, there is an overflow of untreated discharge into the water bodies. Return flow from irrigation projects and diversion of flood waters also result in pollution of the waters.

There are six dams, barrages and regulators in Al Anbar and Nineveh alone.

Dams and other water structures in the hydro-insecure governorates of Iraq

Dam	Governorate	Total Storage Capacity	Active Storage	Maximum Discharge
Haditha Dam	Al-Anbar	0.188- 9.85 BCM	8.7 BCM	11,000 m ³ /s
Ramadi Barrage	Al Anbar	-	-	3000 m ³ /s
Warrar Regulator	Al Anbar	-	-	7800 m ³ /s
Fallujah Barrage	Al Anbar	-	-	3600 m ³ /s
Mosul Dam	Nineveh	11.1 BCM	8.1 BCM	-
Badush Dam	Nineveh	10 BCM	-	-

The Badush dam is under construction. The rest of the hydro-insecure governorates, namely Thi Qar, Muthanna, Qadisiya and Basra do not have any significant dams.

Roughly 70% of the population in the hydro-insecure governorates is connected to the public network of water supply. In Muthanna and Nineveh, just about $\frac{2}{3}$ rd of the population is connected. In reality, a lesser proportion of the population receives water from the public network due to declining water availability and poor quality of infrastructure.

Out of the 9.6 million Iraqis who face serious water shortage, about 2.5 million reside in the hydro-insecure governorates. Thi Qar and Basra have the highest proportions (both 30%) of populations facing water shortage; together, the number goes up to 1.3 million. The hydro-insecure governorates produce up to 1.4 MCM of water per day which can satisfy the domestic demand of almost 80% of the population. The rest of the population, i.e. the 2.5 million inhabitants, faces water shortage on a daily basis.

The supply of drinking water has a wider reach. About 9.8 million people in the hydro-insecure governorates have access to safe drinking water, and while the governorates of Muthanna and Basra rely primarily on bottled and other sources of water, most of the population from the other governorates receive drinking water from the public network. Nevertheless, about 200,000 people still do not have access to safe drinking water.

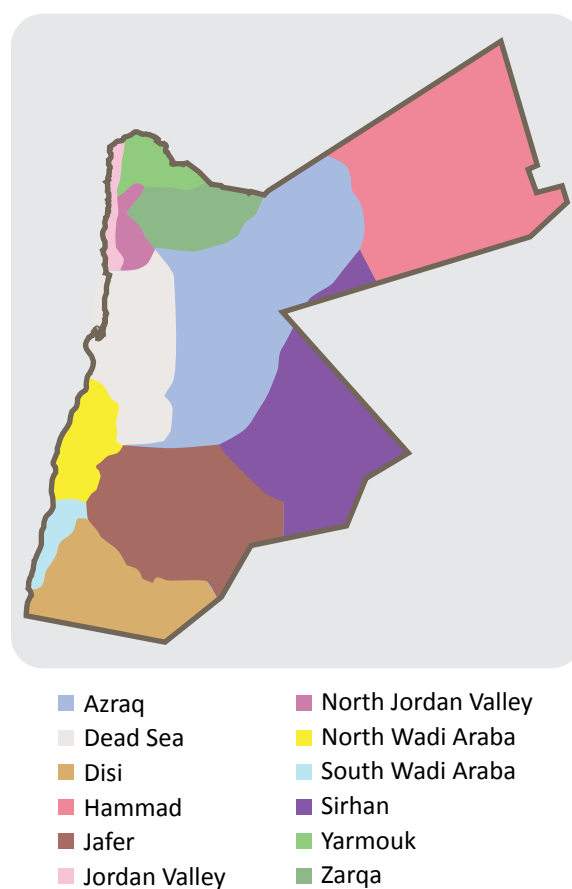
More than a third of the 194 sewage units (not including those in Kurdistan region) across the country are not in operation (of the 13 in Kurdistan region, none are in operation due to lack of power supply). There are 114 sewage processing units in all the ten governorates and they process approx. 90,000 m³, or 57% of the total sewage generated per day. However, only 10% of the population in the hydro-insecure governorates has access to sanitation network. Nineveh and Basra treat 100% of their sewage, whereas Thi Qar and Muthanna treat none. The total population with access to sewage network is roughly a million, which means that about 9.9 million people are without access to sewage treatment.

JORDAN

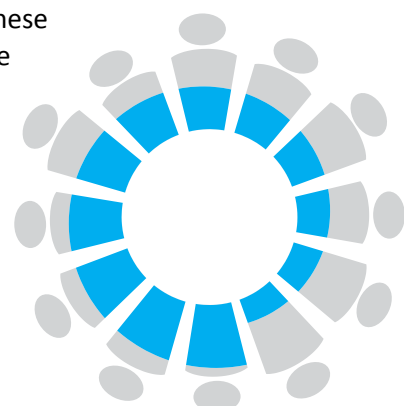
The Saq-Ram Aquifer System is used by both Saudi Arabia and Jordan and in the latter, it spans under parts of Tafiela, providing on an average 60 MCM/year.

Only 5% of all of Jordanian territory receives rainfall and most of it is located in the Jordan Valley. About 80% of the known groundwater reserves are concentrated in the Yarmouk, Amman-Zarqa and Dead Sea basins. The basins yield 40 MCM, 87.5 MCM and 50 MCM respectively and all of them are overexploited. In the governorates which have access to these three basins, especially Irbid, Jarash and Mafraq, the local populations are predominantly rural, poor and agricultural.

Groundwater basins in Jordan



The Hammad basin and the Jordan Valley basin, yield 8 BCM and 21 BCM of water respectively. The Jordan Valley basin also contains renewable brackish water amounting to 50 MCM/year. A part of these brackish water reserves, the salinity levels of which ranges from 2000 to 5000 mg/l, can be used only for irrigation. The Hammad Basin, along with most others, holds



non-renewable brackish water which totals up to 240 BCM. However, due to poor quality, only 10% of this water is usable.

Due to the uneven distribution of rainfall and aquifer recharge, there are several proposals to build dams in the eastern and north-eastern desert regions to even out the groundwater recharge. It is an urgency to manage and replenish the groundwater aquifers in Jordan as most of them are extracted at more than double their sustainable yield.

The water scarcity in Mafrq is of concern and is exacerbated by a high rate of water loss; more than two-thirds, or the highest in the country. The rate of water shortage for Mafrq is around 80%. Home to two groundwater basins, the Azraq and the Hammad, Mafrq sees most of the water of the Azraq basin being extracted for the cities of Amman and Zarqa. The Hammad basin is severely under exploited (only 1.8 BCM out of 8 BCM utilized). Yet, the locals face water scarcity. In addition, the influx of Syrian refugees since 2011 has led to the growth of camps, putting more pressure on the scarce water resources and causing tensions between the locals and the refugees in the governorate.

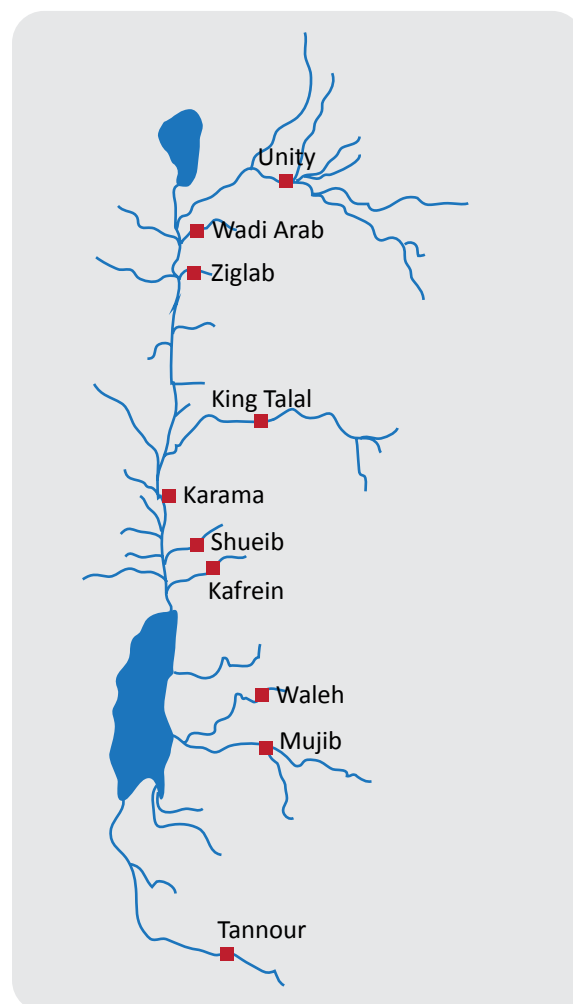
Jordan's surface water is spread across 15 basins of which the Yarmouk River has an annual average flow of 420 MCM and accounts for about 40% of Jordan's water resources, but serves a very small part of the country (i.e. a part of Irbid). Other important basins are wadis near the Jordan River (61.2 MCM) and Wadi Araba (21.4 MCM). All of these are concentrated in the western region of Jordan and cater to the hydro-insecure governorates of Irbid, Jarash and Tafila. Mafrq suffers from lack of access to any major surface source.

There are five dams located in the hydro-insecure regions of Jordan, all in Irbid, Jarash and Tafila.

There are no water structures in Mafrq, which is the most hydro-insecure of all. However, the picture can change considerably if the

proposals to build dams in the eastern and north-eastern desert regions are passed and executed efficiently.

Dams in west/north-west Jordan



Dams in the hydro-insecure governorates of Jordan

Dam	Governorate	Total Storage Capacity	Active Storage
King Talal Dam	Jarash	75 MCM	-
Sharhabeel-Ziglab Dam	Irbid	3.9 MCM	2.6 MCM
Wadi Al-Arab	Irbid	16.8 MCM	5 MCM
Tannur Dam	Tafila	16.8 MCM	8 MCM
Al Wahda (Unity) Dam	Irbid	110 MCM	81 MCM

Of the 330.1 MCM of water supplied for

household and municipal purposes in Jordan 70.1 MCM was supplied to the hydro-insecure governorates. Tafiela and Jarash were supplied the least overall (3.5 MCM and 5.2 MCM respectively), while Jarash and Irbid received the least amount per capita (27.1 m³ and 36.1 m³ respectively).

Most of the wastewater treatment plants are located in Irbid. In 2006, out of the 9.52 MCM of treated wastewater, 7.1 MCM was reused and 2.44 MCM was released in surface water bodies, namely the Yarmouk River and the wadis flowing into the Jordan River. The Wadi Arab plant in Irbid treats the largest amount of wastewater in the hydro-insecure governorates (3.52 MCM) and 100% of the water is used. Four plants in Irbid treat 7.37 MCM of wastewater, of which 5.134 MCM is reused. Three plants, one each in Jarash, Mafraq and Tafiela treat 2.15 MCM and reuse a total of 1.94 MCM of wastewater. However, these plants face a lot of technical difficulties during their operations and consequently, their performance is impaired.

LEBANON

About 400-1000 MCM/year of groundwater quantity is available for exploitation in Lebanon. The Bekaa valley is home to significant aquifers. While the geographical characteristics of these aquifers can be expected to remain the same, the hydrologic/hydraulic features are feared to have changed due to uncontrolled groundwater abstraction.

A preliminary assessment of groundwater in Lebanon shows that pesticide residues and high chloride concentrations are present in the aquifers. Over pumping is rife, especially by farmers. Coastal groundwater shows high sodium and chloride concentrations, which could have been caused due to sea water intrusion. High chloride levels in aquifers in Bekaa can be attributed to intensive fertilizer applications.

Precipitation is uneven, with the eastern region receiving barely 200 mm per year. Annual rainfall varies between 1000-1400 mm in the mountains at the western border of Bekaa, 200-600 mm in the north and central regions, and 600-1000 mm in the southern part. Inter and intra year precipitation shows high variability.

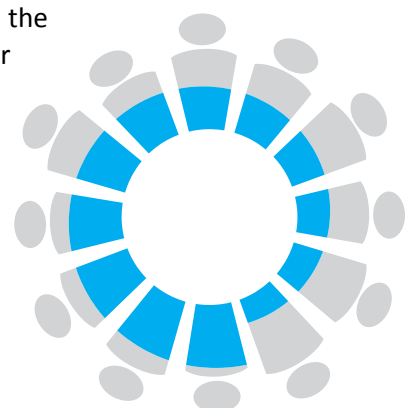
Of the 17 perennial rivers of Lebanon, two flow through Bekaa. Together, the Litani and El-Assi flow for almost 200 kilometres and have a combined average flow of about 14.5 MCM.

The Litani River flows for 170 km with an average annual discharge rate of 770 MCM. Its water shed covers 20% of Lebanon's territory. The El Assi River has 8% of its basin area in Lebanon and its average annual flow volume is about 1.2 BCM, out of which 80 MCM is allocated for Lebanon's use through an agreement with Syria. Later amendments in the agreement have also allowed Lebanon to construct a dam on the Assi.

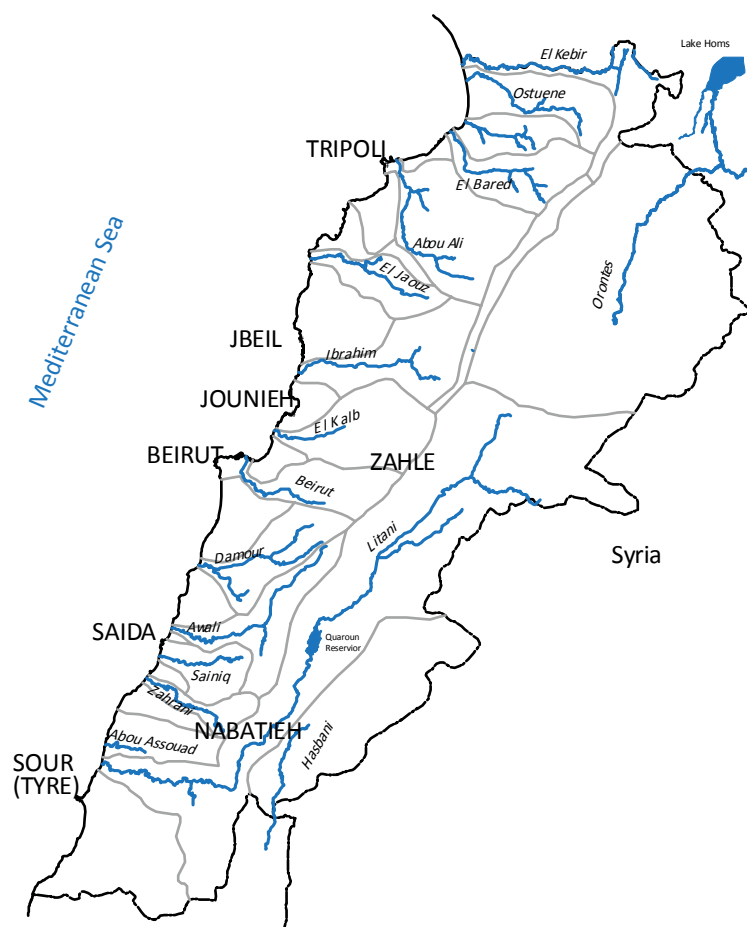
The major dam in Bekaa is the Qaraoun Dam on the Litani River, with a total storage capacity of 220 MCM and actual average storage of 160 MCM.

At the national level, about 80% of Lebanese have access to the water network. Public water network caters to the drinking water needs of 50% of Bekaa's population. However, in actuality, water is not supplied 24 hours a day. Due to inefficient water management, a large majority of the country, including Bekaa, receives water for only a few hours, sometimes as little as 2-4 hours, per day.

The per capita water consumption is the lowest in Bekaa at 48.2 m³ per year. The per capita water consumption at the national level is 53.6 m³ per year. Out of about 250 MCM wastewater generated in the country, Bekaa generated 33.6 MCM, or on an average 68.6 m³/ capita. Out of the



River map of Lebanon



20,324 private wells across the country which produced 182.31 MCM of water, only 13% or 2678 wells were located in Bekaa, the largest governorate, which produced about 22.5 MCM of the total amount of water. Out of the 22.5 MCM produced, less than 2 MCM was used for domestic purposes, while more than 85% was used for irrigation and rest for industrial activity.

SYRIA

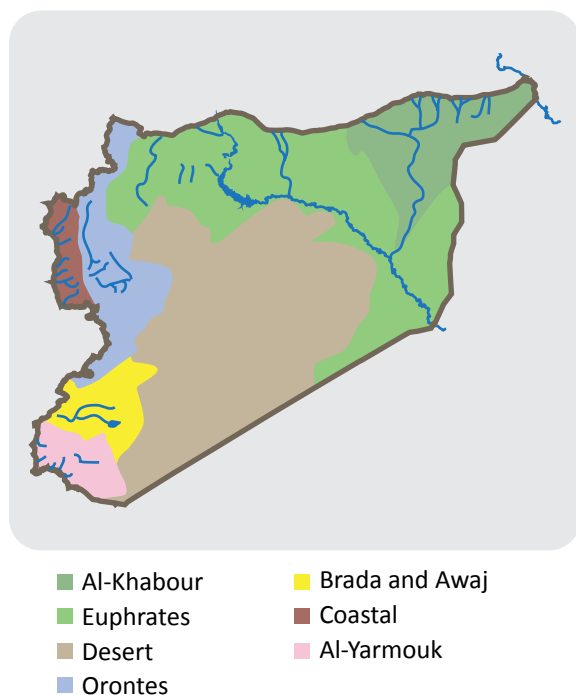
Syria has seven hydrological basins which hold 4811 MCM of groundwater. The hydro-insecure governorates of Syria are located in the basins of the Al-Khabour, Euphrates and the Orontes.

The eastern region of Syria has three main aquifers: Miocene, Miocene-Pliocene, and the Euphrates-Khabour. The Euphrates-Khabour aquifer has good recharge and natural

irrigation capacities in the valley. Its renewable groundwater resources are estimated to be around 650 MCM/year. Groundwater flowing into the northern governorates of Syria has been estimated at 1200 MCM/year, but there is a high possibility that the actual flow is considerably less due to over abstraction inside and outside Syria.

Out of Syria's 21 rivers, 12 rivers are shared with adjoining countries. The rivers of Orontes, Euphrates, El-Khabour, and a tiny sliver of the Tigris on the north-border are directly related to the hydro-insecure regions of Syria. In case of Euphrates, Turkey has agreed to release 500 m³ of water per second to Syria, of which Syria (the region includes the governorate of Deir-ez-Zor) can use 42%, or 6.62 BCM/year. The agreement extended to Tigris as well, allotting 1.25 BCM of Tigris waters to Syria annually.

Syria Hydrological basins



Separate agreements were made with Lebanon over the Orontes and Al-Kebir Rivers according to which the total water flowing into Syria would be 410 MCM.

Syria has a total of 141 dams with a storage capacity of 15800 MCM. Even though Al-Hasakeh is considered as the richest governorate in Syria in terms of water resources, the two principal rivers of Al-Hasakeh, the Khabour and Jaghiagh are polluted or on the verge of drying up, and the governorate has no major water storage structure.

The Tishrin Dam is a major water structure, situated in Aleppo, with a total water storage capacity of 1.9 BCM. Another dam, the Halabiye, is proposed to be built in Deir-ez-Zor for the purpose of irrigation.

Out of the 1.2 BCM drinking water produced for the country, 0.45 BCM, or 37.5% is supplied to the hydro-insecure governorates, with Aleppo alone getting 0.27 BCM. On an average, almost a third of the water is lost due to infrastructural inefficiencies and evaporation, about 4% of the consumption is free of cost, while the rest is

priced in the hydro-insecure governorates. The average per capita consumption free of cost in the hydro-insecure governorates is 27.7 m³, with Aleppo having the least share of 5.8 m³ and Al Hasakeh having the largest share of 67.1 m³. The average per capita priced consumption is 252.4 m³ with Idlib consuming the least, i.e. 156.1 m³.

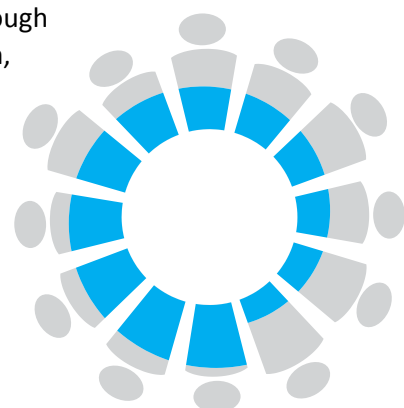
TURKEY

The Zakho Basin (shared with Iraq) consists of three aquifers- Bai Hassan, Bekhme and Pila Spi with a highly variable recharge rate of 20-300 mm/year. The basin covers the provinces of Diyarbakir, Mardin and Sirnak.

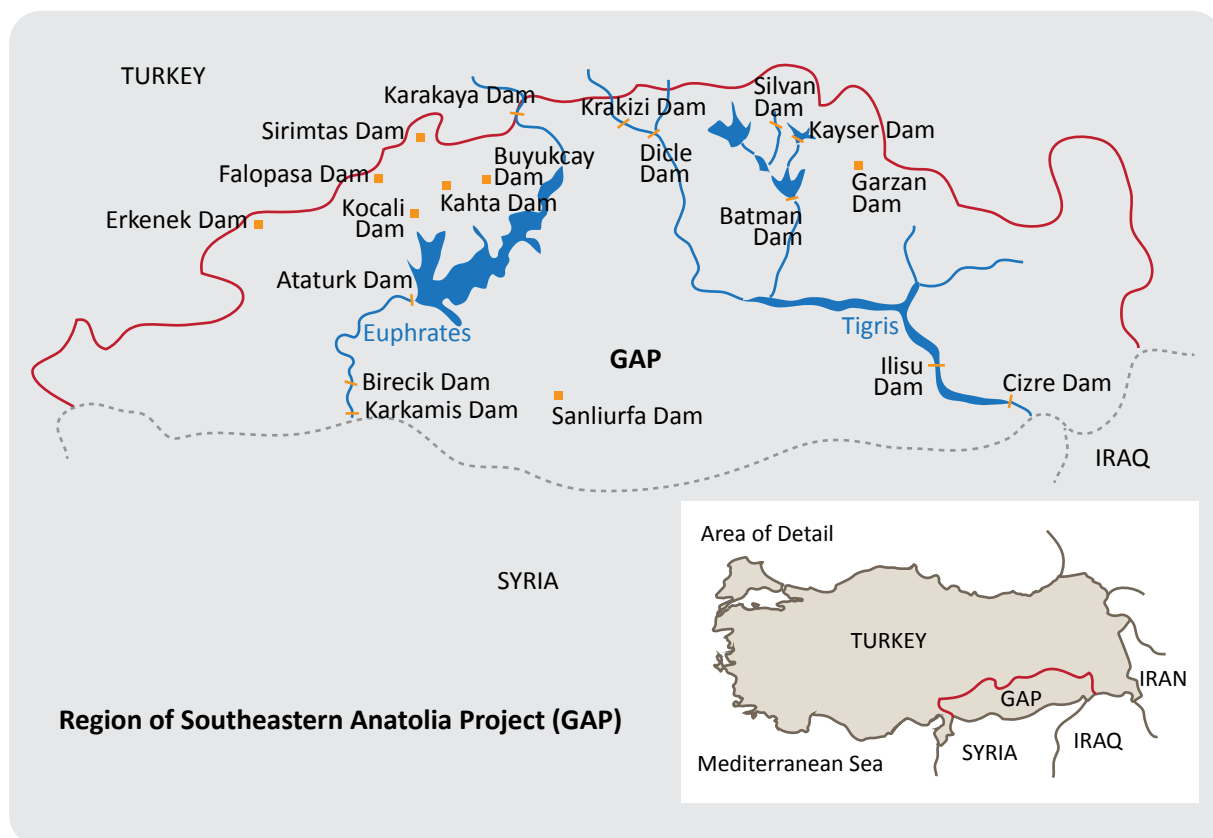
The Jezira/ Al Khabour Basin (shared with Syria) also has a considerably variable recharge rate of 20-100 mm/year and is made up of two aquifers. This basin covers the provinces of Mardin and Sanliurfa in Turkey. Due to recent shifts from rain-fed irrigation to groundwater irrigation in the region, the abstraction levels have increased drastically; almost 6000 wells abstract about 3000 MCM/year from this system, causing the discharge of springs which used to supply about 87% of the water from this aquifer system to dry out. These springs discharged more than 1200 MCM/year from the system into tributaries of the Euphrates until 2000.

There is high variability in precipitation, but the average is estimated at 335 mm per year. 22% of the ET Basin and two-thirds of the rivers' courses are concentrated in the 20-odd provinces of these regions. Together, the run off of the two rivers in Turkey is about 80 BCM annually.

The Euphrates flows through Elazig, Malatya, Adiyaman, Sanliurfa, Bingol, Agri and Gaziantep. Of the total 3000km flow of the Euphrates, 41% or 1230 kms, lies in South Eastern



Sites of Dams (part of the GAP) in Turkey



and Eastern Anatolia. Of total area of the Euphrates basin, 28% is in South Eastern and Eastern Anatolia. The Tigris and its tributaries flow through Elazig, Diyarbakir, Bitlis, Siirt and Sirnak. The Tigris flows a total of 1850 kms of which 400 kms or 22% lies in South Eastern and Eastern Anatolia. 12% of the Tigris basin, lies in South Eastern and Eastern Anatolia. The Orontes contributes very little (120 MCM out of 1.2 BCM) to Turkey.

Dams in the hydro-insecure governorates of Turkey

Dam	Province	Total Storage Capacity	Active Storage
Dicle Dam	Diyarbakir	0.6 BCM	-
Ilisu Dam	Mardin-Sirnak	7.46 BCM	-
Ataturk Dam	Sanliurfa	48.7 BCM	12.7 BCM
Keban Dam	Elazig	30.6 BCM	14 BCM
Karakaya Dam	Diyarbakir	9.54 BCM	6 BCM

On an average, about 97% of the municipal population in the hydro-insecure governorates of Turkey has access to a water supply network. A total of 0.64 BCM of water is abstracted for drinking water supply, with Kilis and Bingol getting the least of all. About two-thirds of this water is obtained from groundwater abstraction. On a per capita basis, Kilis and Sirnak fare at the bottom: 128 litres/ day/ capita.

A total of 0.2 BCM of wastewater is treated in this region, but only six provinces- Diyarbakir, Elazig, Gaziantep, Kilis, Sivas and Sanliurfa- carry out the process. The largest amount of wastewater treated, about 70 MCM, is in Gaziantep.



CHAPTER II

Problems of Water Pricing

Introduction

Water pricing in Iraq, Jordan, Lebanon, Syria and Turkey is subsidized and does not cover full costs, let alone generate profits. The supply side of the water system has to bear the financial loss. Water wastage, infrastructural inefficiency, lack of repair and maintenance facilities on the supply side can be attributed to this loss and the consequent shortage of funds.

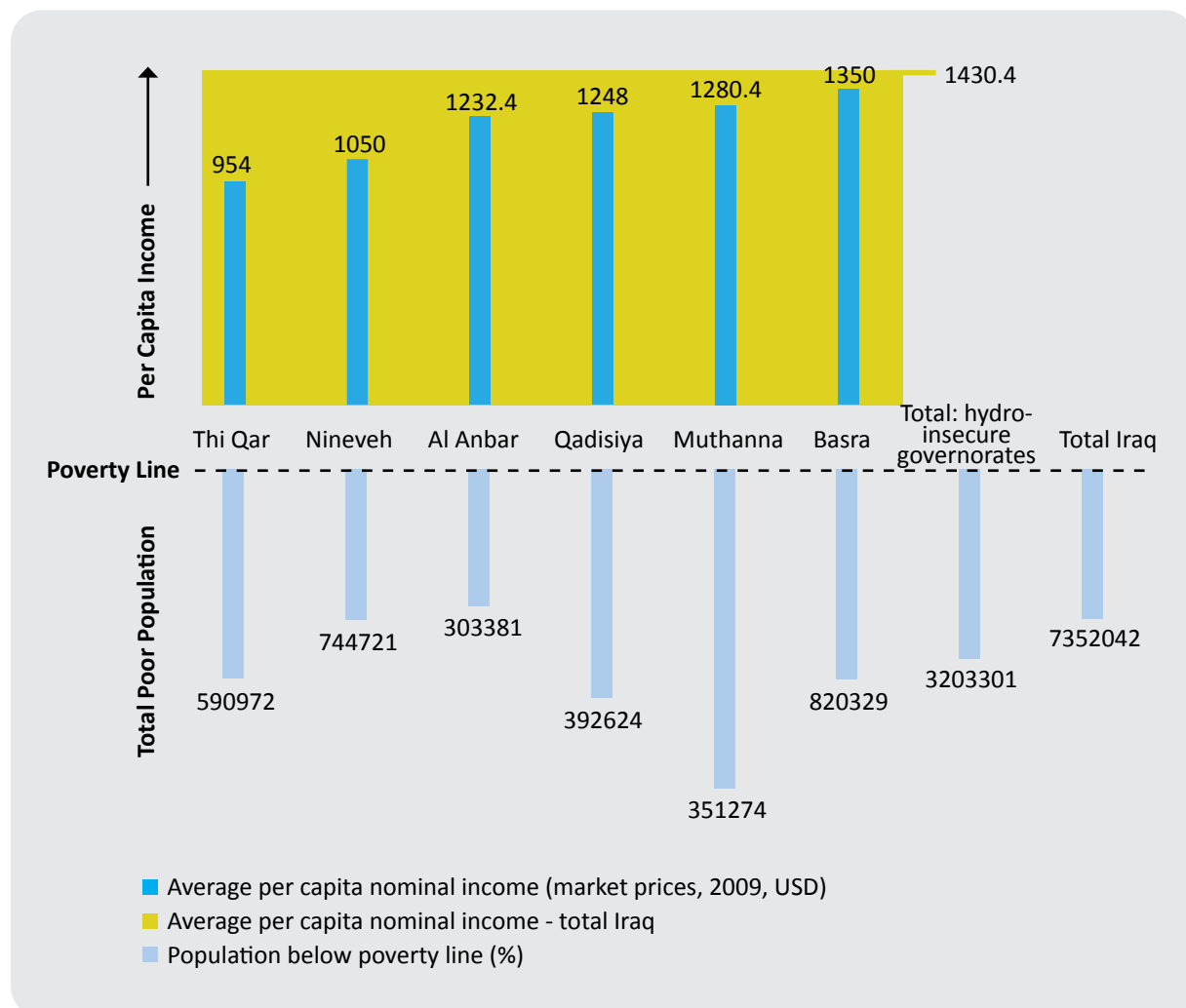
Conversely, the average individual in each of the hydro-insecure governorates spends a relatively small portion of his income (in many cases, near to zero) on water.

Low Income groups are defined here as populations which show all or combinations of the following- a) Low level of income and/or expenditure b) low level of labour force participation and c) high level of unemployment.

Note: All data is annual, the currency used is US Dollars, and water consumption is measured in m³.



Hydro-insecure governorates of Iraq- Populations below poverty line



Out of the 3.2 million people living below poverty line, more than 50% are in the rural regions. In terms of proportion, Muthanna comes out as the governorate with the largest share of population living under the poverty line (48.8%) while in terms of absolute numbers, Basra and Nineveh have the largest poor populations, each more than half a million.

The western and southern governorates are sparsely populated compared to those in the north and lying in the ET Basin (especially Baghdad); however, these regions are particularly vulnerable income-wise because-

a) All the hydro-insecure governorates have per

capita income figures below national average,

b) The bottom one-third of the list of Iraqi governorates ranked in descending order according to their per capita income features four (Thi Qar, Nineveh, Al Anbar and Qadisiya) of the six hydro-insecure governorates and

c) Four out of six governorates have a third or more of their population living below the poverty line.

Water use and pricing

The tariff for domestic water in Iraq is heavily subsidised at USD 0.0034/m³ i.e. IQD 3.95/m³ (as on 29 Apr. 2014).

Drinking water consumption and proportion of income spent on drinking water in the hydro-insecure governorates of Iraq

Governorates	Annual nominal income per capita at market prices (USD, 2009)	Annual avg. water consumed per capita (m ³)	Annual expenditure on water per capita (USD)	Proportion of annual income spent on water per capita (%)
Qadisiya	1248	72	0.2	0.02
Thi Qar	954	90	0.3	0.03
Nineveh	1050	86.4	0.3	0.03
Al Anbar	1232.4	115.2	0.4	0.03
Muthanna	1280.4	111.6	0.4	0.03
Basra	1350	115.2	0.4	0.03
Iraq	1430.4	104.4	0.4	0.02

The hydro-insecure populations spend a negligible (almost zero) portion of their income on water consumption. The national consumption is of 104 m³/capita/year, 45% more than the international standard of 72 m³/capita/year. The revenue earned covers only 2-5% of operational and maintenance costs. Metering is not common, and water losses range between 10-30%.

For those who earn below average, a) the proportion of income spent on water is more than average and/or b) the amount of water consumed is less than average.

In areas where the public water supply network has limited or no reach, the general population is dependent on private water suppliers. These suppliers charge more than government tariff. As a result, the poorer people end up allotting a larger part of their income to water. For the poorest, the proportion of income spent on drinking water can be more than one-third of their total income.

In the case of domestic water supply, the low tariff does not provide any revenue benefits to the government, as the revenue does not cover even the operation and maintenance costs. It also does not encourage the general population to use water efficiently or consume less of it (as is evident from the national consumption

figures) as it does not reflect the true extent of water scarcity in the region.

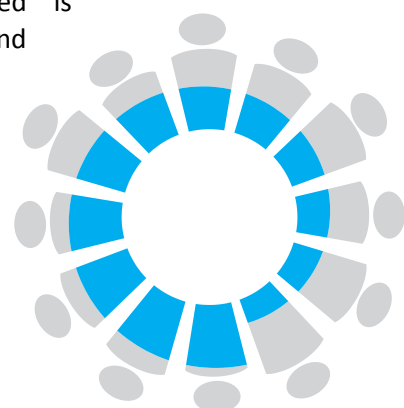
JORDAN

Mafraq has the highest share of population living below the poverty line and has the second-least per capita income in the country. Along with Mafraq, Tafiela and Jarash are among the four (one-third of total) governorates which host the largest share of populations living below poverty line. On examining the governorates according to per capita income, we find that Mafraq and Tafiela appear in the bottom one-third.

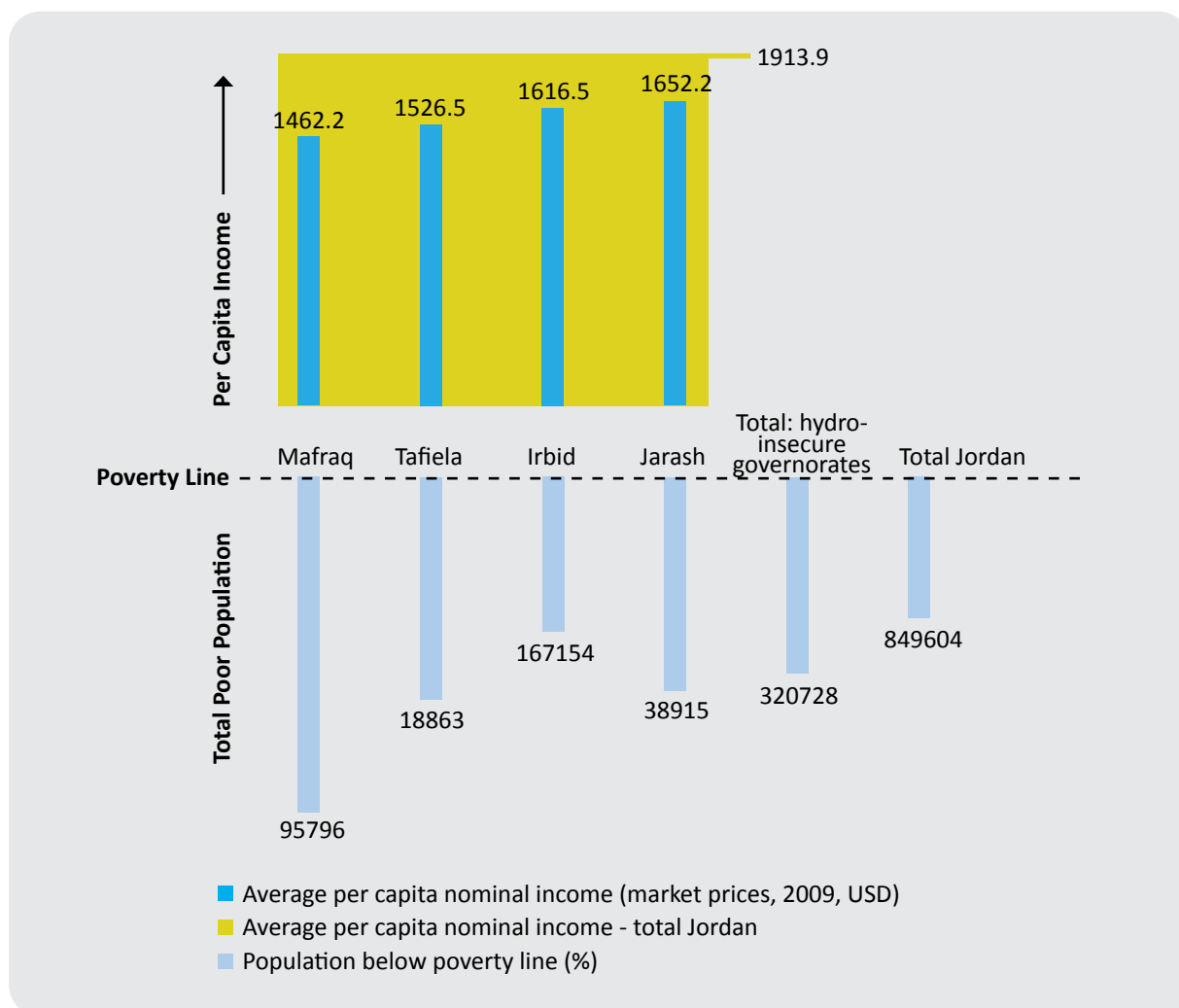
Water use and pricing

Miyahuna (Amman), Aqaba Water (Aqaba) and the Yarmouk Water Company (YWC) (Ajlun, Jarash, Irbid and Mafraq) have higher tariffs than Water Authority of Jordan (WAJ).

Quantity of water consumed is categorized into 'blocks' and billed per month. The lowest blocks (0-20 and 21-38 m³) are subsidized for the poor, while the following blocks are priced at an increasing rate.



Hydro-insecure governorates of Jordan- Populations below Poverty Line



Drinking water consumption and proportion of income spent on drinking water in the hydro-insecure governorates of Jordan

Governorates	Annual nominal income per capita (USD, 2008)	Served by	Annual avg. water consumed per capita (m ³)	Tariff	Proportion of annual income spent on water per capita (%)
Jarash	1652.2	YWC	27.1	48.43	2.9
Tafiela	1526.5	WAJ	39.1	52.5	3.4
Irbid	1616.5	YWC	36.1	59.94	3.7
Mafrq	1462.2	YWC	67.9	100.58	6.9
Jordan	1913.9	-	51.7	52.2	2.7

However, the consumption is metered and not based on use per capita. An average of 20% of Jordanian households share meters. Poor households tend to be larger in size, and tend to share their meter with similar households, which results in a higher consumption reading on the meter. Hence, these households end up in the higher tariff blocks. That does not necessarily mean that their per capita use of water is high. Yet, they have to spend a larger proportion of their income for purchasing municipal water than households with smaller sizes who do not share their meters. Smaller households are also usually financially better off.

Even though in reality the consumption is metered, it is possible to find out theoretically how much one has to spend on water. This can be done applying the tariffs to the average annual water consumption per capita in each hydro-insecure governorate. While the results average out across the governorate, we can be sure that a) poorer families pay tariff more than average and b) the proportion of tariff to their income is higher than the figures given below.

For non-domestic purposes, the first two cubic metres of water are charged a flat USD 2.84 rate per month, while for any higher quantity it is USD 3.7 per month.

Irrigation tariffs in the Jordan Valley (2014)

Usage block (m ³ /month 3.5 ha maximum)	Current irrigation tariff (1000 m ³)
0-250	\$11.5 (JD8)
2501-3500	\$17.3 (JD12)
3501-4500	\$28.8 (JD20)
Over 4500	\$50.4 (JD35)

The Jordan Valley Authority (JVA) charges on an average USD 0.017/m³ for water used for irrigation purposes. Both fresh and low quality water (fresh water mixed with treated effluents or highly saline water) are charged the same and the irrigation tariff is based on the size of

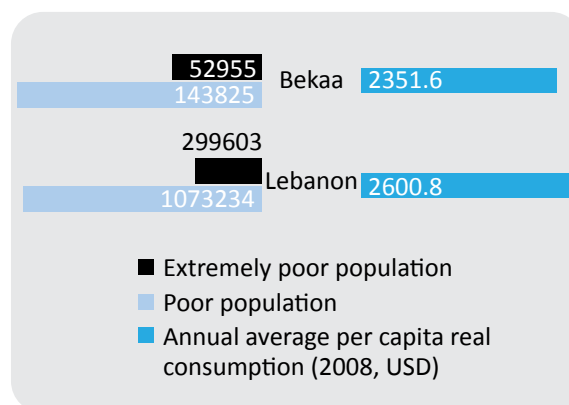
land, not on quantity of water used. As a result, there is no incentive to control/reduce the use of water for irrigation or to switch from water-intensive to water-conserving crops.

For industrial purposes, the tariffs range from as low as USD 0.35/m³ for water pumped from private wells, to as high as USD 2.54/m³ in Qualifying Industrial Zones and for the potash industry.

Among domestic, irrigation and industrial tariffs, the domestic tariff per capita is the highest, with three of the four hydro-insecure governorates receiving water from the water companies. The irrigation tariff is the lowest among the three, and covers neither the pumping costs nor the operation and maintenance costs completely.

LEBANON

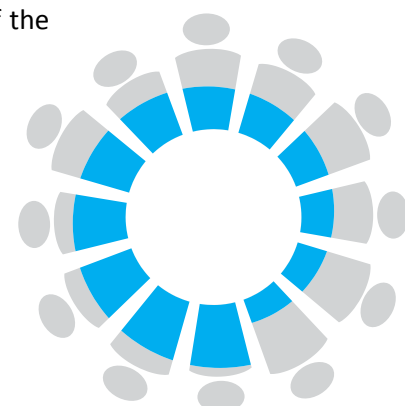
Bekaa Governorate- Population below Poverty Lines



Population categorized as 'extremely poor' is that which is living on less than USD 2.4 per day. Population categorized as 'poor' is that which is living on less than USD 4 per day. Bekaa hosts 13.4% of the country's 1 million plus poor and 17.7% of the country's extremely poor.

Water use and pricing

Currently, the domestic



Annual consumption of drinking water and proportion of drinking water in total average annual consumption in Bekaa

Governorates	Total annual avg. real consumption per capita (USD, 2009)	Annual avg. water consumed per capita (m ³)	Annual expenditure on water per capita (USD)	Proportion of annual water consumption in total annual consumption per capita (%)
Bekaa	2351.6	48.9	19.1	0.81
Lebanon	2600.8	54.4	21.2	0.82

water tariff is USD 0.39/m³ while the irrigation water tariff is USD 0.12/m³. Neither of these tariffs covers operation and maintenance costs, let alone full costs, and they are expected to be changed soon. The tariff on wastewater is USD 0.1/m³ at this stage, but it has been implemented only in certain areas, and will be charged across the country by 2020.

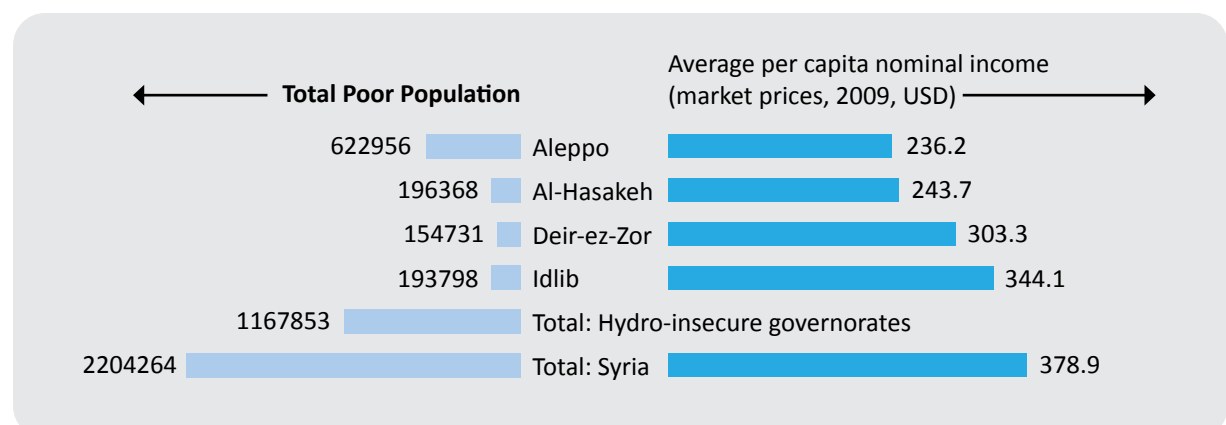
The tariff on domestic water is low due to focus on affordability. However, reliability of supply, rather than affordability of the water supply, is the main constraint. Private water supply plays a huge role in meeting the domestic water needs. At a national level, 75% of total household water expenditure is on private supply. Hence, the total proportion of expenditure on water is higher than the ones mentioned, and will be even higher for those with consumption levels below average.

The tariff rates for irrigation are even lower, resulting in an even smaller proportion of income allocated to water.

The expected tariff hike could help cover some of the operation and maintenance costs. With increased funds, the public water supply system could be better positioned to carry out extensive repairs and update water supply technology. This can improve the reliability of the supply network. Consequently, it could also reduce the dependence of households on private suppliers. Also, better tariff collection systems and a nationwide tariff on wastewater can contribute to increase in the revenues.

SYRIA

Extremely poor population and annual per capita expenditure (in USD) in the hydro-insecure governorates of Syria



Drinking water consumption and proportion of income spent on drinking water in the hydro-insecure governorates of Syria

Governorates	Annual average per capita expenditure (USD, 2007)	Annual avg. water consumed per capita (m ³)	Annual avg. expenditure on water per capita (USD)	Proportion of annual water expenditure in total annual expenditure per capita (%)
Al-Hasakeh	243.7	24.7	1.2	0.5
Idlib	344.1	28.8	2.9	0.8
Deir-ez-Zor	303.3	44.7	6.7	2.2
Aleppo	236.2	43.4	6.5	2.8
Syria	378.9	42.7	6.4	1.7

Note: Family size is taken to be 5.5 persons for Idlib and Aleppo and 8 persons for Deir-ez-Zor, Al-Hasakeh, and Al-Rakka.

An ‘extremely’ poor population is generally defined as that population which is unable to obtain even the most basic nutrition and non-nutrition needs, namely clothing and shelter. The hydro-insecure governorates are the poorest regions in Syria, where 15.4% of the population, or more than 1.1 million people, are in extreme poverty against a national proportion of 12.3%. Poverty is intensified in the rural areas where more than a fifth (22.7%) of the population (more than 600,000 people) is extremely poor. All four governorates appear in the bottom one-third with respect to per capita expenditure across the country.

Aleppo alone hosts more than half of the poor population of the hydro-insecure governorates.

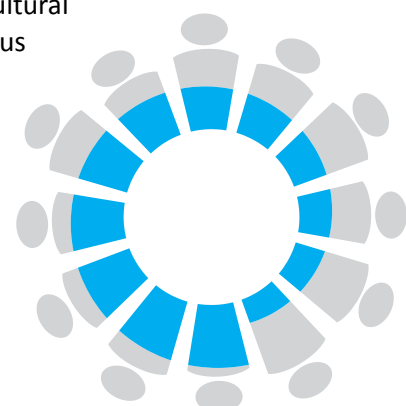
Water use and pricing

Domestic water consumption is priced according to the block system ranging from USD 0.02/m³ for consumption quantities between 1 m³ and 15 m³ to USD 0.2/ m³ for consumption quantities more than 60 m³. Government agencies are charged a flat rate of USD 0.09/m³. Water consumed for commercial/ industrial purpose is charged USD 0.2/m³. The low proportion of water expenditure in total expenditure does not reflect the water scarcity and poverty in the region. The actual strain is evident on the supply end: only 65% of the water supplied is billed. Water loss

during supply is 31.3% and the remaining 4% is not charged. The revenues from the domestic sector do not cover supply cost, let alone economic cost. Industries are not fined/ charged for excessive effluent discharge and wastewater treatment.

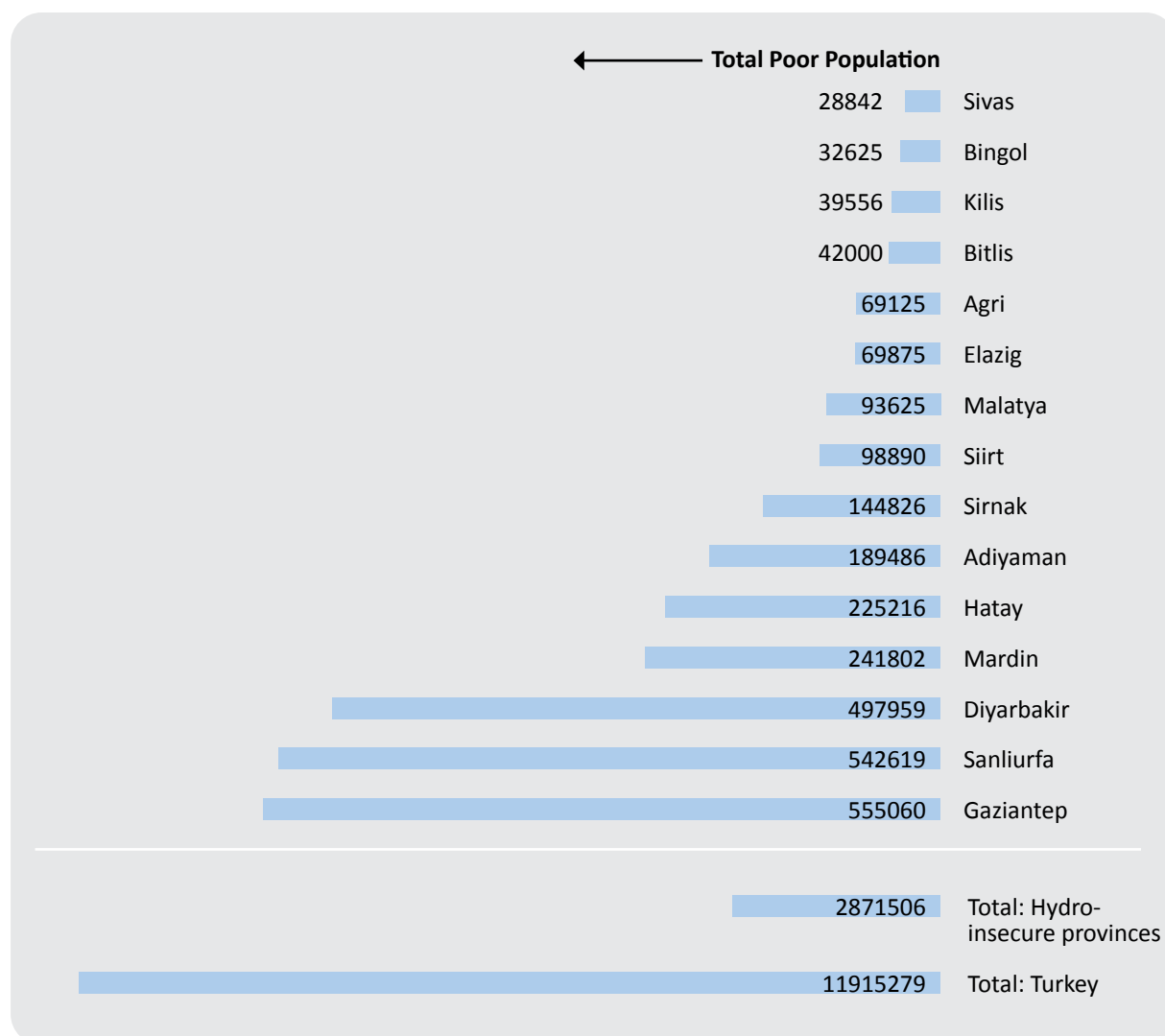
For agriculture, water use is charged a flat rate of USD 23.5/ ha. The agricultural tariff along with service charge attempts to cover a share of the cost of the distribution network, operation and maintenance, but it is based on the area of land irrigated and not on the nature of crop or amount of water used. This means that there is no incentive to produce water-conserving crops or make use of water-efficient irrigation techniques.

The artificially low tariffs are unsustainable in the long run as they provide no incentive to conserve water in any sector. Wastewater treatment is free throughout the country except in Damascus; charging and reusing it could improve the finances of the public systems as well as make more water available to the population. While the industrial sector is minor, the agricultural sector could do with serious reforms in its irrigation tariffs which encourage water-intensive crops and largely benefit the richer farmers.



TURKEY

Poor population in the hydro-insecure governorates of Turkey



- ◇ The poverty rate for South Eastern Anatolia is 31.9% while that for Eastern Anatolia is 12.5%. Sivas lies in Central Anatolia which has the poverty rate of 4.6%. Hatay lies in the Mediterranean Region which has the poverty rate of 15.3%.
- ◇ South Eastern Anatolia has the largest concentration of poverty in Turkey; almost a third of the South Eastern Anatolian population classifies as poor.
- ◇ South Eastern Anatolia also hosts the larger share of the poor; out of the total poor population in South Eastern and Eastern

Anatolia, almost 90% reside in South Eastern Anatolia.

- ◇ Both South Eastern and Eastern Anatolia fall in the bottom one-third in terms of poverty rates (i.e. they are among the four regions of Turkey with the highest poverty rates).

Even within the hydro-insecure provinces, those provinces that fall in the South Eastern Anatolian region in particular are poorer than other provinces by a large margin. Poverty statistics distinctly set apart South Eastern Anatolia from other regions of Turkey.

GDP per capita in the hydro-insecure provinces of Turkey

Regions	Provinces	Regional GDP per capita (USD, 2011)
Eastern Anatolia - East	Bitlis	6776
North Eastern Anatolia - East	Agri	7748
South Eastern Anatolia - Middle	Sanliurfa, Diyarbakir	8327
South Eastern Anatolia - East	Siirt, Mardin, Sirnak	9146
South Eastern Anatolia - West	Adiyaman, Gaziantep, Kilis	9603
Eastern Anatolia - West	Bingol, Malatya, Elazig	11286
Mediterranean region - East	Hatay	11332
Central Anatolia - East	Sivas	12778
Total: Turkey	-	17836

Domestic water abstraction and proportion of GDP spent on domestic water in the hydro-insecure provinces in Turkey

Provinces	GDP per capita (USD, 2011)	Domestic water abstraction per capita (m ³)	Water tariff	Proportion of income spent on domestic water (%)
Kilis	9603	46.7	78	0.8
Sirnak	9146	46.7	78	0.9
Hatay	11332	70.4	117.6	1
Mardin	9146	62.4	104.2	1.1
Gaziantep	9603	65.3	109.1	1.1
Elazig	11286	74.8	125	1.1
Sivas	12778	85	142	1.1
Malatya	11286	80.7	134.7	1.2
Bingol	11286	81.8	136.5	1.2
Adiyaman	9603	75.6	126.2	1.3
Siirt	9146	89.1	148.7	1.6
Diyarbakir	8327	85.8	143.2	1.7
Sanliurfa	8327	93.8	156.7	1.9
Agri	7748	93.4	156	2
Bitlis	6776	96.7	161.5	2.4
Turkey	17836	78.8	131.6	0.7



Water use and pricing

In the domestic sector, the average water tariff is quite high at USD 1.28/m³. The waste water tariff is 0.77/m³. The combined tariff is subsidized at USD 1.67/m³. Overall, the poorer populations have lower GDP per capita, lower purchasing power, smaller water consumption figures and/or larger proportions of income spent on water as compared to the actual average income spent on water consumed.

The domestic and industrial sectors use volumetric pricing, whereas in agriculture, the tariff is simply the expected operation and maintenance costs divided by the total area irrigated. Depending on the nature of the crop, a flat fee per hectare is levied; however, it covers only the operation and maintenance costs.

While attempts are made to cover operation and maintenance costs in all three sectors, the domestic sector ends up paying higher tariffs compared to industry and agriculture. It is understandable that irrigation tariffs are low in the drought-prone region. However, it is necessary to revise the tariff structure and adjust the levels of tariffs in all three sectors such that each sector bears the costs in similar proportions to their income strengths.

Conclusion

The water pricing policy has worsened the vulnerability of the hydro-insecure populations. The tariffs are not an accurate indicator of the water stress and scarcity faced by the region. They provide no incentive to the general population to minimise water wastage and reduce consumption. While tariffs are subsidized, the poor are forced to buy water from private contractors. This results in a very heavy burden on their financial resources.

Domestic water tariffs are higher than irrigation or industrial water tariffs. In many places, irrigation tariff is based on size of the land

irrigated, not on water use. This encourages the cultivation of water-intensive crops.

Overall, there is a need to revise the water tariff structure.



CHAPTER III

The Rural Challenge

Introduction

About 13 million people in the hydro-insecure regions of Iraq, Jordan, Lebanon, Syria and Turkey live in rural areas, and approx. 3.8 million are directly employed in agriculture. In Iraq, Syria and Turkey roughly more than a third of the population of the hydro-insecure regions is rural. It is directly and indirectly dependent on agriculture and allied occupations for sustenance.

The rural and agricultural populations are characterized by chronic poverty. They face challenges of low agricultural productivity and lack of access to irrigation infrastructure.

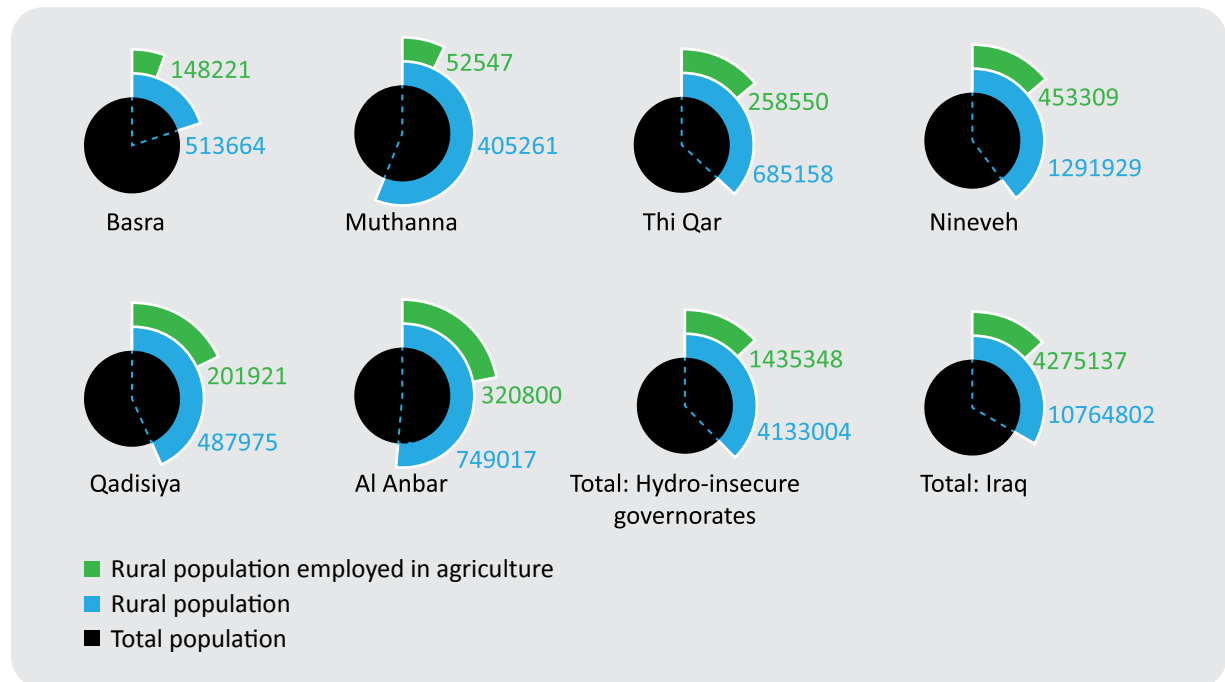
Agricultural Populations

IRAQ

Almost 40% of the hydro-insecure population reside in rural areas, and a third of it is employed in agriculture. While Muthanna, Al Anbar and Qadisiya are among the top six (out of eighteen) governorates regarding concentration of rural population, only Al Anbar and Qadisiya appear among the top six regarding agricultural employment. Within the hydro-insecure governorates too, agricultural employment has highest concentration in the rural populations of Al Anbar and Qadisiya.



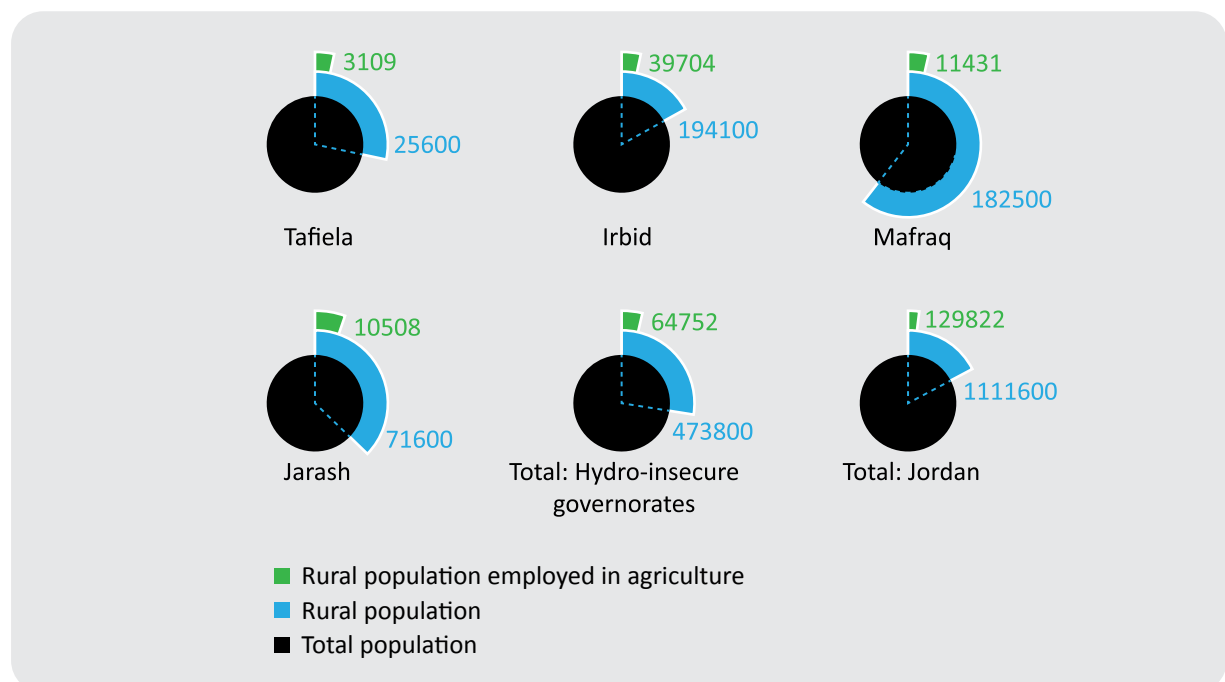
Rural population and population employed in agriculture in the hydro-insecure governorates of Iraq



The proportion of population employed in agriculture in the hydro-insecure governorates is less than national average and has decreased due to migration of youth to urban areas: in the early 1990s, the proportion of active agricultural workers was 16% which decreased to 10% in the 2000s. Among the main reasons for migration were land degradation, successive droughts and extreme poverty. In Basra and Muthanna where agricultural employment is the lowest, the oil sector is the major employer.

JORDAN

Rural population and population employed in agriculture in the hydro-insecure governorates of Jordan



The agricultural sector is limited in terms of production (about 28% of the GDP) and employment, due to limited resources and less than 5% of arable land. Mafraq and Jarash are among the top one third of governorates with regards to the proportion of rural population, but in case of agricultural employment, only Jarash appears in the top one third of the list. In absolute numbers, Irbid has the largest size of rural population as well as of population directly employed in agriculture.

The overall rural population is indirectly dependent on agriculture for livelihood as less than 20% of its income comes from non-farming sources. About a fifth of this population is very poor and consists of small farmers, landless labourers, large households and households headed by women.

LEBANON

Rural population and population employed in agriculture in Bekaa

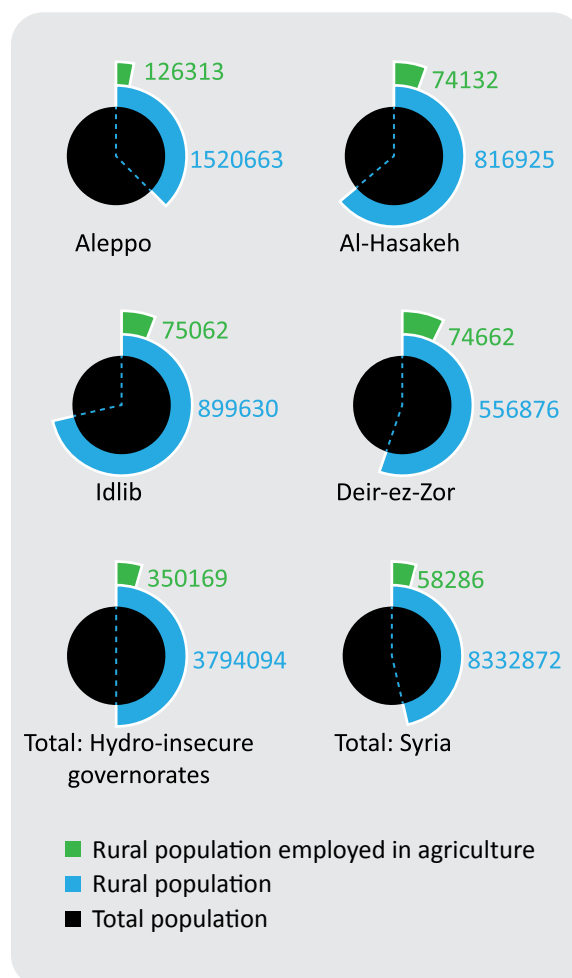
Governorate	Bekaa	Lebanon
Rural population	-	488688
Rural population % of total population	-	13
Population employed in agriculture	15436	80789
% of rural population employed in agriculture	-	16.5
% of total population employed in agriculture	3.2	2.1

Bekaa hosts a significant proportion of the rural population. 11.1% (almost double of the national average of 6.3%) of the labour force of Bekaa is employed in agriculture. 43% of the total farms of the country are located in Bekaa, while the area of Baalbek-Hermel accounts for a quarter of the farms of the country. In this region about 80% of the regional GDP consists of agriculture and allied activities.

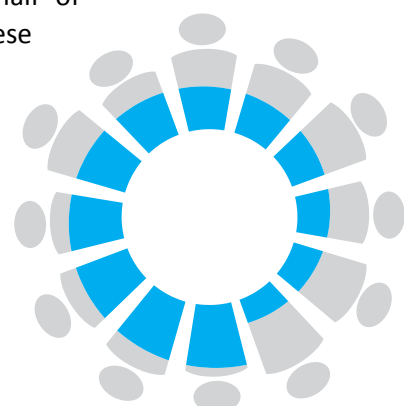
29% of the agricultural population of Bekaa is poor. Agricultural activities are frequently affected by conditions such as aridity and frost, limited water resources, continual conflict and poor water management.

SYRIA

Rural population and population employed in agriculture in the hydro-insecure governorates of Syria



Half of the total agricultural workforce of Syria is concentrated in the four hydro-insecure governorates. Also, half of the rural population in these regions is directly or indirectly dependent on agriculture and allied activities for sustenance. Idlib and Al-Hasakeh feature in the top one third governorates in

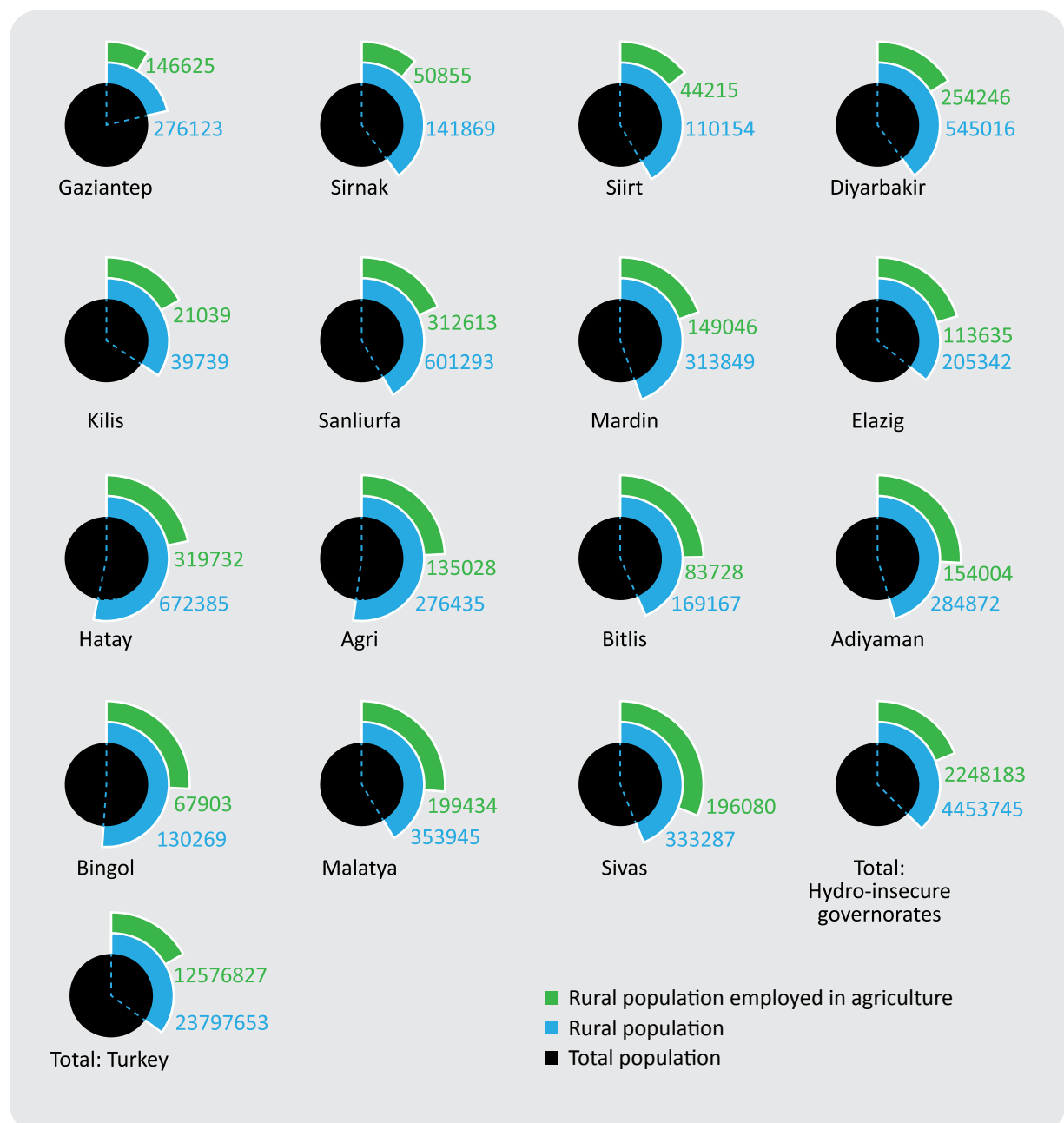


terms of proportion of rural population. In the case of proportion of agricultural workforce, Idlib and Deir ez Zor appear in the top one third.

These populations are an extremely vulnerable group facing multiple challenges of climate change, water stress, soil and water pollution, lack of agricultural infrastructure and conflict. More than a fifth of the population face severe poverty. Unemployment is high due to low productivity of the sector and irregular demand for labour.

TURKEY

Rural population and population in rural areas directly employed in agriculture in vulnerable regions of Turkey



The two main occupations of the rural populations in the hydro-insecure provinces are agriculture and animal husbandry. None of the hydro-insecure provinces are in the top one third of all Turkish provinces regarding agricultural employment, and only Hatay, Agri and Bingol are in the top one third in case of concentration of rural population. Yet, the agricultural workforce and the rural populations in these provinces are especially vulnerable due to high incidence of poverty, low levels of literacy and women's development, prolonged conflict, and poor management of water resources.

However, the region, especially the nine South Eastern Anatolian provinces, is going through an economic transition due to the investments in water and other developmental sectors under the South-eastern Anatolia Project (GAP). GAP is impacting irrigation and farming technology in agriculture. Through its infrastructural, power generation and educational projects, it is also causing a transition from agriculture to industry and services in the region.

Half of the rural population is still directly employed in agriculture, while a larger proportion is indirectly dependent on agriculture for sustenance. Low level of education and low rate of labour participation (especially female) are hindering the rural population from taking up new opportunities in industries and services and keeping pace with the transition.

Agricultural Productivity and Irrigation

IRAQ

The major crops grown in the hydro-insecure governorates are wheat, barley, rice and dates. Iraq is heavily dependent on food imports and its agricultural production, especially cereals, is significantly sensitive to drought: the drought of 2008 affected the production of wheat, causing a 55% reduction in its production. Consequently, 74% of wheat requirements and 69% of cereal requirements in the country had to be met with imports.

Nineveh is the largest producer of wheat and barley, Qadisiya is the largest producer of rice, and Basra is the largest producer of dates in the country. Nineveh and Basra, despite being largest producers of three out of four principal crops, have very low productivity levels. These can be attributed to continual droughts, wars, and in case of Nineveh, large dependence on agriculture for rains. Basra is still recuperating from the effects of prolonged conflict and faces droughts, high salinity and crop disease risks at the same time. Of the major crops, wheat and rice are water-intensive while barley and dates are water-conserving and drought-tolerant.

Salinity affects 40% of agricultural land, mainly in central and southern Iraq, while 40-50% of productive land since the 1970s has been

Productivity of major crops in the hydro-insecure governorates of Iraq

Governorates	WHEAT KG/donum	BARLEY KG/donum	RICE KG/donum	DATES KG/palm
Nineveh	101.5	181.0	-	-
Al Anbar	591.4	388.2	-	82.1
Muthanna	357.6	455.6	488.4	57.9
Qadisiya	505.1	293.4	1196.8	75.1
Thi Qar	490.5	443.2	446.5	60.8
Basra	400.0	350.5	-	60.4

affected by land degradation. A large part of the area equipped for irrigation is not irrigated in practice because of malfunctioning systems and droughts. Water logging and increase in salinity levels, especially in Qadisiya and Thi Qar, have also rendered large tracts of cultivable land useless and unfit for farming even with irrigation.

JORDAN

The major crops grown in the hydro-insecure governorates are wheat, barley, lentils, vegetables, bananas and olives.

Irbid is the largest producer of wheat, and barley among the hydro-insecure governorates. It is also the largest wheat producer in the country. Mafraq is the largest producer of vegetables in the country. Fruits, especially water-intensive ones like bananas, and vegetables are grown in Jarash, Tafiela and western Mafraq.

Most production in these governorates is rainfed; only some fruit and vegetable plantations are irrigated. Most of these crops, except barley and olives, are water-intensive.

Due to high pumping and transport costs, a lot of fresh surface and groundwater which is not in proximity to urban areas is excluded from drinking water supply. The water is then left to be used for irrigation at source. The lack of sufficient water-saving techniques and the relative easy availability of water leads to excessive irrigation, causing water logging, land

salinity and wastage of water.

At the same time, there is a growing tendency of transferring water from agricultural use to municipal and sometimes, industrial use. This is because irrigation is considered to be of 'low value' while municipal and industrial uses are considered to be of 'high value' i.e. giving higher economic returns. In reality, the economic returns are not significant and do not cover even operation and maintenance costs, and the deprived agricultural sector suffers.

Climate change, water scarcity, and inefficient irrigation practices pose a threat to the agriculture in these regions. This threat ultimately extends to food security and survival of these populations.

LEBANON

Bekaa is the largest producer of wheat with an average productivity of 2.9 tonnes/ha. It also accounts for the bulk of the cereal production of the country: more than 70%, or roughly 400,000 tonnes, two-thirds of the national production of potatoes, and a third of fruits. The northern part of Bekaa receives low rainfall but practices rainfed agriculture. The cultivation of barley, a drought-tolerant crop takes place in this region. Southern Bekaa has irrigation facilities where most of the other crops are grown.

Snow and rainfall are the chief renewable sources of water but only one-third of this water is available for irrigation. Two thirds

Productivity of principal crops in hydro-insecure governorates of Jordan

Governorates	WHEAT (ton/ha)	BARLEY (ton/ha)	Olives (ton/ha)	Vegetables (ton/ha)	Fruit Trees (ton/ha)
Irbid	1.6	1.6	1.8	10.5	4.8
Tafiela	0.6	0.6	2	17.7	4.1
Jarash	0.8	1	2.7	14.5	4.7
Mafraq	0.8	0.9	1.5	28.8	9.7

of the agricultural land in Bekaa (approx. 50,000 ha) is irrigated, but almost 50% of the irrigation system needs rehabilitation. Agriculture consumes more than 80% of the water abstracted, which can be attributed to using gravity irrigation techniques and other older methods of irrigation, instead of drip and sprinkler methods which are used by less than 10% of the total cultivated land. According to estimates, the amount of water Bekaa consumes every year is 1.5 times the amount of surface and ground water replenished annually. Due to this rate of usage, groundwater tables have declined and water scarcity has increased.

While the agricultural labour force in Bekaa is decreasing, the overall population dependent on agriculture for survival is increasing. By 2030, the population of Bekaa will have grown by more than a third of its original population in 1997. Accommodating this growth can reduce the land under agriculture. At the same time, the overall demand for food will have risen. Consequently, the decreased area under agriculture might face increased pressure of intensive agriculture. Meeting the growing food demand can cause excessive use of fertilizers and water, leading to land degradation, salinity and increased water stress in the process.

SYRIA

In the hydro-insecure governorates, wheat, barley, cotton, lentils, fruits and vegetables are the principle crops.

Cotton is grown in Al Hasakeh and Deir ez Zor as an irrigated crop. Production of fruits and tree

crops have seen the largest growth, especially in Idlib and Aleppo which also account for 60% of the total olive production in the country. Wheat and barley are grown across all governorates.

Most of the production is rainfed and there is significant pressure on the poor, less fertile and highly saline farmlands. Successive droughts are common. All these factors together heighten the vulnerability of cereal farming. Together, they have caused Syria to go from being a cereal-exporter to being a cereal-importer.

The overall agricultural production has halved since the civil war started in 2011, especially for wheat and barley. Only 45% of the farmers have been able to fully harvest their cereal crops, while 14% have been unable to harvest at all “due to insecurity and lack of fuel”.

Reduction in crop production, particularly in the case of wheat, is in a crisis situation because a) yields of irrigated wheat are usually twice or thrice of those of rainfed wheat and b) wheat is a staple food for the region and essential for food security.

In reality, the arable land in these governorates has now reduced. During agricultural development in the 1960s and the 1980s, 70% of the annual agricultural budget was allotted to irrigational projects, most of them in the Euphrates basin which met with limited success due to geographical reasons, water logging, increasing land salinity and poor drainage systems.

Productivity of major crops in hydro-insecure governorates of Syria

	WHEAT Tons/ha	BARLEY Tons/ha	COTTON Tons/ha	LENTILS Tons/ha
Aleppo	2.28	0.88	2.06	1.43
Al-Hasakeh	1.53	0.28	4.65	0.46
Deir ez Zor	3.03	0.15	3.06	-
Idlib	2.78	1.33	2.96	0.77

In the present situation, pumping stations, pumps and irrigation canals have been damaged or destroyed; in Deir ez Zor the damage to canals is as much as 30%. High costs of diesel have forced many farmers, especially those cultivating cereals, to either cut back on their irrigation schemes or resort to rainfed agriculture.

TURKEY

The major crops of the hydro-insecure regions are cereals, lentils and potatoes. Rice is cultivated in irrigated patches across the region, and is mostly concentrated in Diyarbakir. Hatay and Gaziantep primarily produce vegetables and fruits. Due to the irrigation facilities of GAP, the region is experiencing a boom in cotton production as well. Sanliurfa is the largest producer of cereals, potatoes, roots and leguminous products.

Productivity of cereals and potatoes, roots and leguminous products in the hydro-insecure provinces of Turkey

PROVINCES	CEREALS	POTATOES, ROOTS, LEGUMINOUS PRODUCTS
	Tons/ha	Tons/ha
Adiyaman	3.3	1.8
Agri	2	2.3
Bingol	3.2	3.8
Bitlis	1.5	37
Diyarbakir	3.7	1.8
Elazig	2.4	1.5
Gaziantep	3.7	1.7
Hatay	5.4	20.3
Kilis	2.8	1.5
Malatya	1.8	1.4
Mardin	5.1	1.6
Sanliurfa	3.8	1.4
Siirt	3	1.4
Sirnak	3.2	1.9
Sivas	2.5	8

The provinces in the north are high in altitude and mountainous and face natural obstacles to creating an extensive irrigation infrastructure network. Eastern Anatolia is mountainous as well as pastoral which has resulted in livestock dominating the agricultural sector with secondary importance given to extensive irrigation. The GAP and its dams play a pivotal role in irrigating the crops in the southern provinces.

On one hand, successive droughts and growing infertility of land are causing reduction in the area of land under irrigation. On the other hand, water projects under the GAP are bringing significantly large areas under irrigation. Most of the agricultural production is rainfed but the South Eastern Anatolian region is seeing increasing use of modern irrigation techniques due to GAP. The hydro-insecure provinces of South Eastern Anatolia, especially certain regions in Diyarbakir, are greatly benefitting from the GAP, which is allowing these regions to cultivate even paddy, a water-intensive and irrigated crop. Without GAP, only about 190,000 ha, or about 8.1% of total arable land in South Eastern Anatolia would be irrigated.

The privatization of irrigation services in South Eastern Anatolia has done little to improve the poor conditions of irrigation in the region. The distribution of water between farmers is very unequal and many farmers do not get any water at all due to distance of fields from the network. Water flow is not measured accurately, causing water wastage and losses. Over irrigation is a grave problem as a third of the total water supplied is surface runoff.

Free Market in Agriculture

Lebanon and Iraq are in the process to enter the WTO. Jordan's partnership with the WTO has produced mixed results regarding reduction of hydro-insecurity. The implications of this move, significantly a free market economy, are considered to be both positive and negative.

The immediate effects can be considerably negative, as due to reduction in subsidies the number of marginalized farmers will grow, leading to an increase in the size of hydro-insecure populations, especially in the hydro-insecure governorates. However, in the long run, a change in cropping patterns, especially from water-intensive crops to water-conserving crops and techniques can be expected. In the long run, more efficient allocation of water resources in these countries can be expected.

Conclusion

Agriculture in the hydro-insecure regions faces problems of land degradation, dependence on rainfall and droughts. Yet, in every region, at least one water-intensive crop (notably, wheat) is produced. Wheat is the most vulnerable crop in all these regions due to water scarcity, dependence on rainfall, successive droughts and lack of extensive irrigation. Wheat is also a staple food item for the population in these regions and hence directly connected to their food security.

Fruits, vegetables, rice and olives are produced with the help of irrigation. However, the distribution of irrigation facilities is uneven; some areas have no access to irrigation and completely depend on rainfall, while some face over irrigation and consequent water logging and wastage.

Lack of long-term vision in cropping pattern and irrigation increases the predicament of the hydro-insecure. Short term gains are traded off for long term losses. The hydro-insecure feel that they improve their standard of living by cultivating water-intensive crops.

Their short-sighted approach does not take it long to bring them into trouble. When the situation is acute, some of them get displaced. As the numbers of refugees and displaced persons swell, policy makers become alert of the crisis. By then, it is too late.





CHAPTER IV

Swelling Refugees

Introduction

The Syrian civil war has caused a large influx of refugees in Iraq, Jordan, Lebanon and Turkey. In addition, there are Palestinian and Iraqi refugees who are also fleeing the war and have been displaced a second or a third time. The hydro-insecure governorates/provinces have been receiving a considerable proportion of this influx.

Of all the sections of the hydro-insecure population, the refugee/displaced section is the most insecure. Communities that are playing host to these populations are facing increasing water stress as well.

IRAQ

Following the armed conflict in Al Anbar at the end of 2013, almost half a million residents of Al Anbar have been displaced. While about 20% of them have dispersed to other parts of the country, 80% of them continue to stay in the conflict-ridden areas.

Since early 2014, about 12,000 households have been displaced due to the deliberate flooding of Abu Ghraib by insurgents in Al Anbar. The insurgents gained control over the Fallujah Barrage and closed the gates, causing floods. To pressurize the terrorists, the government shut down the Haditha Dam to stop the flow to the Fallujah Barrage in order to reduce water levels of the



latter, affecting more than 60,000 people and destroying up to 80,000 donums (8000 ha) of agricultural land in Al Anbar and Muthanna.

The terrorist group named the Islamic State of Iraq and al-Sham (ISIS) captured Mosul in June 2014, displacing half a million in and around the city.

In 2013, the number of Iraqi returnees from neighbouring countries, notably Syria, was more than the number of internally displaced people returning to their governorates. The only noticeable return of the internally displaced among the hydro-insecure governorates was seen in Al Anbar. Iraqi returnees from other countries, especially Syria, increased in number since 2011 due to relative stability after the sectarian violence in 2006-07. However, their number has decreased in 2014 due to the conflict in Al Anbar. Most of the entrants in the country are now Syrian refugees and Iraqi returnees who earlier sought refuge in Syria and are now fleeing the civil unrest there.

The basic problems of the refugees, returnees and IDPs are broadly the same; high security risk, high unemployment and lack of basic amenities like electricity, water, health care and education.

JORDAN

The influx and movement of refugees in Jordan has put strain on the locals, pushing many into poverty. Conflicts are especially evident in Mafraq which threaten to reach violent levels. Prices of housing, competition for employment, burden of schools and cultural and social differences are causing friction while the pressure on water, electricity and food has increasingly become a bigger threat, exacerbated due to the drought of 2013-14.

Most Syrian refugee settlements are concentrated in the western part of Mafraq, in and around Mafraq city. Most of the settlements either get water less than once

a week or are not connected to the water supply network at all. Very few settlements get water 1-2 times a week (twice a week is the maximum). In 2013, most Syrian refugee settlements in Irbid got water a maximum of twice a week. While only three settlements in Jarash got water twice a week; the rest received water less than once a week.

The worst hit governorate has been Mafraq, particularly in water and sanitation areas. The population of Mafraq has doubled in the last four years due to the inflow of refugees and even in well-known camps like Zaatari, water problems have already started becoming acute. Even the locals who are already connected to piped water have to resort to buying water from tankers.

LEBANON

Since 2011, influx of refugees into Lebanon has been so high that water consumption has increased by 20-25%. The water and sanitation facilities over Bekaa are dispersed unevenly. About 225 localities are vulnerable to water stress. The most vulnerable ones are situated in northern and central parts of Bekaa. The case is similar with hygiene and sanitation facilities. Poor water, sanitation and hygiene facilities have directly impacted the health of the refugees, with the children being the hardest hit. From 2012 to 2013, Severe Acute Malnutrition (SAM) almost doubled in Bekaa and over half of those suffering from SAM in the country live in Bekaa.

The Syrian war is expected to have an adverse effect on the Lebanese economy. 300,000 people are at the risk of unemployment and 170,000 could be pushed below poverty line. Between 2012 and 2014, Lebanon's GDP is said to have dropped by 2.9% and unemployment to have doubled to more than 20%. The magnitude and intensity of these setbacks are being felt most severely in Bekaa which is the poorest and least developed governorate, hosting the largest refugee population,

experiencing continual attacks from across the border, and is chronically short of coping mechanisms.

SYRIA

In May 2014, rebels in Syria cut off water supply to 3 million people, both civilians and rebels, in Aleppo. In the same month, the water level of Lake Assad dropped by 20 feet and 7 million Syrians were put at the risk of going without water in a couple of weeks.

The rural areas of Idlib have no running water, so people have to resort to either drinking bad quality water from wells and rivers or buying it at exorbitant prices. Even regions which receive tap water suffer because water is non-treated, as the production of treatment chemicals has stopped. The water supply in all the hydro-insecure governorates has reduced to a third of the pre-war level. The worst affected governorate is Deir ez Zor where water pumping for household purposes is barely 10% of pre-war levels. The residents face water scarcity and due to untreated sewage mixing with water sources, they also face grave health problems. In 2013, most of the 800 cases of hepatitis and 2500 cases of typhoid in Syria were from Deir ez Zor.

Intense fighting has damaged infrastructure, caused scarcity of fuel and electricity, interrupted maintenance and repairs, and made it difficult for water aid to reach the masses. As a result, children, the disabled, the ill and the injured (all with heightened insecurity within the already hydro-insecure populations) now face a dearth of effective aid. Displacement has forced people from totally diverse backgrounds, financial classes, ethnicities and religions to stay together, causing social tensions and frictions.

TURKEY

The number of refugees outside camps in Turkey exceeds the number of refugees housed

in camps. As of May 2014, there are 220,000 (or slightly more than a fifth) Syrian refugees living in the 22 camps along the border. While water and sanitation facilities provided to refugees have been considered to be satisfactory and well-functioning so far, the recent drought has strained water facilities in the region and is adversely impacting the water supply to refugees.

Water Refugees

Climate change and droughts in the Fertile Crescent are forcing people to abandon their arid lands and migrate to other locations in search of livelihood. These migrants are termed as 'water refugees'. Apart from climate change and droughts, poor water management and imbalance in the population/resource ratio due to population explosion are also instrumental in creating water refugees. Water refugees are mostly found in Syria and Iraq, especially in the ET Basin, which includes the hydro-insecure governorates of Aleppo, Al Hasakeh and Deir ez Zor of Syria, and all of the hydro-insecure governorates of Iraq.

Internal displacement of populations due to droughts constitutes as the reason of 12% of all the IDPs in Iraq.

Between December 2007 and June 2009, 4,263 families (25,578 individuals) were displaced due to drought, with more than 80% from Nineveh governorate. The trend was highest in Muthanna (92%) followed by Thi Qar, though the largest numbers of IDPs have been in Nineveh. About 300,000 people got displaced due to the damage to the marshes in the south. Many could not return due to the drought which struck in 2012. Also, while the marshes can survive and adapt to the environmental change, the Marsh Arabs will lose their traditional livelihoods of fishing and agriculture. About 10 million people, mostly farmers, are at direct risk in the Shatt al-Arab region.

Droughts have led to drying up of about 70% of

the 'Qanats' in Iraq – the ancient water canals, predominantly in Kurdish governorates. One of the most affected has been Nineveh. The result has been forced migration of residents of these governorates. In addition to the local hydro-insecure populations are the 200,000+ Syrian refugees located in the same region (and parts of Al Anbar). Droughts are leading to desertification of hydro-insecure governorates, with the largest impact on agricultural populations concentrated in the region.

In Syria the effects of drought on the hydro-insecure populations have been serious: of all the victims natural hazards, 57% of the affected people were accounted for by droughts alone.

In 2007-2008, herders and farmers in the eastern and northern governorates of Syria were the worst hit, with herders selling their livestock for 60 to 70% below their normal prices, 59,000 small herders losing all of their livestock and 47,000 more losing more than half of it. Moreover, they had to sell off other assets as well for sustenance.

Overall, 1.3 million people have been directly impacted. More than 160 villages have been abandoned, 800,000 Syrians have lost their sources of livelihood, and 65,000 rural families have had to migrate to urban slums.

In Jordan, Lebanon and Turkey the phenomenon of water refugees is not very prominent, but significant portions of population have been affected. For instance, in Jordan during the drought of 1999-2000, the most affected people were the rural populations and small farmers, numbering 180,000, while 4.75 million people faced food insecurity. In the Bekaa valley, the drought directly affected 11,000 people in 2007-2008. In 2007, the agricultural losses in the hydro-insecure provinces of Turkey forced about a 100,000 tradesmen, herders and owners of at least 4000 sheep, and thousands of farmers, farm labourers and small artisans to migrate to other regions of within the country.

Conclusions

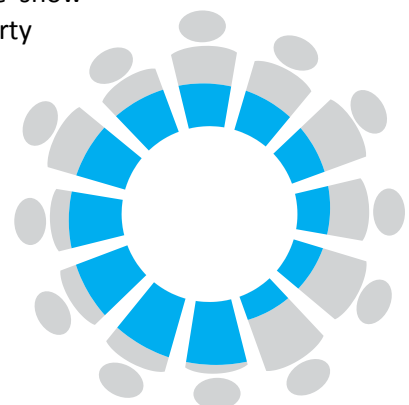
The conditions of the displaced people and refugees in all the countries are more or less the same, with Turkey performing comparatively better.

In every country, a large number of refugees and IDPs are found in the hydro-insecure regions. Water has been a key factor, not only for their survival, but as seen in parts of Al Anbar and Al Hasakeh, also for their displacement. The flooding of key areas as a war tactic is being used by terrorists as a weapon to cripple the administration, terrorize the civilians, harm agriculture (and consequently, food security) and cause economic losses.

Furthermore, water, or the lack thereof, has emerged as an important factor of displacement. Drought and climate change have created water refugees in the region. Along with the rest of the refugee/displaced population, they too deal with multiple difficulties of security and survival.

International aid and asylum offers for refugees have been forthcoming but insufficient to help the hosting countries who have been overburdened with a minimum of 3 million Syrian refugees (registered). The aid, in both cash and kind, is needed the most for shelter and food, followed by water and sanitation, health and education. Also, aid goes to registered refugees and refugee camps. A large number of returnees, refugees and IDPs, especially in the hydro-insecure governorates, have little to no access to these funds and water facilities.

The facts and figures available show the alarming levels of poverty and insecurity faced by the refugees in all the five countries. However, they do not show the whole picture which is worse on two counts-



- ◇ The conditions of off-camp refugees and most importantly, unregistered refugees are under-documented: They are the most hydro-insecure groups not just within refugees but within the whole population of the region. The size of their population, exact locations, living conditions and access to aid are not documented. Specifically in case of water, their access to safe and consistent water supply is not controlled by aid agencies. They make use of the local supply network. That makes them most vulnerable to any adverse effects on the water resources in the region, and causes water stress to the local population as well.
- ◇ Hurdles faced by second/third-time refugees: The region is home to many refugees who have already been displaced twice or thrice and have to relocate all over again. The aid distributed during the conflicts in Iraq and Syria focuses on local Syrians and Iraqis, while Palestinian refugees and second-time Iraqi refugees, along with the Afghans, Somalis, Yemenis, Iranians, Sudanese and other refugee groups have been shifted to the background.

Both of these groups face insecurity like the rest of the population and additional obstacles of discrimination, forced deportation to their country of origin, failure to integrate and adapt due to repeated displacement, and threats like human trafficking.

The direct impact of these hostile conditions is on their access to basic necessities like shelter, food and water. Continual relocation and instability has given rise to uncertainty of access to water resources and drastically reduced their purchasing and controlling power.



CHAPTER V

An Unfair Deal

Introduction

Women in the hydro-insecure communities in particular receive an unfair deal. Some factors are common across the region.

1. The proportion of men and women in the population is almost equal. Men have higher literacy rates and labour force participation rates than women. Female unemployment rate is higher than male unemployment rate, the only exceptions being national unemployment rates of Lebanon and overall unemployment rates of hydro-insecure provinces of Turkey.
2. Water is considered an economic good.
 - ◇ Women have a strong presence and interests in health and daily sustenance.
 - ◇ Men have a strong presence and interests in the economy.
 - ◇ Water is primarily considered to be an economic resource which has shifted focus from survival and health to economy; it thus reduces the role and control of women over water resources.
 - ◇ The results of treating water as an economic resource are negative and span into the areas of education, health, food security and employment, affecting women and children the most.
 - ◇ The water sharing, management and ownership systems established at a local/community level are also adversely affected by turning water into an economic good.



3. Women are largely invisible in agriculture and irrigation sectors.

◇ Examples of hydro-insecure governorates in Syria and Turkey show that female participation/contribution to agricultural and irrigation activities and household income-generating activities is neither paid nor documented in national accounting.

4. The power and positions of men and women in the water sector are imbalanced. Women are users and procurers for the family whereas men are funders and decision makers.

◇ In all hydro-insecure governorates, women lack the ability to pay for water resources due to low level of education, economic inactivity, and low or no wages (due to unskilled jobs) or unemployment.

◇ Men hold the power to pay but making water available to the household is considered to be “the woman’s task”, and the time spent by a woman in fetching water is not considered to be valuable.

◇ In economic terms: Cost (women’s time) < Cost (fetching water)

◇ Socio-cultural restraints result in women not having ownership rights on resources like land and water; they are often controlled by male members of the family.

Gender vulnerability can be explained as the overall degree of weakness or inability of a specific gender to cope with external, adverse events. In this study, the main factors considered are literacy rate, labour force participation rate, and unemployment rate while others such as health indicators and ownership of property have been excluded due to lack of adequate data.

IRAQ

Women’s decision making capacity with regards to water management (domestic as well as in the agricultural sector) is severely distorted. On one hand, there is a healthy female presence

in higher controlling positions: Nesreen Mustafa Siddeek Barwari is the Minister of Municipalities and Public Works in charge of water treatment, waste management, environmental sanitation and municipal facilities and 40% of the PWD staff is female. On the other hand, the number of women suffering from water scarcity problems has increased since 2003.

Manmade disasters such as war, draining of marshes and sectarian violence have displaced many families in the hydro-insecure governorates and caused loss of male members – often the heads – of the family, which have resulted in women heading these displaced, poor and often, large households. Large internal displacements have taken place due to droughts in Muthanna and Nineveh, armed conflict in Al Anbar, and the draining of marshlands in Basra and Thi Qar.

The gravest problem regarding water access faced by women in these governorates is insecurity due to persistent conflict. The hostile conditions and disruption of water infrastructure neither allow water to reach women nor allow women to physically fetch it from a distance.

JORDAN

The most vulnerable section of women in the hydro-insecure governorates is the female refugees and refugee households headed by women. They face cultural difficulties in negotiating for basic amenities; have limited income sources (only 4% of those in camps report having work), and deal with insecurity and fear in using the water and sanitation facilities in camps. The off-camp refugee population is three times the number in camps. The public system is under severe stress as it is serving up to 50% more people in areas that have a large refugee population. The number of refugees living beyond the public system is increasing with households creating their own sanitation facilities and buying water from the markets.

Another vulnerable female group is that of women in agricultural populations located in the hydro-insecure governorates. Female farmers make up about 10% of the total number of farmers, but they are responsible for 60% of the agricultural work. The proportion of women is high among landless labourers, who do not have control on water resources or purchasing power.

LEBANON

Women in Bekaa are important contributors to agriculture due to male migration to urban areas and increased widowhood after the civil war. However, the decision making capacity regarding irrigation and other water-related activities still lies with men. At the household level, women are responsible for providing water to the household, but they do not have the purchasing power. More than 10% of the rural households are headed by women. In these households too, decisions are made by other males in the family.

Refugee women constitute the most vulnerable sections within the female population in Bekaa. Of the total Syrian refugee population in Bekaa, more than three quarters are women and children, as many men/heads of households have stayed behind in Syria. About 25% of the refugee households are headed by women. The Lebanese government has prohibited camps with the intention of integrating the refugees directly into local communities, but the result has been growth and proliferation of illicit camps and a rise in prices of all essential services, including water and sanitation. Often, women refugees have to resort to survival/transactional sex, forced marriage, or in case of minors, child labour to get access to basic necessities such as food and water.

The Palestinian women in Bekaa also face increased problems of water scarcity. Their houses are not properly connected to sewage systems and since the Syrian civil war began, vouchers from aid agencies to purchase

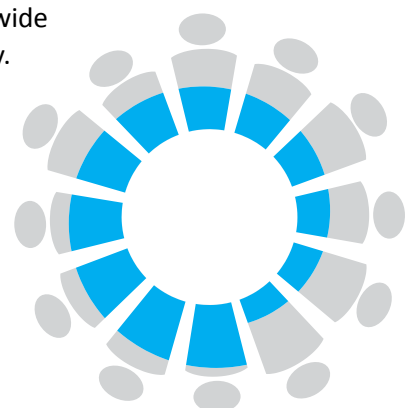
drinking water have stopped. Scarce and polluted water, lack of infrastructure and poor hygiene practices have been causing diarrhoea, lice and scabies for which they have limited access to medical help.

SYRIA

Women in pre-war Syria played an important role in water management at both agricultural and household levels. They contributed to 70% of agricultural activities; about a third of the total agricultural labour was female. This proportion had been increasing, especially in the hydro-insecure governorates, due to male migration and fewer opportunities. In the Ministries of Agriculture and Irrigation, a fifth of the workforce was female.

The government ratified the Convention of Eliminating all types of Discrimination against Women (CEDAW) and amended certain agricultural laws to give more security to women in the agricultural sector, but the male members still retained the decision-making power in allocation and usage of water. No female participation/contribution was statistically documented because female activities regarding water in the house or on the field were viewed as complementary to household and family tasks.

Since the conflict, women in the hydro-insecure governorates are facing intense water and sanitation shortages, high security risks in procuring water, heightened vulnerability due to growing water prices, and consequent health disorders. The regions of heavy fighting are in and around these governorates. The water network in Syria extensively interconnected, and any destruction of water infrastructure can affect a wide geographic area quite easily. For example, the control of dams by rebels in Al-Rakka, situated about 140 kms to the north-west of Deir ez Zor, is affecting water



supply in Deir ez Zor. Due to such a situation, women are finding it more and more difficult to procure water for their families and farms.

Rebels shut down Aleppo city's potable water supply in May 2014, forcing women to line up "in front of mosque fountains and government wells in order to fill small containers such as cooking pots, teapots and plastic bottles as well as small barrels". Toilets and toiletry are scarce, women and children have to incur additional risk due to lack of doors, locks and windows in toilets and bathrooms. Diarrhoea, hepatitis A (especially in Aleppo and Idlib), scabies and other health related problems are spreading.

TURKEY

Surveys in to-be irrigated areas of GAP show that 84% of male households feel that women's irrigation training is unnecessary despite the fact that most of the agricultural labour force is female. Crop production and money management are male responsibilities; hence changes in either of them result into changes in water management, from which women are increasingly marginalized.

As a result, women are finding it more difficult to access funds and control over water allocation in their homes and farms. Due to low level of labour force participation, many of them do not earn money. Many serve as unpaid labour on family farms. Those who do earn wages do not have complete control on their expenditure. Overall, rural, inactive and/or unpaid women are specifically more vulnerable within the total female population of the region.

Refugee women and children in the refugee camps and more importantly, off camps, are the most vulnerable of all. The UNHCR estimates that 75% of the Syrian refugees in Turkey are women and children. Most camps have been filled to their capacity for at least two years, hence water and sanitation facilities are falling below standard and need repairs

and upgrading. Female refugees in particular have complained about lack of warm water for showers and consequent poor hygiene conditions. Both the government and the locals from the hydro-insecure regions have noted the pressure of refugees especially on the local water services as 80% or about 800,000 of the refugees stay off-camp and derive their water from the local municipal system.

The prolonged civil war is affecting water supply to refugees as well as local populations. The increased pressure of population on the public water supply system is inevitable as the off camp refugees cannot be shifted to camps. The camps are already filled to their capacity and face water infrastructural problems. Also, there is additional strain on the water availability due to the drought of 2013-14.

Constructive Initiatives

IRAQ

The University of Basra, UNEP and the Women and the Environment Organization (WATEO) have started local initiatives in Basra and Thi Qar for rural women, educating them about water, environment and health. Through workshops and training, they educate the local rural women about the importance of the marshlands and the impact of human actions on them.

JORDAN

The Jordanian Hashemite Fund for Human Development (JOHUD) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) under the German government jointly set up the Water Wise Women's Initiative (WWWI) at the micro level, one of the focus areas being villages in northwest Irbid. It trains women in household health and hygiene, water saving and efficient use, grey-water reuse and rainwater harvesting, plumbing, marketing and communication. Starting with five JOHUD staff

members, the organization has multiplied into 100 volunteers, with training and instruction to 2000 housewives and an estimated outreach into 10,000 people in the community.

The International Union for Conservation of Nature (IUCN) along with the Arab Women Organization (AWO) is pressing for Jordanian women to be able to actively participate in decision-making in the water sector and press for their rights regarding water use and management.

LEBANON

The Water and Livelihoods Initiative (WLI) is working with the Lebanese Agricultural Research Institute (LARI) to achieve women empowerment and improved water management in El Qaa, Bekaa. The projects include field experiments and demonstrations for the locals on increasing water productivity, promoting use of water-conserving irrigation technologies, developing livelihood strategies for women, and promoting water-efficient cultivating, processing and marketing techniques among female farmers and female-headed businesses.

TURKEY

The Greenhouse Project sponsored by an NGO named HasNa is a local project which originally started with HasNa sponsoring construction of a greenhouse for a widow in Diyarbakir and the local government offering land, seeds and technical expertise. The project was an effective public-private partnership and promoted a good model of sustainable and effective year round production and consequent financial security. Rural women, especially those heading households are direct potential benefits from such projects.

Some salient features of these initiatives are as follows-

- ◇ Most have incorporated training and education regarding water management and conservation in agriculture in their programs. This is especially beneficial because in the regions of focus, women are important contributors to the local agriculture.
- ◇ The programs also focus on providing livelihood to women. The female labour participation rate in the hydro-insecure governorates is very low. Most women stay out of the economy due to socio-cultural reasons. These initiatives provide them with socially acceptable and water-management-related opportunities and training to enter the economy.
- ◇ The initiative of IUCN and AWO in gaining decision making power for women in the water sector can deliver important results in women empowerment, improvement in public health and hygiene, and water conservation.

Conclusion

Refugee women and women heading refugee households are the most vulnerable as well as affected. They face social constraints in negotiating for their water and sanitation needs. In the process of gaining access to adequate water and sanitation facilities, they are vulnerable to sexual harassment.

Due to droughts, conflict, and influx of refugees, local women too find it increasingly difficult to provide water to their households. Overall, women are in charge of providing water to the household but lack control and purchasing power which lie with men. Insecurity due to conflict and the consequent flow of refugees adversely affect the public water supply system, and make it difficult for women to provide adequate water to their household.





CHAPTER VI

Water and Violence

Introduction

The conflicts in Iraq, Lebanon and Syria are largely based on religion, sect and ethnicity while those in Jordan and Turkey are based on political and economic factors. The nature of the conflict ranges from non-violent rallies of civilians protesting against the government (for example, in Jordan), to violent clashes between different communities (as in Iraq and Lebanon) to the full scale Syrian civil war involving the government, rebels and militant groups.

Inclusive development plays a vital role in reducing conflicts and establishing peace. Access to and control of resources is a precursor to development. Water being a vital resource for human survival can serve as both, the fundamental factor leading to development, and the trigger for conflicts in the region.

IRAQ

The conflicts in Iraq have largely been sectarian in nature, but have their base in low development. Friction has existed between sects and between sects and government. In the past five years, Baghdad, Kirkuk, Al Anbar and Nineveh have experienced the majority of the conflicts in Iraq. There have been some incidents in Basra as well.

The combination of drought risks, climate change, poor resource management



and social friction has led to high levels of poverty and unemployment in the region. Droughts and climate change, and the consequent water shortage have also played a significant role in internally displacing communities across the country. Displacement and forced relocation have increased the risk of social and economic discrimination, particularly against the displaced. For the local population, it has caused an increase in pressure on limited local resources, insecurity, and inflation. As a result, social and economic stability, food security, and quality and quantity of local resources have been severely impacted. There has been a rise of a sense of insecurity and dissent towards the government for limited implementation and success of policies among the local population.

The attack of IS on parts of western and northern Iraq and their seizure of important water and oil infrastructures has underlined the importance and the role played by natural resources in the region. In the first half of 2014, the IS captured the Fallujah Dam and then proceeded to capture the Haditha Dam and the Mosul Dam, acquiring the latter by mid-2014. Both IS and the Iraqi military forces have made use of water as a weapon to disrupt the settlements of their opponent, causing economic and agricultural losses, and terrorizing civilians in the process. By capturing dams, the IS has gained control not only over water supply to civilians, but also on downstream agriculture and electricity supply (more than a third of the country).

The arrival of IS coincides with one of the most severe and long term droughts faced by Iraq and the violent unrest in Al Anbar in December 2013. Local support to IS could have been possible because of shared sect, but their control on a vital resource such as water serves as a decisive factor as well.

The civilians have already faced displacement and destruction of agricultural land due to deliberate flooding and downstream drying in early 2014. To prevent further losses, they have

few options but to cooperate with the IS. By capturing the strategic dams, the IS holds a vital card to pressure civilians and the government. It holds the key to economic gains (agriculture and electricity supply), their own food and energy supplies, and the survival of local populations.

LEBANON

The recent conflicts in Lebanon are a mixture of sectarian friction and direct impact of the Syrian civil war. The diverse population of Lebanon, especially Bekaa, is almost clearly divided over the Syrian conflict, with the Sunnis (especially in northern Bekaa) supporting the rebels, and the Hezbollah and Shias supporting the Syrian government. Apart from missiles coming over from across the border, certain parts of Bekaa experience violent clashes among the locals, incoming rebels, and Syrian government supporters. Particularly, Arsal in northern Bekaa has become a sensitive point in terms of security due to these clashes.

Water has been identified as a source of conflict in Lebanon, especially in Bekaa, due to scarcity and poor management practices. Protests have taken place in Baalbeck demanding equal access to all. There have been tensions among the local clans over water allocation. During the drought in 2007-2008, Shias and Christians clashed over water consumption for irrigation. There have been frequent clashes between farmers and the Lebanese army over illegal production of hashish, a profitable cash crop. Also, food production has dropped as more land has been allocated to hashish. As a result, the food shortage and insecurity in the region have been on a rise.

The large size of refugee population in the local community has led to pressure on essential goods and local resources, and inflation. Moreover, the year of 2013-14 has been a drought year for Lebanon, especially Bekaa. Water supply especially has been adversely impacted. Both locals and refugees have been

facing significant water stress which is causing social tension within the community.

SYRIA

The unrest in Syria in 2011 began as agitation against a food and water crisis which then turned into a political and religious war. The severe droughts between 2006 and 2010 caused significant agricultural losses and resulted into forced migrations to cities. However, migration to cities did not alleviate the food and water issue as cities too faced the same due to drought and improper resource management. Social and economic tensions increased due to competition between locals, migrants and foreign refugees for scarce food, water and jobs. Religious, ethnic and sectarian friction arose in the process of competition for survival. In 2011, the protests in Dar'a against government failure to tackle the food and water crisis were met with tough curbs from the government which sparked off the civil war across the country.

The Syrian war also has an economic dimension. New free market policies have created a dominating class of industrialists and merchants, while economically marginalizing the rural and the poor. At the same time, scarcity of and pressure on agricultural land, high drought risk levels and consequent low crop productivity have led to an increase in poverty and water and food shortage in the rural and agricultural areas. The widening economic gap created imbalance in the allocation of scarce resources within communities, thus sparking off social and economic tensions and leading to violent conflict.

The flashpoints of the war are the poorest regions of the country. Large parts of Al Hasakeh and Deir ez Zor, and rural regions of Aleppo see intense fighting. The IS has captured considerable size of territory in these governorates, especially that which contains oil fields and which is in the Euphrates basin.

As in Iraq, IS is using vital natural resources, especially water, as a strategic card for gaining control on civilians and opponents. It controls a large portion of the ET basin spanning across Syria and Iraq. It holds the key to downstream agriculture, power, sanitation and stability in the Euphrates basin in Syria. The drought of 2013-14 has further increased the stakes of both countries in the scarce water resources in the region, now under IS control.

JORDAN AND TURKEY

The reasons of conflict in Jordan and Turkey have mostly been related to political and economic reforms. They have focused on democracy, curbing corruption and fairer political representation.

The conflicts in Jordan, largely mass agitations and protest rallies, have particularly pertained to poverty, lack of economic opportunities, inflation and democratization. Privatization in the Jordanian economy has not been viewed favourably by locals who hold it responsible for corruption, reduced employment opportunities, and resultant low incomes. Rising food prices and overall inflation also have made a severe impact, causing thousands to protest against the government across seven cities in 2011. The protests turned violent later in the same year when government supporters and opposition clashed violently. The reduction of fuel subsidy in 2012 sparked riots across the country, with considerable intensity in the hydro-insecure governorates.

Conflicts in the hydro-insecure region of Turkey have been of violent nature, particularly due to the activities of the Kurdistan Workers' Party (PKK), and the sensitive nature of the ethnic clashes in the region.

Significant presence of poverty and low social and economic development has created unrest among the Kurds. The high drought risk level faced by the hydro-insecure provinces is an important contributing factor to the

low development and resultant discontent of the locals. Under the PKK till 2013, the unrest took the form of violent attacks in the region. The unrest in the hydro-insecure regions pertains to development and equal rights, and is being reflected in peace talks between the government and the Kurds. The GAP is considered as a tool of development and peace building in the region. Water is a focal point here as the core of GAP focuses on development and efficient use of water resources in the ET basin.

Economic reforms are an inseparable part of development. Equal rights lead to inclusive development and fairer allocation of resources. In both scenarios, water plays a fundamental role as the vital resource for food, power generation and health and sanitation. By addressing water vulnerability of the populations in the hydro-insecure regions, a considerable portion of development can be achieved.

Conclusion

Water is seen to play multiple roles in the conflicts in the region and especially in the Syrian civil war. The shortage and improper management of water is a fundamental cause for the unrest within communities in the country. Along with shortage of food, it has functioned as the trigger to the civil war. Water, as in the case of water cuts in Aleppo, has also been used as a weapon to terrorize civilians and pressurize opponents. The IS is further using it as a strategic tool of controlling populations and local economy in both Syria and Iraq.

Beneath the layers of sectarian friction, political issues and ideological disputes, low and uneven economic development emerges as a fundamental reason for conflict. The population directly participating in as well as affected by unrest and conflict is largely poor, rural and agricultural. This population has faced the direct impact of imbalanced economic policies, marginalization, and consequent poverty,

insecurity and low levels of development, causing them to migrate. This has given rise to conflicts along the lines of rural-urban divide, ethnic/sectarian/religious differences, and economic gap. With inclusive development, the grievances of these populations can be redressed.

For achieving the economic and social development of these populations, water is indispensable. Imbalance in availability, allocation and use of this resource, which is scarce in these regions, is directly connected to survival issues and economic deprivation. Scarcity leads to competition which if mismanaged, can escalate to communal discrimination, discontent against the government, violent clashes and ultimately, war.

While there have been no full scale water wars in any of the five countries, water shortage, allocation and management occurs at the core of the conflicts in each of them. Addressing the issues regarding this vital resource can be instrumental in nipping the conflicts in the bud.





CHAPTER VII

Responding to the Crisis

Introduction

The concept of hydro-insecurity has two salient aspects, a) that it extends to developmental factors beyond water availability and b) that it has an element of future i.e. weakness in coping with future water issues. Hence, the solutions to tackle hydro-insecurity should also be rooted in these aspects. There is a need to reduce water vulnerability and equip the identified water vulnerable populations with mechanisms to cope with issues related to future water scarcity.

1. Involvement of local institutions and populations

Local stakeholders include provincial, district and local government and statistical bodies, local NGOs, and the local population at the governorate level. To tackle hydro-insecurity at a micro level, it is important to consult these local elements in policy formulation.

The primary reason for engaging local government and statistical bodies and local NGOs is their reach. They are in a favourable position to collect and process data in a detailed and regular manner. Local universities and research institutes, women's organizations, and other social groups can also be included in this activity. This kind of research and analysis will further aid efficient and comprehensive policy making. They are also the closest institutions to the hydro-insecure populations. Proximity and connection to targeted population



plays an important role in determining the reach and success of policy execution.

The hydro-insecure population should also be included as a participant, as directly as possible, in data collection, policy making, and policy execution. Their participation will grant policy makers direct exposure to hydro-insecurity and related issues at the grass root level. At the same time, the hydro-insecure populations will gain a voice in the policy process. Involving hydro-insecure populations in collection of data and policy execution can lead to increase in awareness among them regarding water and developmental issues. Also, the hydro-insecure populations face high unemployment rates and low economic activity rates. Diffusion of data collection and policy execution activities can create more income opportunities and increase the labour force within the populations.

2. Cooperation across governorates

Once the local institutions and populations within the governorates have been involved in policy making and execution, there can be an arrangement to cooperate across hydro-insecure governorates.

The hydro-insecure governorates of each country can collaborate over data collection methods, research techniques and policy making. Certain hydro-insecure governorates already have some noteworthy initiatives. By establishing an inter-governorate cooperative mechanism, the know-how and logistics of such initiatives can be exchanged and promoted. They can also carry out joint research and joint implementation of solutions.

In the light of stable conditions and established security, all of the thirty hydro-insecure governorates can come together to cooperate on research and development. Thirteen out of the thirty hydro-insecure governorates share international political borders. In the long run, these governorates can form small cooperation enclaves carrying out similar tasks.

3. Addressing development indicators apart from water management

In each of the thirty hydro-insecure governorates, water risks are accompanied with one or more developmental issues. Their relationship with hydro-insecurity is intricate and non-linear; they are among the causes as well as consequences of hydro-insecurity. Tackling water issues in a vacuum is therefore neither effective nor possible.

It is important to address developmental issues of the hydro-insecure populations along with their water issues. Low level of education can directly impact awareness of water management and water-friendly agricultural practices. Unemployment and poverty significantly affect water pricing policies and limit the supply side from recovering its costs.

Low level of education, employment and economic activity among women can affect their purchasing power and control of water as a resource, which in turn affects their ability to procure water for their families and farms. Socio-cultural constraints are an important factor in determining women's roles and functions in water management.

4. Engagement of women at all levels

Middle Eastern women play an important role in water management which is not balanced with the control they have over the resource.

Involving women right from the grass root level will spread awareness regarding the need and techniques of water conservation among them. They can be trained to implement solutions and promote water-friendly practices in water management, environmental education, technological development and support, and infrastructural services. Certain modifications in work culture, hours and attitudes can be introduced to overcome socio-cultural constraints. E.g. Water Wise Women's Initiative (WWWI) in Jordan trains female plumbers who

can be called for repairs by other women when the men are not at home.

The benefit of involving women is that it can empower women in knowledge and financial resources. The female employment and economic activity rates in the hydro-insecure governorates in particular and Middle East in general are among the lowest in the world. By involving them in the developmental process, they can gain employment, boost their purchasing power, and acquire control over basic resources, among which lies water. Women are closely connected to water procurement and distribution, at both household and farm level, and have a strong presence in health and hygiene, especially at the household level. This proximity can lead to more accurate and detailed research, more fine-tuned policies, and more effective execution of policies.

5. Reforms in agriculture and irrigation

About 75% of the water withdrawn in West Asia is utilized by agriculture alone. Yet, agriculture in the region suffers from low productivity, degraded land, increasing desertification, recurring droughts and high dependence on rainfall. Consequently, the region experiences food insecurity and dependence on food imports. Hence, agriculture and irrigation need to be especially focused upon.

Agricultural policies need to focus on improving agricultural practices in the region in a way that not only benefits the sector's performance, but also gives tangible positive results to the agricultural community and the environment. Revision of cropping patterns with a focus on restoring soil fertility, combating land degradation and reducing dependence on rainfall is a necessary reform for agriculture in this region. For example, planting leguminous crops and thirsty and land-draining crops like cotton in rotation, and producing barley instead of wheat in regions with relatively more aridity and less irrigation infrastructure can

be instrumental in restoring land fertility and saving water.

Extensive development of water-saving infrastructure can prove to be vital in reducing excessive dependence of agriculture on rainfall. Instead of using the traditional gravity irrigation systems, drip and sprinkler methods can be promoted actively through government agencies, NGOs and farmers' organizations. Water, even for irrigation and industrial purposes, is subsidized in the hydro-insecure regions. While it causes losses on the supply side, it does not contribute to financial benefit of the farmers, especially small ones. It also does not provide any incentive to practice efficient water-conserving techniques and produce water-friendly crops. In such a scenario, the government can transfer its funds from subsidising tariffs to providing extensive water-conserving irrigation infrastructure at subsidized rates or even for free.

6. Regional Cooperation in the Middle East

Hydro-insecurity is not merely an internal problem of Iraq, Jordan, Lebanon, Syria and Turkey. It is also a challenge at the broader regional level in the Middle East. As pointed out earlier in this paper, one third of the governorates are in the border area. Therefore, problems in one governorate can easily get transferred to another one across the border. It is therefore imperative that the crisis of survival for the hydro-insecure should be treated as a regional challenge for the entire Middle East.

A regional challenge needs a regional response underpinned by regional cooperation. It is important to examine how water can be converted from a potential source of crisis into a potential instrument of cooperation and comprehensive peace. Agreements between countries to manage water courses in a sustainable and collaborative manner are the need of the hour. They can begin with exchange of data since we can only manage

what we know, and progress to calibration of data, harmonisation of standards, exchange of technology, joint capacity building, joint planning of projects and investments, collaborative response to climate change and protection of water courses from a wide range of risks. These risks include pollution undermining the quality of water, increase in salinity, and as observed in parts of Iraq and Syria in 2014, the control of water assets by illegitimate violent groups and terrorist organisations. Such a complex menu of cooperation requires interaction at all levels from technical experts to senior political leaders. Indeed, political will is a prerequisite for collaborative response to the crisis of survival faced by the hydro-insecure.

The Blue Peace framework makes a positive, pro-active and political process possible. It involves engaging mainstream political actors in the trans-boundary water discourse, setting up innovative regional water cooperation mechanisms and facilitating exchange between water and other needs to integrate water into the social and economic system. This paper demonstrates why the Blue Peace should not only focus on high political agenda of large projects that impact trans-boundary water flows but also include the hydro-insecure who face crisis of survival. It is essential to understand the risks associated with neglecting the hydro-insecure and craft policy solutions at all levels.



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